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A home-based, carer-enhanced exercise program improves balance and falls efficacy in community-dwelling older people with dementia

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Abstract

BACKGROUND: Older people with dementia are at increased risk of physical decline and falls. Balance and mood are significant predictors of falls in this population. The aim of this study was to determine the effect of a tailored home-based exercise program in community-dwelling older people with dementia.

METHODS: Forty-two participants with mild to moderate dementia were recruited from routine health services. All participants were offered a six-month home-based, carer-enhanced, progressive, and individually tailored exercise program. Physical activity, quality of life, physical, and psychological assessments were administered at the beginning and end of the trial.

RESULTS: Of 33 participants (78.6%) who completed the six-month reassessment ten (30%) reported falls and six (18%) multiple falls during the follow-up period. At reassessment, participants had better balance (sway on floor and foam), reduced concern about falls, increased planned physical activity, but worse knee extension strength and no change in depression scores. The average adherence to the prescribed exercise sessions was 45% and 22 participants (52%) were still exercising at trial completion. Those who adhered to $\geq 70\%$ of prescribed sessions had significantly better balance at reassessment compared with those who adhered to $< 70\%$ of sessions.

CONCLUSIONS: This trial of a tailored home-based exercise intervention presents preliminary evidence that this intervention can improve balance, concern about falls, and planned physical activity in community-dwelling older people with dementia. Future research should determine whether exercise interventions are effective in reducing falls and elucidate strategies for enhancing uptake and adherence in this population.

PDF Y Endnote Y

Age-related changes in force control under different task contexts

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Abstract

We investigated age-related differences in motor behavior under different task contexts of isometric force control. The tasks involved rapid force production and force maintenance, either separately or in combination. For the combined context, we used Fitts-like tasks, in which we scaled either the force level (D manipulation, i.e., manipulation of the amplitude of the force to be produced) or the tolerance range (W manipulation, i.e., manipulation of the target width in which force is allowed to

fluctuate). We studied two age groups and analyzed mainly variables that quantify behavioral variability (SD), information processing (signal-to-noise ratio and efficiency functions), and age-related slowing (slowing ratio). For rapid force control, age-related differences were more pronounced when preplanned processes were primarily involved, that is, in the rapid force production and Fitts-D manipulation tasks. Further, older adults were comparable to the younger adults in terms of end-point variability at the cost of being slower and more variable in timing. For force maintenance control, requiring mainly online control, age-related differences were the most visible in the stabilized phase of Fitts-D manipulation, followed by Fitts-W manipulation for SD, and then the force maintenance task. In sum, our findings reveal an age-related reorganization of how preplanned and online control processes are combined under different force control contexts. Indeed, both behavioral slowing and the overreliance on online control processes seem to be dependent on the task. In this respect, beyond the study of force control, we show the interest of investigating age effects using functionally different tasks.

PDF Y Endnote Y

Effect of geriatric-specific trauma triage criteria on outcomes in injured older adults: a statewide retrospective cohort study

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J. Am. Geriatr. Soc. 2016; ePub(ePub): ePub.

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(Copyright © 2016, John Wiley and Sons)

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Abstract

OBJECTIVES: To evaluate the effect on outcomes of the Ohio Department of Public Safety statewide geriatric triage criteria, established in 2009 for emergency medical services (EMS) to use for injured individuals aged 70 and older.

DESIGN: Retrospective cohort study of the Ohio Trauma Registry.

SETTING: All hospitals in Ohio.

PARTICIPANTS: Individuals aged 70 and older in the Ohio Trauma Registry from January 2006 through December 2011, 3 years before and 3 years after criteria adoption (N = 34,499).

MEASUREMENTS: Primary outcomes were in-hospital mortality and discharge to home. Criteria effects were assessed using chi-square tests, multivariable logistic regression, interrupted time series plots, and multivariable segmented regression models.

RESULTS: After geriatric criteria were adopted, the proportion of older adults qualifying for trauma center transport increased from 44% to 58%, but EMS transport rates did not change (44% vs 45%). There was no difference in unadjusted mortality (7.1% vs 6.6%) (P = .10). In adjusted analyses, subjects with an injury severity score (ISS) less than 10 had lower mortality after adoption (3.0% vs 2.5%) (odds ratio (OR) = 0.81, 95% confidence interval (CI) = 0.70-0.95, P = .01). Discharge to home increased after adoption in the adjusted analysis (OR = 1.06, 95% CI = 1.01-1.11, P = .02). There were no time-dependent changes for either outcome.

CONCLUSION: Although the proportion of older adults meeting criteria for trauma center transport substantially increased with geriatric triage criteria, there were no increases in trauma center transports. Adoption of statewide geriatric triage guidelines did not decrease mortality in more

severely injured older adults but was associated with slightly lower mortality in individuals with mild injuries (ISS <10) and with more individuals discharged to home. Improving outcomes in injured older adults will require further attention to implementation and use of geriatric-specific criteria.
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PDF Endnote Y

Eye movements affect postural control in young and older females

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Abstract

Visual information is used for postural stabilization in humans. However, little is known about how eye movements prevalent in everyday life interact with the postural control system in older individuals. Therefore, the present study assessed the effects of stationary gaze fixations, smooth pursuits, and saccadic eye movements, with combinations of absent, fixed and oscillating large-field visual backgrounds to generate different forms of retinal flow, on postural control in healthy young and older females. Participants were presented with computer generated visual stimuli, whilst postural sway and gaze fixations were simultaneously assessed with a force platform and eye tracking equipment, respectively. The results showed that fixed backgrounds and stationary gaze fixations attenuated postural sway. In contrast, oscillating backgrounds and smooth pursuits increased postural sway. There were no differences regarding saccades. There were also no differences in postural sway or gaze errors between age groups in any visual condition. The stabilizing effect of the fixed visual stimuli show how retinal flow and extraocular factors guide postural adjustments. The destabilizing effect of oscillating visual backgrounds and smooth pursuits may be related to more challenging conditions for determining body shifts from retinal flow, and more complex extraocular signals, respectively. Because the older participants matched the young group's performance in all conditions, decreases of posture and gaze control during stance may not be a direct consequence of healthy aging. Further research examining extraocular and retinal mechanisms of balance control and the effects of eye movements, during locomotion, is needed to better inform fall prevention interventions.

PDF Y Endnote Y

Fall risk assessment predicts fall-related injury, hip fracture, and head injury in older adults

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J. Am. Geriatr. Soc. 2016; ePub(ePub): ePub.

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Abstract

OBJECTIVES: To investigate the role of a fall risk assessment, using the Downton Fall Risk Index (DFRI), in predicting fall-related injury, fall-related head injury and hip fracture, and death, in a large

cohort of older women and men residing in Sweden.

DESIGN: Cross sectional observational study.

SETTING: Sweden.

PARTICIPANTS: Older adults (mean age 82.4 ± 7.8) who had a fall risk assessment using the DFRI at baseline (N = 128,596).

MEASUREMENTS: Information on all fall-related injuries, all fall-related head injuries and hip fractures, and all-cause mortality was collected from the Swedish Patient Register and Cause of Death Register. The predictive role of DFRI was calculated using Poisson regression models with age, sex, height, weight, and comorbidities as covariates, taking time to outcome or end of study into account.

RESULTS: During a median follow-up of 253 days (interquartile range 90-402 days) (>80,000 patient-years), 15,299 participants had a fall-related injury, 2,864 a head injury, and 2,557 a hip fracture, and 23,307 died. High fall risk (DFRI ≥ 3) independently predicted fall-related injury (hazard ratio (HR) = 1.43, 95% confidence interval (CI) = 1.39-1.49), hip fracture (HR = 1.51, 95% CI = 1.38-1.66), head injury (HR = 1.12, 95% CI = 1.03-1.22), and all-cause mortality (HR = 1.39, 95% CI = 1.35-1.43). DFRI more strongly predicted head injury (HR = 1.29, 95% CI = 1.21-1.36 vs HR = 1.08, 95% CI = 1.04-1.11) and hip fracture (HR = 1.41, 95% CI = 1.30-1.53 vs HR = 1.08, 95% CI = 1.05-1.11) in 70-year old men than in 90-year old women (P < .001).

CONCLUSION: Fall risk assessment using DFRI independently predicts fall-related injury, fall-related head injury and hip fracture, and all-cause mortality in older men and women, indicating its clinical usefulness to identify individuals who would benefit from interventions.

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Falls risk assessment outcomes and factors associated with falls for older Indigenous Australians

Hill KD, Flicker L, Logiudice D, Smith K, Atkinson D, Hyde Z, Fenner S, Skeaf L, Malay R, Boyle E.

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Abstract

OBJECTIVE: To describe the prevalence of falls and associated risk factors in older Indigenous Australians, and compare the accuracy of validated falls risk screening and assessment tools in this population in classifying fall status.

METHOD: Cross-sectional study of 289 Indigenous Australians aged ≥ 45 years from the Kimberley region of Western Australia who had a detailed assessment including self-reported falls in the past year (n=289), the adapted Elderly Falls Screening Tool (EFST; n=255), and the Falls Risk for Older People-Community (FROP-Com) screening tool (3 items, n=74) and FROP-Com falls assessment tool (n=74).

RESULTS: 32% of participants had ≥ 1 fall in the preceding year, and 37.3% were classified high falls risk using the EFST (cut-off ≥ 2). In contrast, for the 74 participants assessed with the FROP-Com, only 14.9% were rated high risk, 35.8% moderate risk, and 49.3% low risk. The FROP-Com screen and assessment tools had the highest classification accuracy for identifying fallers in the preceding year (area under curve >0.85), with sensitivity/specificity highest for the FROP-Com assessment (cut-off

≥12), sensitivity=0.84 and specificity=0.73.

CONCLUSIONS: Falls are common in older Indigenous Australians. The FROP-Com falls risk assessment tool appears useful in this population, and this research suggests changes that may improve its utility further.

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Fear of falling correlates with subtle neuromuscular balance and strength deficits of fragility fracture patients

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Abstract

Fragility fractures, or fractures occurring from a low-trauma event, are extremely prevalent among the elderly population worldwide and associated with significant mortality and morbidity. This study evaluated the relationship between FES-I Fear of Falling Survey results, self-reported activity restrictions via the SF-36 survey, and scores recorded by portable, inexpensive clinical assessment tools (CATs) during dynamic functional tasks. Low scores during these tasks may indicate functional deficits that put patients at risk for falls and subsequent fragility fractures. Forty-one subjects (20 fragility fracture patients, 21 controls without history of fragility fractures) over the age of 50 were recruited from three outpatient orthopaedic clinics. All subjects were administered a FES-I Fear of Falling Survey, a portion of an SF-36 survey, and tested using three different portable CATs: the Wii Balance Board, iPod Level Belt and Saehan Squeeze Hand Grip Dynamometer. There were several measured variables that showed a moderate correlation with Fear of Falling scores. Of note, correlations between FES-I scores and maximum hand grip strength for both the dominant hand ($R = -0.302$, $p = 0.069$) and non-dominant hand ($R = -0.309$, $p = 0.059$), as well as maximum anterior-posterior sway measured by the iPod Level Belt ($R = 0.320$, $p = 0.056$) were found to be marginally significant. In addition, the correlation between FES-I and average anterior-posterior sway was found to be significant ($R = 0.416$, $p = 0.012$). The Nintendo Wii and iPod Level Belt are relatively inexpensive, portable tools that can assess patients for subtle deficits during dynamic functional tasks. The results indicate that these tools can provide a more objective measure of a patient's limitations during daily activities such as walking by assigning them a numerical value and correlating this value to physical deficits that impact balance and coordination. In the future, CATs may also have a role in predicting outcomes and in individualizing care, therapy, and at-home preventive measures.

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Geriatric falls in the context of a hospital fall prevention program: delirium, low body mass index, and other risk factors

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Abstract

BACKGROUND: Inpatient geriatric falls are a frequent complication of hospital care that results in significant morbidity and mortality.

OBJECTIVE: Evaluate factors associated with falls in geriatric inpatients after implementation of the fall prevention program.

METHODS: Prospective observational study comprised of 788 consecutive patients aged 79.5 ± 7.6 years ([Formula: see text] \pm standard deviation) (66% women and 34% men) admitted to the subacute geriatric ward. Comprehensive geriatric assessment (including Mini-Mental State Examination, Barthel Index of Activities of Daily Living, and modified Get-up and Go Test) was performed. Confusion Assessment Method was used for diagnosis of delirium. Patients were categorized into low, moderate, or high fall risk groups after clinical and functional assessment.

RESULTS: About 15.9%, 21.1%, and 63.1% of participants were classified into low, moderate, and high fall risk groups, respectively. Twenty-seven falls were recorded in 26 patients. Increased fall probability was associated with age ≥ 76 years ($P < 0.001$), body mass index (BMI) < 23.5 ($P = 0.007$), Mini-Mental State Examination < 20 ($P = 0.004$), Barthel Index < 65 ($P = 0.002$), hemoglobin < 7.69 mmol/L ($P = 0.017$), serum protein < 70 g/L ($P = 0.008$), albumin < 32 g/L ($P = 0.001$), and calcium level < 2.27 mmol/L. Four independent factors associated with fall risk were included in the multivariate logistic regression model: delirium (odds ratio [OR] = 7.33; 95% confidence interval [95% CI] = 2.76-19.49; $P < 0.001$), history of falls (OR = 2.55; 95% CI = 1.05-6.19; $P = 0.039$), age (OR = 1.14; 95% CI = 1.05-1.23; $P = 0.001$), and BMI (OR = 0.91; 95% CI = 0.83-0.99; $P = 0.034$).

CONCLUSION: Delirium, history of falls, and advanced age seem to be the primary risk factors for geriatric falls in the context of a hospital fall prevention program. Higher BMI appears to be associated with protection against inpatient geriatric falls.

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Injuries in adults 65 years of age and older prescribed muscle relaxants

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Abstract

OBJECTIVE: The Beers criteria list skeletal muscle relaxants (SMR) as inappropriate for individuals 65 years of age and older because of anticholinergic effects, sedation, and risk of falls/fractures.

Patients 65 years of age and older presenting to U.S. primary care clinics for injury, prescribed an SMR, are at risk for these events. SMR prescribing patterns in older adults with injury have not been well studied at the population level. Using nationally representative data, the prevalence of older adults prescribed an SMR presenting to U.S. primary care clinics with injury was examined.

DESIGN: A cross-sectional study analyzing 2012 National Ambulatory Medical Care Survey (NAMCS) data using bivariate and multivariate techniques. NAMCS, a nationally representative database of the U.S. population, collects data from primary care office visits and uses a multi-stage sampling strategy.

SETTING: Primary care offices throughout the United States.

PATIENTS, PARTICIPANTS: Adults 65 years of age and older, presenting to rural primary care clinics with injury.

MAIN OUTCOME MEASURE(S): Prescription for SMR.

RESULTS: Multivariate analysis yielded that the study population presenting to rural clinics for injury had 28% greater odds, non-Caucasian adults had 11% greater odds, and those who had been seen at least twice in the past 12 months had 34% greater odds of being prescribed an SMR. Logistic regression analysis also yielded that females 65 to 74 years of age had greater odds of having a prescription for an SMR.

CONCLUSION: The results of this study identified disparities among adults 65 years of age and older presenting to U.S. rural primary care clinics with injury and prescribed an SMR. Adults 65 years of age and older, Collaborative.

PDF N Endnote Y

Reduction of falls and fractures after permanent pacemaker implantation in elderly patients with sinus node dysfunction

Brenner R, Ammann P, Yoon SI, Christen S, Hellermann J, Girod G, Knaus U, Duru F, Krasniqi N, Ramsay D, Sticherling C, Lippuner K, Kühne M.

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DOI 10.1093/europace/euw156 **PMID** 27702858

Abstract

AIMS: Elderly patients with sinus node dysfunction (SND) are at increased risk of falls with possible injuries. However, the incidence of these adverse events and its reduction after permanent pacemaker (PPM) implantation are not known.

METHODS AND RESULTS: Eighty-seven patients (mean [SD] age 75.4 [8.3] years, 51% women) with SND and an indication for cardiac pacing were included and were examined by a standardized interview targeting fall history. The incidence and total number of falls, falls with injury, falls requiring treatment, and falls resulting in a fracture were assessed for the time period of 12 months before (retrospectively) and after PPM implantation (prospectively). Furthermore, symptoms such as syncope, dizziness, and dyspnea were evaluated before and after PPM implantation. The implantation of a PPM was associated with a reduced proportion of patients experiencing at least one fall by 71% (from 53 to 15%, $P < 0.001$) and a reduction of the absolute number of falls by 90% (from 127 to 13, $P < 0.001$) during the 12 months before vs. after PPM implant. Falls with injury (28 vs. 10%, $P = 0.005$), falls requiring medical attention (31 vs. 8%, $P < 0.001$), and falls leading to fracture (8 vs. 0%, $P = 0.013$) were similarly reduced. Notably, fewer patients had syncope (4 vs. 45%, $P < 0.001$) and dizziness after PPM implantation (12 vs. 45%, $P < 0.001$).

CONCLUSION: Falls, fall-related injuries, and fall-related fractures are frequent in SND patients. Permanent pacemaker implantation is associated with a significantly reduced risk of these adverse events, although no causal relationship could be established due to the study design.

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Risk factors for recurrent injurious falls that require hospitalization for older adults with dementia: a population based study

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(Copyright © 2016, BioMed Central)

DOI 10.1186/s12883-016-0711-3 **PMID** 27687085

Abstract

BACKGROUND: Older adults with dementia are at an increased risk of falls, however, little is known about risk factors for recurrent injurious falls (a subsequent fall after the first fall has occurred) among this group. This study aimed to identify risk factors for recurrent injurious falls requiring hospitalization among adults aged 60+ years with dementia.

METHODS: This retrospective, whole-population cohort study was conducted using the Western Australian Hospital Morbidity Data System and Western Australian Death Registrations from 2001 to 2013. Survival analysis using a stratified conditional Cox model (type 1) was undertaken to identify risk factors for recurrent injurious falls requiring hospitalization.

RESULTS: There were 32,519 participants with an index hospital admission with dementia during the study period. Over 27 % (n = 8970) of the cohort experienced a total of 11,073 injurious falls requiring hospitalization during follow up with 7297 individuals experiencing a single fall, 1330 experiencing two falls and 343 experiencing three or more falls. The median follow-up time for each individual was 2.49 years. Females were at a significantly increased risk of 7 % for recurrent injurious falls resulting in hospitalization (adjusted hazard ratio 1.07, 95 % CI 1.01-1.12), compared to males. Increasing age, living in rural areas, and having an injurious fall in the year prior to the index hospital admission with dementia also increased the risk of recurrent injurious falls resulting in hospitalization.

CONCLUSIONS: Screening those with dementia for injurious falls history could help to identify those most at risk of recurrent injurious falls. Improvement of health care and falls prevention services for those with dementia who live in rural areas may also reduce recurrent injurious falls.

PDF Y Endnote Y

The direct costs of fatal and non-fatal falls among older adults - United States

Burns ER, Stevens JA, Lee R.

J. Saf. Res. 2016; 58: 99-103.

Affiliation: National Center for Injury Prevention and Control, Centers for Disease Control and Prevention, Atlanta, GA, USA.

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DOI 10.1016/j.jsr.2016.05.001 **PMID** 27620939

Abstract

INTRODUCTION: This study sought to estimate the incidence, average cost, and total direct medical costs for fatal and non-fatal fall injuries in hospital, ED, and out-patient settings among U.S. adults

aged 65 or older in 2012, by sex and age group and to report total direct medical costs for falls inflated to 2015 dollars.

METHOD: Incidence data came from the 2012 National Vital Statistics System, 2012 Healthcare Cost and Utilization Project-Nationwide Inpatient Sample, 2012 Health Care Utilization Program National Emergency Department Sample, and 2007 Medical Expenditure Panel Survey. Costs for fatal falls were derived from the Centers for Disease Control and Prevention's Web-based Injury Statistics Query and Reporting System; costs for non-fatal falls were based on claims from the 1998/1999 Medicare fee-for-service 5% Standard Analytical Files. Costs were inflated to 2015 estimates using the health care component of the Personal Consumption Expenditure index.

RESULTS: In 2012, there were 24,190 fatal and 3.2 million medically treated non-fatal fall related injuries. Direct medical costs totaled \$616.5 million for fatal and \$30.3 billion for non-fatal injuries in 2012 and rose to \$637.5 million and \$31.3 billion, respectively, in 2015. Fall incidence as well as total cost increased with age and were higher among women.

CONCLUSION: Medically treated falls among older adults, especially among older women, are associated with substantial economic costs. **PRACTICAL APPLICATION:** Widely implementing evidence-based interventions for fall prevention is essential to decrease the incidence and healthcare costs associated with these injuries.

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PDF Y Endnote Y

The impact of Strong for Life on the physical functioning and health of older adults receiving home and community-based services

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DOI unavailable **PMID** 27695646

Abstract

BACKGROUND/OBJECTIVES: To test the effects of Strong for Life (SFL) on the physical performance and self-rated health of older adults receiving Home and Community-Based Services (HCBS).

DESIGN: Randomized, two-group trial with pre-post measures.

SETTING: In-home exercise program. **PARTICIPANTS:** Clients aged 65-95 (n=42) and their Home Care Aide (HCA) (n=32) were randomly assigned to a usual care and SFL intervention or usual care control group.

INTERVENTION: Clients were instructed in SFL by their HCA and completed SFL 3 times per week for 12-weeks. **MEASUREMENTS:** Outcomes included grip and quadriceps strength, Timed Up and Go, gait speed, Self-Efficacy for Exercise, pain, and PROMIS-global health measured at baseline and immediately following the intervention. Clients completed opened ended survey items on SFL program evaluation.

RESULTS: Effect sizes were moderate for grip strength (d=.38), pain (d=.34), and PROMIS-global health (d=.27). Small effect sizes were found for all other measures. Median quadriceps and TUG scores differentially improved among intervention participants versus controls. No adverse health events and high program satisfaction were reported. Frailty prevalence in the control group increased between baseline and post-test while frailty prevalence in the intervention group

decreased during the same time period.

CONCLUSION: Strong for Life has the potential to improve the strength, mobility, health, and frailty of older adults receiving HCBS. This study provides initial evidence of the impact of SFL for older adults receiving HCBS, as well as the safety of the intervention evidenced by the lack of reported adverse events.

PDF N Endnote Y

Variability of the modified Balance Error Scoring System at baseline using objective and subjective balance measures

Starling AJ, Leong DF, Bogle JM, Vargas BB.

Concussion 2016; 1(1): e5.

(Copyright © 2016, The Drake Foundation, Publisher Future Medicine)

DOI 10.2217/cnc.15.5 **PMID** unavailable

Abstract

AIM: To investigate preseason modified Balance Error Scoring System (mBESS) performance in a collegiate football cohort; to compare scores to an objective mobile balance measurement tool.

Materials & methods: Eighty-two athletes completed simultaneous balance testing using mBESS and the King-Devick Balance Test, an objective balance measurement tool. Errors on mBESS and objective measurements in the double-leg, single-leg (SS) and tandem stances were compared.

RESULTS: Mean mBESS error score was 7.23 ± 4.65 . The SS accounted for 74% of errors and 21% of athletes demonstrated the maximum error score. There was no significant correlation between mBESS score and objective balance score.

CONCLUSION: The high variability and large number of errors in the SS raises concerns over the utility of the SS in identifying suspected concussion.

PDF Y Endnote Y

Walking up to one hour per week maintains mobility as older women age: findings from an Australian longitudinal study

Field B, Cochrane T, Davey R, Kinfu Y.

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(Copyright © 2016, Human Kinetics Publishers)

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Abstract

The aim of this study was to identify determinants of walking and whether walking maintained mobility among women as they transition from their mid-70s to their late 80s. We used 12 years of follow-up data (baseline 1999) from the Australian Longitudinal Study on Women's Health (n=10,322). Fifteen determinants of walking were included in the analysis and three indicators of mobility. Longitudinal data analyses techniques were employed. Thirteen of the 15 determinants were significant predictors of walking. Women in their mid-70s who walked up to one hour per week were less likely to experience loss of mobility in very old age, including reduced likelihood of using a mobility aid. Hence, older women who do no walking should be encouraged to walk to maintain

their mobility and their independence as they age, particularly women in their 70s and 80s who smoke, are overweight, have arthritis or who have had a recent fall.

PDF Y Endnote Y

A survey exploring self-reported indoor and outdoor footwear habits, foot problems and fall status in people with stroke and Parkinson's

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J. Foot Ankle Res. 2016; 9: e39.

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Abstract

BACKGROUND: Ill-fitting shoes have been implicated as a risk factor for falls but research to date has focused on people with arthritis, diabetes and the general older population; little is known about people with neurological conditions. This survey for people with stroke and Parkinson's explored people's choice of indoor and outdoor footwear, foot problems and fall history.

METHODS: Following ethical approval, 1000 anonymous postal questionnaires were distributed to health professionals, leads of Parkinson's UK groups and stroke clubs in the wider Southampton area, UK. These collaborators handed out survey packs to people with a confirmed diagnosis of stroke or Parkinson's.

RESULTS: Three hundred and sixty three completed surveys were returned (218 from people with Parkinson's and 145 from people with stroke). Most respondents wore slippers indoors and walking shoes outdoors and considered comfort and fit the most important factors when buying footwear. Foot problems were reported by 43 % (95 % confidence intervals 36 to 52 %; stroke) and 53 % (95 % confidence interval 46 to 59 %; Parkinson's) of respondents; over 50 % had never accessed foot care support. Fifty percent of all respondents reported falls. In comparison to non-fallers, a greater proportion of fallers reported foot problems (57 %), with greater proportions reporting problems impacting on balance and influencing choice of footwear ($p < 0.01$) in comparison to non-fallers in each case. Forty-seven percent of fallers with foot problems had not accessed foot care support.

CONCLUSIONS: Many people with stroke and Parkinson's wear slippers indoors. A high percentage of these individuals reported both foot problems and falls impacting on footwear habits and choice of footwear; however many did not receive foot care support. These findings highlight that further exploration of footwear and foot problems in these populations is warranted to provide evidence based advice on safe and appropriate footwear to support rehabilitation and fall prevention.

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Anticipatory postural control of stability during gait initiation over obstacles of different height and distance made under reaction-time and self-initiated instructions

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Abstract

Despite the abundant literature on obstacle crossing in humans, the question of how the central nervous system (CNS) controls postural stability during gait initiation with the goal to clear an obstacle remains unclear. Stabilizing features of gait initiation include anticipatory postural adjustments (APAs) and lateral swing foot placement. To answer the above question, 14 participants initiated gait as fast as possible in three conditions of obstacle height, three conditions of obstacle distance and one obstacle-free (control) condition. Each of these conditions was performed with two levels of temporal pressure: reaction-time (high-pressure) and self-initiated (low-pressure) movements. A mechanical model of the body falling laterally under the influence of gravity and submitted to an elastic restoring force is proposed to assess the effect of initial (foot-off) center-of-mass position and velocity (or "initial center-of-mass set") on the stability at foot-contact. RESULTS showed that the anticipatory peak of mediolateral (ML) center-of-pressure shift, the initial ML center-of-mass velocity and the duration of the swing phase, of gait initiation increased with obstacle height, but not with obstacle distance. These results suggest that ML APAs are scaled with swing duration in order to maintain an equivalent stability across experimental conditions. This statement is strengthened by the results obtained with the mechanical model, which showed how stability would be degraded if there was no adaptation of the initial center-of-mass set to swing duration. The anteroposterior (AP) component of APAs varied also according to obstacle height and distance, but in an opposite way to the ML component. Indeed, results showed that the anticipatory peak of backward center-of-pressure shift and the initial forward center-of-mass set decreased with obstacle height, probably in order to limit the risk to trip over the obstacle, while the forward center-of-mass velocity at foot-off increased with obstacle distance, allowing a further step to be taken. These effects of obstacle height and distance were globally similar under low and high-temporal pressure. Collectively, these findings imply that the CNS is able to predict the potential instability elicited by the obstacle clearance and that it scales the spatiotemporal parameters of APAs accordingly.

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External validation of a 3-step falls prediction model in mild Parkinson's disease

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Abstract

The 3-step falls prediction model (3-step model) that include history of falls, history of freezing of gait and comfortable gait speed <1.1 m/s was suggested as a clinical fall prediction tool in Parkinson's disease (PD). We aimed to externally validate this model as well as to explore the value of additional predictors in 138 individuals with relatively mild PD. We found the discriminative ability of the 3-step model in identifying fallers to be comparable to previously studies [area under curve (AUC), 0.74; 95 % CI 0.65-0.84] and to be better than that of single predictors (AUC, 0.61-0.69). Extended analyses generated a new model for prediction of falls and near falls (AUC, 0.82; 95 % CI 0.75-0.89) including history of near falls, retropulsion according to the Nutt Retropulsion test (NRT) and tandem gait (TG). This study confirms the value of the 3-step model as a clinical falls prediction

tool in relatively mild PD and illustrates that it outperforms the use of single predictors. However, to improve future outcomes, further studies are needed to firmly establish a scoring system and risk categories based on this model. The influence of methodological aspects of data collection also needs to be scrutinized. A new model for prediction of falls and near falls, including history of near falls, TG and retropulsion (NRT) may be considered as an alternative to the 3-step model, but needs to be tested in additional samples before being recommended. Taken together, our observations provide important additions to the evidence base for clinical fall prediction in PD.

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Gait and balance assessment

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Abstract

Gait and balance deficits are commonly experienced by individuals with a variety of neurologic disorders. These deficits can be particularly frustrating because they often profoundly impact a person's quality of life. The author applies information about gait and balance based on the neurologic examination and summarizes important relationships among common impairment measures of gait and balance deficits. She also provides an interpretation of these relationships to assist the clinician in how to identify and manage gait and balance deficits.

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Gait deficits in people with multiple sclerosis: a systematic review and meta-analysis

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Abstract

BACKGROUND: Multiple Sclerosis (MS) results in postural instability and gait abnormalities which are associated with accidental falls.

OBJECTIVE: This systematic review and meta-analysis aims to quantify the effect of MS on gait to inform the development of falls prevention interventions.

METHODS: A systematic literature search identified case-control studies investigating differences in gait variables between people with MS and healthy controls. Meta-analysis examined the effect of MS on gait under normal and fast paced conditions.

RESULTS: Forty-one studies of people with Expanded Disability Status Scale (EDSS) 1.8 to 4.5 were included, of which 32 contributed to meta-analysis. A large effect of MS was found on stride length (Standardised Mean Difference, SMD=1.27, 95% CI{0.93, 1.61}), velocity (SMD=1.12, 95% CI{0.85, 1.39}), double support duration (SMD=0.85, 95% CI{0.51, 1.2}), step length (SMD=1.15, 95% CI{0.75, 1.5}) and swing phase duration (SMD=1.23, 95% CI{0.06, 2.41}). A moderate effect was found on step

width and stride time with the smallest effect found on cadence (SMD=0.43, 95% CI{0.14, 0.72}). All effect sizes increased for variables investigated under a fast walking pace condition (for example the effect on cadence increased to SMD=1.15, 95% CI{0.42, 1.88}).

CONCLUSIONS: MS has a significant effect on gait even for those with relatively low EDSS. This effect is amplified when walking at faster speeds suggesting this condition may be more beneficial for assessment and treatment. No studies investigated the association between these deficits and falls. Further investigation relating to the predictive or protective nature of these deficits in relation to falls is warranted.

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Perceiving slipperiness and grip: a meaningful relationship of the shoe-ground interface

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Abstract

The present study investigated the relationship between objective measurements of the available (CoFA), the utilized (CoFU) coefficient of friction and subjective perception of grip or slipperiness. It was hypothesized that significant correlations exist between the perception of grip or slip and the CoF during sports movement and that a minimum CoF was needed to ensure an optimal grip/slipperiness perception. Eighteen healthy active females performed forward and backward cutting tasks onto a forceplate. Six shoes and two floors were used to induce different grip conditions. Subjective ratings and CoFU were assessed for each shoe-floor combination, and mechanical CoFA was also measured in a specific test bed. Significant relationships ($p < 0.001$) were found between grip, slipperiness ratings or CoFA with the CoFU ($r = 0.98$, $r = -0.97$, $r = 0.88$, respectively). Individual sensory thresholds of the minimum required CoFU were also determined using probit models between the CoFU and the grip acceptability. The mean threshold defined in the present study was 0.70 ± 0.11 . This meant that below this threshold, the grip perception was not acceptable, whereas above this threshold, the grip was felt good enough to perform the task. In conclusion, strong relationships between subjective perceptions and objective measurements of friction were found in sports-like movements. Moreover, a minimum friction requirement was defined for indoor dry shoe-floor conditions. The present study gives new insights of the shoe-floor interaction and outlines friction requirements for the manufacturers of sports floor or footwear.

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