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A combination of clinical balance measures and FRAX® to improve identification of high-risk fallers

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Abstract

BACKGROUND: The FRAX® algorithm quantifies a patient's 10-year probability of a hip or major osteoporotic fracture without taking an individual's balance into account. Balance measures assess the functional ability of an individual and the FRAX® algorithm is a model that integrates the individual patients clinical risk factors [not balance] and bone mineral density. Thus, clinical balance measures capture aspects that the FRAX® algorithm does not, and vice versa. It is therefore possible that combining FRAX® and clinical balance measures can improve the identification of patients at high fall risk and thereby high fracture risk. Our study aim was to explore whether there is an association between clinical balance measures and fracture prediction obtained from FRAX®.

METHOD: A cross-sectional study design was used where post hoc was performed on a dataset of 82 participants (54 to 89 years of age, mean age 71.4, 77 female), with a fall-related wrist-fracture between 2008 and 2012. Balance was measured by tandem stance, standing one leg, walking in the figure of eight, walking heel to toe on a line, walking as fast as possible for 30 m and five times sit to stand balance measures [tandem stance and standing one leg measured first with open and then with closed eyes] and each one analyzed for bivariate relations with the 10-year probability values for hip and major osteoporotic fractures as calculated by FRAX® using Spearman's rank correlation test.

RESULTS: Individuals with high FRAX® values had poor outcome in balance measures; however the significance level of the correlation differed between tests. Standing one leg eyes closed had strongest correlation to FRAX® (0.610 $p < 0.01$) and Five times sit to stand was the only test that did not correlate with FRAX® (0.013).

CONCLUSION: This study showed that there is an association between clinical balance measures and FRAX®. Hence, the use of clinical balance measures and FRAX® in combination, might improve the identification of individuals with high risk of falls and thereby following fractures. Results enable healthcare providers to optimize treatment and prevention of fall-related fractures.

TRIAL REGISTRATION: The study has been registered in Clinical Trials.gov, registration number NCT00988572.

PDF Y Endnote Y

Age-related changes in gait adaptability in response to unpredictable obstacles and stepping targets

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Gait Posture 2016; 46: 35-41.

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Abstract

BACKGROUND: A large proportion of falls in older people occur when walking. Limitations in gait adaptability might contribute to tripping; a frequently reported cause of falls in this group.

OBJECTIVE: To evaluate age-related changes in gait adaptability in response to obstacles or stepping targets presented at short notice, i.e.: approximately two steps ahead.

METHODS: Fifty older adults (aged 74 ± 7 years; 34 females) and 21 young adults (aged 26 ± 4 years; 12 females) completed 3 usual gait speed (baseline) trials. They then completed the following randomly presented gait adaptability trials: obstacle avoidance, short stepping target, long stepping target and no target/obstacle (3 trials of each).

RESULTS: Compared with the young, the older adults slowed significantly in no target/obstacle trials compared with the baseline trials. They took more steps and spent more time in double support while approaching the obstacle and stepping targets, demonstrated poorer stepping accuracy and made more stepping errors (failed to hit the stepping targets/avoid the obstacle). The older adults also reduced velocity of the two preceding steps and shortened the previous step in the long stepping target condition and in the obstacle avoidance condition.

CONCLUSION: Compared with their younger counterparts, the older adults exhibited a more conservative adaptation strategy characterised by slow, short and multiple steps with longer time in double support. Even so, they demonstrated poorer stepping accuracy and made more stepping errors. This reduced gait adaptability may place older adults at increased risk of falling when negotiating unexpected hazards.

PDF Y Endnote Y

Assessment of falls in older people: is there any association between restless leg syndrome and falls?

Silay K, Özkaya H, Yalçın A, Akıncı S, Ulaş A, Öztürk E, Canbaz M, Yalçın B.

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Abstract

OBJECTIVES: The fall risk increases in the elderly due to comorbidities and age. Restless legs syndrome (RLS) might be a potential risk factor since it is a sensorimotor disorder. It is associated with paresthesias and motor restlessness which may cause sleep problems. The aim of this study is to evaluate the effect of restless legs syndrome on falls among geriatric patients and identify the other risk factors for falls.

MATERIALS AND METHODS: This is a cross sectional study including patients 65 years and older. The diagnosis of RLS was established with 2012 International Restless Legs Syndrome Study Group criteria. Patients were evaluated with comprehensive geriatric assessment. The association between falls and RLS and geriatric conditions was evaluated with binominal logistic regression analysis.

RESULTS: There were total 70 patients in the study. 44.3% of patients were living in the assisted living facility. There were 37 females. The rate of restless legs syndrome was shown 15.7%. The number of falls in the last one year was 24.3%. The rate of comorbidity and polypharmacy was 37.1% and 65.7% respectively. 21.4% patients were dependent on activities of daily living (ADL) and 40% had positive timed up and go (TUG) test. Possible depression and cognitive impairment rate was found 47.1% and 38.6 respectively. The association between falls and RLS and positive TUG test was

found statistically significant ($p=0.041$, $OR=6.59$ and $p=0.046$, $OR=6.31$).

CONCLUSION: Our study revealed that RLS is a risk factor for falls in elderly. It is essential to address and modify the underlying risk factors including RLS in older patients. This finding would increase the awareness of physicians about RLS as a risk factor for falls. Also the association between falls and positive TUG test has been found statistically significant. Our study suggests that performing TUG test should be an essential part of fall evaluation.

PDF Y Endnote Y

Association of mobility limitations with incident disability among older adults: a population-based study

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Age Ageing 2016; ePub(ePub): ePub.

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(Copyright © 2016, Oxford University Press)

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Abstract

BACKGROUND: mobility-related limitations predict future disability; however, the extent to which individual and combined mobility tests may predict disability remains unclear.

OBJECTIVES: to estimate the odds of developing disability in activities of daily living (ADL) according to limitations in walking speed, balance or both; and explore the role of chronic diseases and cognitive function.

DESIGN: a prospective cohort study.

SETTING: urban area of Stockholm, Sweden.

SUBJECTS: one thousand nine hundred and seventy-one disability-free persons (age ≥ 60 years, 63% women) from the Swedish National study on Aging and Care in Kungsholmen (SNAC-K), who underwent baseline examination in 2001-04 and follow-up assessments for 6 years.

MEASUREMENTS: mobility limitation was defined as a one-leg balance stand < 5 s or walking speed < 0.8 m/s. ADL disability was defined as the inability to complete one or more ADL: bathing, dressing, using the toilet, transferring and eating.

RESULTS: during a total of 11,404 person-years (mean per person 5.8 years, SD 0.30) of follow-up, 119 (incidence 1.5/100 person-years) participants developed ADL disability. The demographic adjusted odds ratios (OR) (95% confidence intervals, CI) of incident ADL disability related to balance stand and walking speed limitations were 3.8 (2.3-6.3) and 8.4 (5.2-13.3), respectively. The associations remained statistically significant after controlling for number of chronic diseases and cognitive status. People with limitations in both balance and walking speed had an OR of 12.9 (95% CI 7.0-23.7) for incident disability compared with no limitation.

CONCLUSION: balance and walking speed tests are simple clinical procedures that can indicate hierarchical risk of ADL dependence in older adults.

PDF Y Endnote Y

Attentional costs of walking are not affected by variations in lateral balance demands in young and older adults

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Gait Posture 2016; 46: 126-131.

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Abstract

Increased attentional costs of walking in older adults have been attributed to age-related changes in visuomotor and/or balance control of walking. The present experiment was conducted to examine the hypothesis that attentional costs of walking vary with lateral balance demands during walking in young and older adults. Twenty young and twenty older adults walked on a treadmill at their preferred walking speed under five conditions: unconstrained normal walking, walking on projected visual lines corresponding to either the participant's preferred step width or 50% thereof (i.e. increased balance demand), and walking within low- and high-stiffness lateral stabilization frames (i.e. lower balance demands). Attentional costs were assessed using a probe reaction-time task during these five walking conditions, normalized to baseline performance as obtained during sitting. Both imposed step-width conditions were more attentionally demanding than the three other conditions, in the absence of any other significant differences between conditions. These effects were similar in the two groups. The results indicate that the attentional costs of walking were, in contrast to what has been postulated previously, not influenced by lateral balance demands. The observed difference in attentional costs between normal walking and both visual lines conditions suggests that visuomotor control processes, rather than balance control, strongly affect the attentional costs of walking. A tentative explanation of these results may be that visuomotor control processes are mainly governed by attention-demanding cortical processes, whereas balance is regulated predominantly subcortically.

PDF Y Endnote Y

Carrying shopping bags does not alter static postural stability and gait parameters in healthy older females

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Gait Posture 2016; 46: 81-85.

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Abstract

Food shopping is an important aspect of maintaining independence and social interaction in older age. Carriage of shopping bags alters the body's weight distribution which, depending on load distribution, could potentially increase instability during standing and walking. The study examined the effect of carrying UK style shopping bags on static postural stability and gait in healthy older and young females. Nine older (71.0 ± 6.0 years) and 10 young (26.7 ± 5.2 years) females were assessed in five conditions carrying no bags, one 1.5kg bag in each hand, one 3kg bag in each hand, one 1.5kg bag in preferred hand, one 3kg bag in preferred hand. Antero-posterior and medio-lateral displacement, and 95% ellipse area from a 30s quiet standing were used for postural stability assessment. Stride length and its coefficient of variation, total double support time, step asymmetry and gait stability ratio were calculated from 1min treadmill walking at self-selected speed for gait assessment. Carrying shopping bags did not negatively affect postural stability or gait variables, in

either group. Further, in older individuals, a decrease in sway velocity was found when holding bags during the postural stability assessment ($p < 0.05$), suggesting that carriage of bags, irrespective of the load distribution, may have a stabilising effect during quiet standing. These results should help to alleviate concerns regarding safety of carrying shopping bags and help encourage shopping, both as a social and as a physical activity.

PDF Y Endnote Y

Challenges in assessment of the mild traumatic brain injured geriatric patient

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Injury 2016; 47(5): 985-987.

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Abstract [Abstract unavailable]

PDF Y Endnote Y

Comparison of seven fall risk assessment tools in community-dwelling Korean older women

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Ergonomics 2016; ePub(ePub): ePub.

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

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Abstract

This study aimed to compare seven widely used fall risk assessment tools in terms of validity and practicality, and to provide a guideline for choosing appropriate fall risk assessment tools for elderly Koreans. Sixty community-dwelling Korean older women (30 fallers and 30 matched non-fallers) were evaluated. Performance measures of all tools were compared between the faller and non-faller groups through two sample t-tests. Receiver Operating Characteristic curves were generated with odds ratios for discriminant analysis.

RESULTS showed that four tools had significant discriminative power, and the shortened version of Falls Efficacy Scale (SFES) showed excellent discriminant validity, followed by Berg Balance Scale (BBS) with acceptable discriminant validity. The Mini Balance Evaluation System Test and Timed Up and Go, however, had limited discriminant validities. In terms of practicality, SFES was also excellent. These findings suggest that SFES is the most suitable tool for assessing the fall risks of community-dwelling Korean older women, followed by BBS. Practitioner Summary: There is no general guideline on which fall risk assessment tools are suitable for community-dwelling Korean older women. This study compared seven widely used assessment tools in terms of validity and practicality.

RESULTS suggested that the short Falls Efficacy Scale is the most suitable tool, followed by Berg Balance Scale.

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Correlates of cognitive functioning in independent elderly patients discharged home from the emergency department after a minor injury

Ouellet MC, Sirois MJ, Beaulieu-Bonneau S, Gagné MÈ, Morin J, Perry J, Daoust R, Wilding L, Provencher V, Camden S, Allain-Boulé N, Emond M.

Int. Psychogeriatr. 2016; ePub(ePub): ePub.

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(Copyright © 2016, Cambridge University Press)

DOI 10.1017/S104161021600065X **PMID** 27109177

Abstract

BACKGROUND: The objective of this study was to explore correlates of cognitive functioning of older adults visiting the emergency department (ED) after a minor injury.

METHODS: These results are derived from a large prospective study in three Canadian EDs. Participants were aged ≥ 65 years and independent in basic activities of daily living, visiting the ED for minor injuries and discharged home within 48 hours (those with known dementia, confusion, and delirium were excluded). They completed the Montreal Cognitive Assessment (MoCA). Potential correlates included sociodemographic and injury variables, and measures of psychological and physical health, social support, mobility, falls, and functional status.

RESULTS: Multivariate analyses revealed that male sex, age ≥ 85 years, higher depression scores, slower walking speed, and self-reported memory problems were significantly associated with lower baseline MoCA scores.

CONCLUSIONS: These characteristics could help ED professionals identify patients who might need additional cognitive evaluations or follow-ups after their passage through the ED. Obtaining information on these characteristics is potentially feasible in the ED context and could help professionals alter favorably elderly's trajectory of care. Since a significant proportion of elderly patients consulting at an ED have cognitive impairment, the ED is an opportunity to prevent functional and cognitive decline.

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Cross-cultural educational intervention and fall risk awareness

Howard BS, Beitman CL, Walker BA, Moore ES.

Phys. Occup. Ther. Geriatrics 2016; 34(1): 1-20.

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DOI 10.3109/02703181.2015.1105344 **PMID** unavailable

Abstract

AIMS: To determine if a two-visit, personalized falls prevention educational intervention affected awareness of fall risk in community-dwelling older adults in Belize. Secondary aim: to assess new learning in a cross-cultural context and willingness to make lifestyle changes to reduce fall risk.

METHODS: A US-based team completed fall risk assessments (Short FES-I, mCTSIB, TUG, and 30-s Chair Stand Test), pre- and postintervention questionnaires, and an original postintervention semi-structured interview with eighteen participants. Investigators employed the Fall Risk Awareness Questionnaire (FRAQ) to assess awareness of fall risk. Intervention consisted of an educational class regarding fall risks that took place in a day centre, and a home visit. Questionnaire results were analyzed for statistical significance. Investigators completed thematic analysis of interviews.

RESULTS: Mean scores of the FRAQ rose slightly at posttest, but results were not statistically significant. Qualitative analyses revealed themes regarding specific fall risk awareness, barriers to

change, and willingness to change.

CONCLUSIONS: Participants in this sample demonstrated an increase in falls risk awareness after a brief falls prevention program. The sample size and prepost design limited generalizability of the results. Therapists should be aware of cultural competence, health literacy, and personal narrative of participants.

PDF Y Endnote Y

Development of an exergame for urban-dwelling older adults with functional limitations: results and lessons learned

Szanton SL, Walker RK, Lim JH, Fisher L, Zhan A, Gitlin LN, Thorpe RJ, Terzis A.

Prog. Community Health Partnersh. 2016; 10(1): 73-81.

(Copyright © 2016, Johns Hopkins University Press)

DOI 10.1353/cpr.2016.0005 **PMID** unavailable

Abstract

BACKGROUND: Falls at home are common and potentially fatal for disabled older adults. To address this problem, we created an academic-community partnership involving disabled, urban-dwelling older adults and their families, the housing authority, a Tai Chi master, and a university.

OBJECTIVES: We conducted a pilot to assess safety, acceptability, and feasibility of a Wii-based exergame designed to increase disabled older adults' strength and balance.

METHODS: A working prototype was developed and evaluated. Then, we piloted a refined version with 19 disabled urban-dwelling older adults.

RESULTS: The program was enjoyable, feasible, and acceptable. Participants described multiple functional improvements. Of the 16 who completed at least three gaming sessions, average balance score increased 25% and gait speed increased 19%.

CONCLUSIONS: This pilot showed promising results for improving strength and balance in the home setting, and yielded valuable lessons about health technology development with community partners.

PDF Y Endnote Y

Efficacy of ba duan jin in improving balance: a study in chinese community-dwelling older adults

Liu XY, Gao J, Yin BX, Yang XY, Bai DX.

J. Gerontol. Nurs. 2016; 42(5): 38-46.

(Copyright © 2016, Healio)

DOI 10.3928/00989134-20160201-03 **PMID** 27110739

Abstract

The current quasiexperimental study was intended to determine the efficacy of Ba Duan Jin (translation: eight-section brocade) in improving balance ability of Chinese community-dwelling older adults. The trial group (n = 47) engaged in a Ba Duan Jin exercise program for 12 weeks, whereas the control group (n = 48) participated in a 12-week walking exercise program. After the intervention, participants' balance ability was evaluated using the Timed Up and Go Test (TUGT), One Leg Standing Test (OLST), Berg Balance Scale (BBS), and Modified Falls Efficacy Scale (MFES). Ba Duan Jin was associated with increased TUGT and OLST scores at Week 6 with continuous increases reported through Week 12. Ba Duan Jin was also associated with increased BBS and MFES scores at

Week 12. Ba Duan Jin may be an effective means for improving balance ability in Chinese community-dwelling older adults.

PDF Endnote

Exergame and balance training modulate prefrontal brain activity during walking and enhance executive function in older adults

Eggenberger P, Wolf M, Schumann M, de Bruin ED.

Front. Aging Neurosci. 2016; 8: e66.

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(Copyright © 2016, Frontiers Research Foundation)

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Abstract

Different types of exercise training have the potential to induce structural and functional brain plasticity in the elderly. Thereby, functional brain adaptations were observed during cognitive tasks in functional magnetic resonance imaging studies that correlated with improved cognitive performance. This study aimed to investigate if exercise training induces functional brain plasticity during challenging treadmill walking and elicits associated changes in cognitive executive functions. Forty-two elderly participants were recruited and randomly assigned to either interactive cognitive-motor video game dancing (DANCE) or balance and stretching training (BALANCE). The 8-week intervention included three sessions of 30 min per week and was completed by 33 participants (mean age 74.9 ± 6.9 years). Prefrontal cortex (PFC) activity during preferred and fast walking speed on a treadmill was assessed applying functional near infrared spectroscopy pre- and post-intervention. Additionally, executive functions comprising shifting, inhibition, and working memory were assessed. The results showed that both interventions significantly reduced left and right hemispheric PFC oxygenation during the acceleration of walking ($p < 0.05$ or trend, $r = 0.25-0.36$), while DANCE showed a larger reduction at the end of the 30-s walking task compared to BALANCE in the left PFC [$F(1, 31) = 3.54$, $p = 0.035$, $r = 0.32$]. These exercise training induced modulations in PFC oxygenation correlated with improved executive functions ($p < 0.05$ or trend, $r = 0.31-0.50$). The observed reductions in PFC activity may release cognitive resources to focus attention on other processes while walking, which could be relevant to improve mobility and falls prevention in the elderly. This study provides a deeper understanding of the associations between exercise training, brain function during walking, and cognition in older adults.

PDF Y Endnote Y

Fitness, balance efficacy, and postural control in community-dwelling older adults

Lee A, Biggan JR, Ray C.

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(Copyright © 2016, Sage Publications)

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Abstract

Age-related declines in postural control and physical fitness are strong risk factors for falls in older adults. Balance efficacy has been utilized to identify poor postural control, reduced physical

function, and fall risk. However, it is not clear as to whether balance efficacy is truly a better predictor of functional fitness outcomes or postural control. Distinguishing these associations is an important step in the future derivation of physiotherapeutic programming to remediate acute and chronic decline. Therefore, the purpose of this cross-sectional study was to partition which measures are more associated with balance efficacy, fitness, or postural control. One hundred eleven community-dwelling older adults participated and were asked to complete the Balance Efficacy Scale (BES), a functional fitness measure (the Senior Fitness Test [SFT]), and a measure of postural control (the Sensory Organization Test [SOT]). We found that the SFT was more significantly associated with balance efficacy ($R^2 = .37$) than the SOT ($R^2 = .08$) in older adults. Overall, aerobic endurance, functional mobility in the SFT, and the vestibular score on the SOT were significantly associated with balance efficacy.

We concluded that clinicians utilizing the BES as a preliminary screen should recommend physiotherapy follow-up activities that build endurance (walking), lower extremity functional mobility (sit-to-stand), and vestibular function (head movement while walking). Understanding the links between a preliminary screening tool and the physiological needs of the patient will allow for targeted activities to be prescribed.

PDF Y Endnote Y

Indoor and outdoor falls among older adult trauma patients: a comparison of patient characteristics, associated factors and outcomes

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Geriatr. Gerontol. Int. 2016; ePub(ePub): ePub.

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(Copyright © 2016, Japan Geriatrics Society, Publisher John Wiley and Sons)

DOI 10.1111/ggi.12800 **PMID** 27138451

Abstract

AIM: The aim of the present study was to examine significant differences in patient characteristics, associated factors and outcomes for indoor versus outdoor falls among trauma patients.

METHODS: A retrospective cross-sectional study using data from the trauma registry and electronic medical records at a level 1 trauma center in the USA was carried out. People aged 55 years or older, for whom fall location could be identified ($n = 712$), were included in the study. Demographic information, functional status before admission, comorbid conditions, activation level, Injury Severity Score, discharge disposition and injury type were included in the comparative analyses. Associated factors for falls and fractures in each location were also examined using logistic regression.

RESULTS: Significant differences were found in patient characteristics between indoor and outdoor fallers. Significant differences in outcomes were found related to discharge disposition and injury type. Open wounds were more common among outdoor fallers (26.5%) as compared with indoor fallers (16.3%, $P = 0.002$). Although disorders of joints with difficulty walking were associated with fractures among both indoor (OR 7.20, CI 2.19-23.66) and outdoor fallers (OR 5.65, CI 1.27-25.06), sex was only associated with fractures among those who fell indoors (OR 1.69 CI 1.12-2.56).

CONCLUSIONS: Significant differences exist in characteristics of indoor and outdoor fallers, and for discharge disposition and injury type for each fall location among patients admitted for trauma care.

Factors associated with fractures differ between indoor and outdoor fallers. Results can help to inform targeted primary and secondary prevention initiatives.

PDF Y Endnote Y

Lower leg muscle density is independently associated with fall status in community-dwelling older adults

Frank-Wilson AW, Farthing JP, Chilibeck PD, Arnold CM, Davison KS, Olszynski WP, Kontulainen SA. *Osteoporos. Int.* 2016; ePub(ePub): ePub.

(Copyright © 2016, Springer Science+Business Media)

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Abstract

Muscle density is a risk factor for fractures in older adults; however, its association with falls is not well described. After adjusting for biologically relevant confounding factors, a unit decrease in muscle density was associated with a 17 % increase in odds of reporting a fall, independent of functional mobility. Introduction Falls are the leading cause of injury, disability, and fractures in older adults. Low muscle density (i.e., caused by muscle adiposity) and functional mobility have been identified as risk factors for incident disability and fractures in older adults; however, it is not known if these are also independently associated with falls. The purpose of this study was to explore the associations of muscle density and functional mobility with fall status.

METHODS Cross-sectional observational study of 183 men and women aged 60-98 years. Descriptive data, including a 12-month fall recall, Timed Up and Go (TUG) test performance, lower leg muscle area, and density. Odds ratio (OR) of being a faller were calculated, adjusted for age, sex, body mass index, general health status, diabetes, and comorbidities.

RESULTS Every mg/cm³ increase in muscle density (mean 70.2, SD 2.6 mg/cm³) independently reduced the odds of being a faller by 19 % (OR 0.81 [95 % CI 0.67 to 0.97]), and every 1 s longer TUG test time (mean 9.8, SD 2.6 s) independently increased the odds by 17 % (OR 1.17 [95 % CI 1.01 to 1.37]). When both muscle density and TUG test time were included in the same model, only age (OR 0.93 [95 % CI 0.87 to 0.99]) and muscle density (OR 0.83 [95 % CI 0.69 to 0.99]) were independently associated with fall status.

CONCLUSIONS Muscle density was associated with fall status, independent of functional mobility. Muscle density may compliment functional mobility tests as a biometric outcome for assessing fall risk in well-functioning older adults.

PDF Y Endnote Y

Predicting value of nine-item Berg balance scale among the aged: a 3-year prospective follow-up study

Hohtari-Kivimäki U, Salminen M, Vahlberg T, Kivelä SL.

Exp. Aging Res. 2016; 42(2): 151-160.

Affiliation: Department of Social Pharmacy , University of Helsinki , Helsinki , Finland.

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Abstract

BACKGROUND/STUDY CONTEXT: The aim was to assess the predicting value of the nine-item Berg Balance Scale (BBS-9) for falls among the community-dwelling aged.

METHODS: The participants (N = 298) were divided according to BBS-9 (range: 0-36) into those

scoring 0-32 sum points (risk group [RG]; n = 158) and those scoring 33-36 (non-risk group [non-RG]; n = 140). Falls were recorded by fall diaries, which subjects were asked to mail to the research assistants (RAs) monthly during the 12-month follow-up. The occurrences of falls requiring treatment were collected from the health center and hospital registers during the 12- and 36-month follow-ups.

RESULTS: During the 12-month follow-up, 271 falls (171 in RG and 100 in non-RG) and 29 falls requiring treatment (22 in RG and 7 in non-RG) occurred. During 36 months, there were 98 falls that required treatment (72 in RG and 26 in non-RG). The incidence of falls was higher in RG compared with non-RG (incidence rate ratio [IRR]: 1.57, 95% confidence interval [CI]: 1.23-2.01) during the 12-month follow-up ($p < .001$). Also, the incidence of falls requiring treatment was significantly higher in RG than in non-RG during 12 months (IRR: 2.82, 95% CI: 1.20-6.59; $p = .017$) and 36 months (IRR: 2.56, 95% CI: 1.63-4.01; $p < .001$).

CONCLUSION: BBS-9 with a cutoff score of 32/33 is an applicable tool for predicting risk of falls among the community-dwelling aged. Future studies are needed to assess the predicting value of BBS-9 among different age groups in the elderly population.

PDF Y Endnote Y

Prevention of fall-related injuries in the elderly: an eastern association for the surgery of trauma practice management guideline

Crandall M, Duncan T, Mallat A, Greene W, Violano P, Christmas AB, Barraco R.

J. Trauma Acute Care Surg. 2016; ePub(ePub): ePub.

Affiliation: From the Eastern Association for the Surgery of Trauma Injury Control and Violence Prevention Committee and Practice Management Guidelines Section.

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DOI 10.1097/TA.0000000000001025 **PMID** 26958795

Abstract

BACKGROUND: Fall-related injuries among the elderly (age 65 and older) are the cause of nearly 750,000 hospitalizations and 25,000 deaths per year in the United States, yet prevention research is lagging. Using the GRADE (Grading of Recommendations Assessment, Development, and Evaluation) methodology, the Eastern Association for the Surgery of Trauma produced this practice management guideline to answer the following injury prevention related PICO (Population, Intervention, Comparator, Outcomes) questions: PICO 1: Should bone mineral enhancing agents be used to prevent fall-related injuries in the elderly? PICO 2: Should hip protectors be used to prevent fall-related injuries in the elderly? PICO 3: Should exercise programs be used to prevent fall-related injuries in the elderly? PICO 4: Should physical environment modifications be used to prevent fall-related injuries in the elderly? PICO 5: Should risk factor screening be used to prevent fall-related injuries in the elderly? PICO 6: Should multiple interventions tailored to the population or individual be used to prevent fall-related injuries in the elderly? **METHODS:** A comprehensive search and review of all the available literature was performed. We used the GRADE methodology to assess the breadth and quality of the data specific to our PICO questions.

RESULTS: We reviewed 50 articles that met our inclusion and exclusion criteria as they applied to our PICO questions

CONCLUSION: Given the data constraints, we offer the following suggestions and recommendations: PICO 1: We conditionally recommend Vitamin D and Calcium supplementation for frail elderly individuals. PICO 2: We conditionally recommend hip protectors for frail elderly

individuals, in the appropriate environment. PICO 3: We conditionally recommend evidence based exercise programs for frail elderly individuals. PICO 4: We conditionally recommend physical environment modification for frail elderly people. PICO 5: We conditionally recommend frailty screening for the elderly. PICO 6: We strongly recommend risk stratification with targeted, comprehensive risk-reduction strategies tailored to particular high risk groups. LEVEL OF EVIDENCE: Systematic review, level III.

PDF Y Endnote Y

Primary care opportunities to prevent unintentional home injuries: a focus on children and older adults

McDonald EM, Mack K, Shields WC, Lee RP, Gielen AC.

Am. J. Lifestyle Med. 2016; ePub(ePub): ePub.

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DOI 10.1177/1559827616629924 PMID unavailable

Abstract

Unintentional injuries are a persistent public health problem in the United States. A new health care landscape has the potential to create a clinical environment that fosters greater involvement by health care providers in injury prevention. The aim of this article is to provide evidence supporting the need for engagement by primary care providers in unintentional home injury prevention along with examples of how this could be accomplished. We know a great deal about what population groups are at risk for certain types of injuries. We also know that many injuries can be prevented through policies, programs, and resources that ensure safe environments and promote safe behaviors. For example, the Centers for Disease Control and Prevention's STEADI (Stopping Elderly Accidents, Deaths, and Injuries) initiative comprises clinical decision support tools and educational materials for health care providers. Two effective interventions that have demonstrated a reduction in falls among children are the redesign of baby walkers (engineering) and the mandated use of window guards (enforcement). Primary care clinicians can play a key role in promoting their patient's safety. Taken collectively, a focused attention on preventing unintentional home injuries by primary care providers can contribute to the reduction of injuries and result in optimal health for all.

PDF Y Endnote Y

Randomized control trials on Otago exercise program (OEP) to reduce falls among elderly community dwellers in Shahroud, Iran

Dadgari A, Aizan Hamid T, Hakim MN, Chaman R, Mousavi SA, Poh Hin L, Dadvar L.

Iran. Red Crescent Med. J. 2016; ePub(ePub): ePub.

(Copyright © 2016, Iranian Red Crescent Society, Publisher KOWSAR Medical Publishing)

DOI 10.5812/ircmj.26340 PMID unavailable

Abstract

BACKGROUND: Fall is a worldwide health problem among elderly people and a known leading cause of disabilities. Fall prevention programs have been implemented in various forms. The Otago exercise program (OEP) is one of the most recent home-base exercise training program.

OBJECTIVES: This study was conducted to examine the effectiveness of OEP to reduce falls among elderly people in Shahroud, IR Iran.

MATERIALS AND METHODS: This randomised control trial was conducted among the elderly

community dwellers in Shahroud city of the Semnan province, IR Iran, with experience of falls in the last 12 months. Subjects of the study (n = 317) were recruited from elderly senior citizens at public health centers. Block systematic random sampling was applied to categorize the subjects in experimental and control groups. The experimental group (n = 160) received OEP for six months and was compared with the control group (n = 157) who received general health training. This study was registered with the following ID, IRCT2014012016285N1.

RESULTS: The findings of the study showed that OEP improved physical performance (Berg-Balance-Score with $P > 0.025$, and Timed-Up-Go-Test with $P > 0.017$) and functional capacity (Arm-Curl-Test with $P > 0.00$ and Chair-Stand-Test with $P > 0.01$). In addition, OEP significantly reduced the incidence of falls ($P \leq 0.00$) among senior citizens in the experimental group.

DISCUSSION: The OEP as a home-based exercise is effective for the reduction of the incidence of falls among senior citizens with a history of falls. The OEP can be recommended for elderly homebound people who do not have access to facilities.

PDF Y Endnote Y

Static and dynamic balance after ankle plantarflexor fatigue in older adults

Norris ES, Wallmann HW.

Phys. Occup. Ther. Geriatrics 2016; 34(1): 57-70.

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

DOI 10.3109/02703181.2015.1114063 **PMID** unavailable

Abstract

AIMS: The purpose of this study was to evaluate how fatigue of the ankle plantarflexors would affect both static and dynamic standing balance in a healthy older population. Understanding how conditions of muscle fatigue may effect balance control of older adults may lend insight to rehabilitation strategies useful for the screening and prevention of fall risks.

METHODS: 18 healthy older adults (mean age = 74.67 years) were randomly divided into either a fatigue group or a control group. Baseline measurements were collected using the NeuroCom Smart® Balance Master's limits of stability (LOS) test and the sensory organization test (SOT). Participants in the control group rested for 5 min after the baseline testing and then repeated the tests, while participants in the fatigue group repeated the tests after performing heel raises until they became fatigued.

RESULTS: LOS parameters decreased after muscle fatigue but were significant only for the interaction of directional control (DCL). The findings for SOT were nonsignificant.

CONCLUSION: This research suggests that plantarflexor fatigue may have a negative effect on the DCL of an older adult when challenging their LOS and therefore may decrease their ability to avoid a fall.

PDF Y Endnote Y

Structural neural correlates of impaired mobility and subsequent decline in executive functions: a 12-month prospective study

Hsu CL, Best JR, Chiu BK, Nagamatsu LS, Voss MW, Handy TC, Bolandzadeh N, Liu-Ambrose T. *Exp. Gerontol.* 2016; ePub(ePub): ePub.

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(Copyright © 2016, Elsevier Publishing)

DOI 10.1016/j.exger.2016.04.001 **PMID** 27079333

Abstract

Impaired mobility, such as falls, may be an early biomarker of subsequent cognitive decline and is associated with subclinical alterations in both brain structure and function. In this 12-month prospective study, we examined whether there are volumetric differences in gray matter and subcortical regions, as well as cerebral white matter, between older fallers and non-fallers. In addition, we assessed whether these baseline volumetric differences are associated with changes in cognitive function over 12 months. A total of 66 community-dwelling older adults were recruited and categorized by their falls status. Magnetic resonance imaging occurred at baseline and participants' physical and cognitive performances were assessed at baseline and 12 months. At baseline, fallers showed significantly lower volumes in gray matter, subcortical regions, and cerebral white matter compared with non-fallers. Notably, fallers had significantly lower left lateral orbitofrontal white matter volume. Moreover, lower left lateral orbitofrontal white matter volume at baseline was associated with greater decline in set-shifting performance over 12 months.

Our data suggest that falls may indicate subclinical alterations in regional brain volume that are associated with subsequent decline in executive functions.

PDF Y Endnote Y

Tai Chi as an intervention to reduce falls and improve balance function in the elderly: a meta-analysis of randomized controlled trials

Zhao Y, Wang Y.

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(Copyright © 2016, Shanxi Medical Periodical Press, Publisher Elsevier Publishers)

DOI 10.1016/j.cnre.2015.10.003 **PMID** unavailable

Abstract

OBJECTIVE: To systematically evaluate the effectiveness of fall prevention and balance function in the elderly.

METHODS: Databases, including PubMed, Web of Science, Cochrane Library, Chinese Biomedical Literature Database (CBM), and CNKI were electronically searched, and the relevant references of the included papers were also manually searched. Two reviewers independently screened the articles according to the inclusion and exclusion criteria, extracted the data, and assessed the methodological quality. A meta-analysis was performed using the Cochrane Collaboration's RevMan 5.1 software.

RESULTS: Six randomized controlled trials (RCTs) involving 2796 participants were included. The results of the meta-analysis showed that compared with a physiotherapy intervention, Tai Chi could significantly reduce the incidence rates of falls [relative risk (RR) = 0.82, 95% confidence interval (CI) (0.73, 0.92)], while there were significant differences in the Timed Up and Go test, Functional Reach Test and Berger Balance Scale.

CONCLUSIONS: Tai Chi is effective in reducing the risk of falls and improving balance in the elderly.

PDF Y Endnote Y

The frequency of falling elderly and evaluation of the behavioral factors related to preventing the falls

Duru P, Örsal, Unsal A, Balci Alparslan G.

Duzce Univ. Saglik. Bilim. Enst. Dergisi 2016; 6(1): 34-40.

(Copyright © 2016, Düzce University Institute of Health Sciences)

DOI unavailable **PMID** unavailable

Abstract

Present study was carried out to determine the frequency of fall in people over the age of 60 years and to evaluate the awareness of and behaviors related to the prevention of fall among elderly people. A total of 724 individuals including 164 elderly people from nursing homes and 560 elderly people living at their home were included in the study group. The "Falls Behavioral Scale for Older People" was used to evaluate the presence or absence of protective behaviors from falls. The frequency of falls in the last year was 28.3%. Univariate analysis showed the gender, number of children, number of male and female children, number of chronic diseases, the drug use, obesity and use of walker to be associated with the falls (for each; $p < 0.05$). The awareness and behaviors related to the prevention of potential falls in elderly individuals -who did not fall in the last year- were found to be significantly higher in sub-domains of cognitive adaptation, safe movements, avoidance, awareness, rashness, change in the activity plans, mindfulness, level changes and reaching to the telephone (for each; $p < 0.05$).

RESULTS of study suggest that falls are common problem among elderly people and the behavioral factors related to prevent the falls during daily activities were found to be associated with the falling in elderly who had fall in the last year from any reason.

PDF Y Endnote Y

The involvement of ankle muscles in maintaining balance in the upright posture is higher in elderly fallers

Cattagni T, Scaglioni G, Laroche D, Gremeaux V, Martin A.

Exp. Gerontol. 2016; 77: 38-45.

(Copyright © 2016, Elsevier Publishing)

DOI 10.1016/j.exger.2016.02.010 **PMID** unavailable

Abstract

The purpose of this study was to determine whether the mechanical contribution of ankle muscles in the upright stance differed among young adults (YA) ($n = 10$, age: ~ 24.3), elderly non-fallers (ENF) ($n = 12$, age: ~ 77.3) and elderly fallers (EF) ($n = 20$, age: ~ 80.7). Torque and electromyographic (EMG) activity were recorded on the triceps surae and tibialis anterior during maximum and submaximum contractions in the seated position. EMG activity was also recorded in subjects standing still. Plantar flexor (PF) and dorsal flexor (DF) torques generated in the upright posture were estimated from the torque-EMG relationship obtained during submaximum contractions in the seated position. Center of pressure (CoP) displacement was measured to quantify postural stability.

RESULTS showed that, in upright standing, EF generated greater ankle muscle relative torque (i.e. PF + DF torque in the upright stance/PF + DF during maximum isometric torque) than non-fallers (i.e. ENF, YA). The greater involvement of ankle muscles in EF was associated with higher CoP displacement. PF + DF torque in the upright stance was no different among the groups, but PF + DF torque during maximum effort was impaired in older groups compared with YA and was lower in EF

than ENF. These results suggest that the postural stability impairment observed with aging is highly related to ankle muscle weakness.

PDF Y Endnote Y

The relationship between toe grip strength and dynamic balance or functional mobility among community-dwelling older Japanese people: a cross-sectional study

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J. Aging Phys. Act. 2016; ePub(ePub): ePub.

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(Copyright © 2016, Human Kinetics Publishers)

DOI 10.1123/japa.2015-0123 **PMID** 26796741

Abstract

Evaluating toe flexor strength may be an important method for predicting and preventing walking dysfunction and falls, particularly among older people. In this study, toe grip strength (TGS), functional reach (FR, a measure of dynamic balance), the timed up and go (TUG) test (a measure of functional ability), isometric knee extension strength (IKES), sex, age, weight, and height were analyzed among 665 healthy elderly Japanese people. Statistical analyses were used to assess the relationships between TGS and FR or TUG and to investigate whether TGS was independently associated with FR or TUG. Our results indicate that, among both men and women, TGS was associated with TUG, independent of age, height, weight, and IKES, but TGS was not associated with FR. These results may facilitate the development of strategies for improving functional mobility through physical therapy.

PDF Y Endnote Y

Understanding the pathogenesis of hip fracture in the elderly, osteoporotic theory is not reflected in the outcome of prevention programmes

Guerado E, Sandalio RM, Caracuel Z, Caso E.

World J. Orthop. 2016; 7(4): 218-228.

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DOI 10.5312/wjo.v7.i4.218 **PMID** 27114929 **PMCID** PMC4832223

Abstract

Hip fractures are an acute and worsening public health problem. They mainly affect elderly people, a population group that is highly vulnerable to disease and accidents, and to falls in particular. Although it has been suggested that osteoporosis is the cause of hip fractures, they mainly occur after a fall has been suffered. The underlying causes of a fall are not related to osteoporosis, although pharmaceutical companies have coined the term "osteoporotic fracture" for hip fractures in the elderly. Drug treatments for osteoporosis have not diminished the frequency of these injuries, nor have they prevented the occurrence of a subsequent fracture. Since pharmaceutical interests require osteoporosis to be considered a disease, rather than a normal condition of senescence, they go further by assuming that treatment for osteoporosis is essential, and that this policy will diminish the incidence of hip fractures. On the other hand, the origin and treatment of conditions that may be conducive to provoking falls are very difficult to elucidate. In this paper, we consider some of the medical and social problems that arise in this area, as well as conflicts of interest regarding the

aetiopathogenesis and prevention of hip fracture, and propose a new paradigm for the prevention of falls.

PDF Y Endnote Y

Unsteady gait is a determinant for progression in frailty among the elderly

Nagai K, Koshihara H, Tanaka M, Matsui T, Kozaki K.

Geriatr. Gerontol. Int. 2016; 16(5): 655-657.

Affiliation: Department of Geriatric Medicine, Kyorin University School of Medicine, Mitaka, Tokyo, Japan.

(Copyright © 2016, Japan Geriatrics Society, Publisher John Wiley and Sons)

DOI 10.1111/ggi.12578 **PMID** 27109175

Abstract [Abstract unavailable]

PDF Y Endnote Y

Use of Rasch analysis to evaluate and refine the community balance and mobility scale for use in ambulatory community-dwelling adults following stroke

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Phys. Ther. 2016; ePub(ePub): ePub.

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(Copyright © 2016, American Physical Therapy Association)

DOI 10.2522/ptj.20150423 **PMID** 27081206

Abstract

BACKGROUND: The Community Balance and Mobility Scale (CB&M) is increasingly used to evaluate walking balance following stroke.

OBJECTIVE: This study applied Rasch analysis to evaluate and refine the CB&M for use in ambulatory community-dwelling adults following stroke.

METHODS: CB&M content was linked to task demands and motor skill classifications. Rasch analysis was used to evaluate internal construct validity (structural validity) and refine the CB&M for use with ambulatory community-dwelling adults following stroke. CB&M data were collected at 3 time-points: discharge from inpatient rehabilitation, 6 and 12-months post-discharge (total n=238). Rasch analysis evaluated scale dimensionality, item and person fit, item response bias, scoring hierarchy and targeting. Disordered scoring hierarchy was resolved by collapsing scoring categories. Highly correlated and 'misfitting' items were removed. Sensitivity to change was evaluated with Standardized Response Means and One-way Repeated Measures ANOVA.

RESULTS: The CB&M was primarily linked to closed body transport task demands. Significant item-trait interaction ($p < 0.0005$), disordered scoring hierarchies and multi-dimensionality were found. Scoring categories were collapsed in 15/19 items and 5 misfitting items were removed. The resulting stroke-specific 14-item unidimensional CB&M (CB&MStroke) fit Rasch model expectations ($p = .200$) with no item response bias, acceptable targeting (13% floor and 0% ceiling effects) and moderate-strong sensitivity to change at 6-months (SRM.63; 95%CI -1.523, -.142; $p = .019$) and 12-months post-discharge (SRM.73; 95%CI -2.318, -.760; $p < .0005$). **LIMITATIONS:** Findings are limited to a modest sized sample of individuals with mild-moderate balance impairment following stroke.

CONCLUSIONS: The CB&MStroke shows promise as a clinical scale for measuring change in walking balance in ambulatory community-dwelling adults post-stroke.

Future studies are recommended in a larger sample to validate and further refine the scale for use in this clinical population.

PDF Y Endnote Y

Using a manipulation check to uncover age-related difference in focus of attention instruction during a balance task

Yeh TT, Cinelli ME, Lyons J, Lee TD.

Exp. Aging Res. 2016; 42(3): 307-313.

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

DOI 10.1080/0361073X.2016.1156977 **PMID** 27070048

Abstract

BACKGROUND/STUDY CONTEXT: A manipulation check was used to investigate whether there is an age-related difference in the adherence to specific external- and internal-focus instructional constraints.

METHODS: Participants stood on a force platform and were to maintain a feedback cursor (representing their center of pressure) along the horizontal direction, within a target on a computer monitor. Trials were conducted with either an external focus of attention (keeping the feedback cursor within the target) or an internal focus of attention (keeping the weight evenly distributed between both legs).

RESULTS: The finding showed that younger adults followed the experimental instructions; however, older adults relied on external visual information when they were asked to focus on the body movements.

CONCLUSION: Age-related declines may contribute to attention allocation differences. The authors propose that specific manipulation checks be used to ensure proper adherence to instructions when comparing age-related differences in postural control.

PDF Y Endnote Y

Characteristics of falls producing hip fracture in patients on oral anticoagulants

Formiga F, Chivite D, Navarro M, Montero A, Duaso E, Ruiz D, Perez-Castejon JM, Lopez-Soto A, Corbella X.

Acta Clin. Belg. 2016; ePub(ePub): 1-4.

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(Copyright © 2016, Maney Publishing)

DOI 10.1080/17843286.2016.1153815 **PMID** 27145025

Abstract

OBJECTIVE: To analyze the demographic and clinical characteristics of patients on chronic anticoagulant therapy (CAT) admitted because of a hip fracture secondary to a fall, and to compare with patients not receiving CAT.

METHODS: A prospective, observational study realized in six hospitals in the Barcelona area. Demographic and clinical characteristics of patients were collected. The index fall characteristics - cause, height, location, and time of occurrence - were evaluated.

RESULTS: Of the 1225 patients included, 99 (8%) patients were on CAT. When we compare with the rest logistic regression analysis showed that patients receiving CAT were more likely to be male

(odds ratio 3.7), not institutionalized (odds ratio 3.5), to take more number of drugs (odds ratio 1.3), to have dementia (odds ratio 2.1) and stroke (odds ratio 1.7). Results revealed a higher prevalence of combined factors as the cause of the index fall in the group of patients on anticoagulants.

CONCLUSIONS: Characteristics of falls were very similar when comparing the group of patients receiving CAT with those who did not. A prior history of falls should lead physicians to take actions for preventing falls causing hip fracture, in all patients and particularly in these on CAT.

PDF Y Endnote Y

County poverty concentration and disparities in unintentional injury deaths: a fourteen-year analysis of 1.6 million U.S. fatalities

Karb RA, Subramanian SV, Fleegler EW.

PLoS One 2016; 11(5): e0153516.

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(Copyright © 2016, Public Library of Science)

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Abstract

Unintentional injury is the fourth leading cause of death in the United States, and mortality due to injury has risen over the past decade. The social determinants behind these rising trends have not been well documented. This study examines the relationship between county-level poverty and unintentional injury mortality in the United States from 1999-2012. Complete annual compressed mortality and population data for 1999-2012 were obtained from the National Center for Health Statistics and linked with census yearly county poverty measures. The outcomes examined were unintentional injury fatalities, overall and by six specific mechanisms: motor vehicle collisions, falls, accidental discharge of firearms, drowning, exposure to smoke or fire, and unintentional poisoning. Age-adjusted mortality rates and time trends for county poverty categories were calculated, and multivariate negative binomial regression was used to determine changes over time in both the relative risk of living in high poverty concentration areas and the population attributable fraction. Age-adjusted mortality rates for counties with > 20% poverty were 66% higher mortality in 1999 compared with counties with < 5% poverty (45.25 vs. 27.24 per 100,000; 95% CI for rate difference 15.57,20.46), and that gap widened in 2012 to 79% (44.54 vs. 24.93; 95% CI for rate difference 17.13,22.09). The relative risk of living in the highest poverty counties has increased for all injury mechanisms with the exception of accidental discharge of firearms. The population attributable fraction for all unintentional injuries rose from 0.22 (95% CI 0.13,0.30) in 1999 to 0.35 (95% CI 0.22,0.45) in 2012. This is the first study that uses comprehensive mortality data to document the associations between county poverty and injury mortality rates for the entire US population over a 14 year period. This study suggests that injury reduction interventions should focus on areas of high or increasing poverty.

PDF Y Endnote Y

The impact of diabetic neuropathy on balance and on the risk of falls in patients with type 2 diabetes mellitus: a cross-sectional study

Timar B, Timar R, Gaiță L, Oancea C, Levai C, Lungeanu D.

PLoS One 2016; 11(4): e0154654.

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DOI 10.1371/journal.pone.0154654 **PMID** 27119372

Abstract

INTRODUCTION: Diabetic neuropathy (DN) is a prevalent complication of Type 2 Diabetes Mellitus (T2DM) with a major impact on the health of the affected patient. We hypothesized that mediated by the dysfunctionalities associated with DN's three major components: sensitive (lack of motion associated sensory), motor (impairments in movement coordination) and autonomic (the presence of postural hypotension), the presence of DN may impair the balance in the affected patients. Our study's main aim is to evaluate the possible association between the presence and severity of DN and both the balance impairment and the risk of falls in patients with T2DM.

MATERIAL AND METHOD: In this cross-sectional study we enrolled, according to a consecutive-case population-based setting 198 patients with T2DM. The presence and severity of DN was evaluated using the Michigan Neuropathy Screening Instrument, a tool which allows both diagnosing and severity staging of DN. The balance impairment and the risk of falls were evaluated using four validated and standardized tools: Berg Balance Scale (BBS), Timed-up and Go test (TUG), Single Leg Stand test (SLS) and Fall Efficacy Scale (FES-I).

RESULTS: The presence of DN was associated with significant decreases in the BBS score (40.5 vs. 43.7 points; $p < 0.001$) and SLS time (9.3 vs. 10.3 seconds; $p = 0.003$) respectively increases in TUG time (8.9 vs. 7.6 seconds; $p = 0.002$) and FES-I score (38 vs. 33 points; $p = 0.034$). The MNSI score was reverse and significantly correlated with both BBS score (Spearman's $r = -0.479$; $p < 0.001$) and SLS time (Spearman's $r = -0.169$; $p = 0.017$). In the multivariate regression model, we observed that patient's age, DN severity and depression's symptoms acted as independent, significant predictors for the risk of falls in patients with T2DM.

CONCLUSIONS: The presence of DN in patients with DM is associated with impaired balance and with a consecutively increase in the risk of falls.

PDF Y Endnote Y

Validation of a smartphone application measuring motor function in Parkinson's disease

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J. Parkinsons Dis. 2016; ePub(ePub): ePub.

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(Copyright © 2016, IOS Press)

DOI 10.3233/JPD-150708 **PMID** 27061062

Abstract

BACKGROUND: Measurement of motor function is critical to the assessment and management of Parkinson's disease. Ambulatory motor assessment has the potential to provide a glimpse of the patient's clinical state beyond the consultation. We custom-designed a smartphone application that quantitatively measures hand dexterity and hypothesized that this can give an indication of a patient's overall motor function.

OBJECTIVE: The aims of this study were to (i) validate this smartphone application against MDS-UPDRS motor assessment (MDS-UPDRS-III) and the two-target tapping test; (ii) generate a prediction model for MDS-UPDRS-III; (iii) assess repeatability of our smartphone application and (iv) examine

compliance and user-satisfaction of this application.

METHODS: 103 patients with Parkinson's disease were recruited from two movement disorders clinics. After initial assessment, a group of patients underwent repeat assessment within two weeks. Patients were invited to use the smartphone application at home over three days, followed by a survey to assess their experience.

RESULTS: Significant correlation between key smartphone application test parameters and MDS-UPDRS-III ($r=0.281-0.608$, $p < 0.0001$) was demonstrated. A prediction model based on these parameters accounted for 52.3% of variation in MDS-UPDRS-III ($R^2=0.523$, $F(4,93)=25.48$, $p < 0.0001$). Forty-eight patients underwent repeat assessment under identical clinical conditions. Repeatability of key smartphone application tests parameters and predicted MDS-UPDRS-III was moderate to strong (intraclass correlation coefficient $0.584-0.763$, $p < 0.0001$). The follow-up survey identified that our patients were very comfortable with the smartphone application and mobile technology.

CONCLUSIONS: Our smartphone application demonstrated satisfactory repeatability and validity when measured against MDS-UPDRS-III. Its performance is acceptable considering our smartphone application measures hand dexterity only.

PDF N Endnote Y

Validity, reliability, and ability to identify fall status of the Berg Balance Scale, BESTest, Mini-BESTest, and Brief-BESTest in patients with COPD

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Phys. Ther. 2016; ePub(ePub): ePub.

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(Copyright © 2016, American Physical Therapy Association)

DOI 10.2522/ptj.20150391 **PMID** 27081201

Abstract

BACKGROUND: The Berg Balance Scale (BBS), Balance Evaluation Systems Test (BESTest), Mini-BESTest and the Brief-BESTest are useful to assess balance, however their psychometric properties have not been tested in patients with chronic obstructive pulmonary disease (COPD).

OBJECTIVE: This study aimed to compare the validity, reliability and ability to identify fall status of the BBS, BESTest, Mini-BESTest and the Brief-BESTest in patients with COPD.

DESIGN: A cross-sectional study was conducted.

METHODS: Forty-six patients (24 males; 75.9 ± 7.1 years) were included. Participants were asked to report their falls during the previous 12 months and to fill in the Activity-specific Balance Confidence (ABC) Scale. The BBS and the BESTest were administered. Mini-BESTest and Brief-BESTest scores were computed based on the BESTest performance. Validity was assessed by correlating balance tests with each other and with the ABC Scale. Interrater reliability (2 raters), intrarater reliability (48-72 hours) and minimal detectable changes (MDCs) were established. Receiver operating characteristics assessed the ability of each balance test to differentiate between patients with and without a history of falls.

RESULTS: Balance test scores were significantly correlated with each other (spearman's correlation [ρ]= $0.73-0.90$) and with the ABC Scale ($\rho=0.53-0.75$). Balance tests presented high interrater

(Intraclass Correlation Coefficients[ICCs]=0.85-0.97) and intrarater reliability (ICCs=0.52-0.88), and acceptable MDCs (MDCs=3.3-6.3 points). Although all balance tests were able to identify fall status (area under the curve [AUC]=0.74-0.84), the BBS (sensitivity=73%, specificity=77%) and the Brief-BESTest (sensitivity=81%, specificity=73%) had the higher ability. LIMITATIONS: Findings are generalizable mainly to older patients with moderate COPD.

CONCLUSIONS: The four balance tests are valid, reliable and valuable to identify fall status in patients with COPD. The Brief-BESTest presented slightly higher interrater reliability and ability to differentiate patients' falls status.

PDF Y Endnote Y