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A resident-led initiative improves screening and treatment for vitamin D deficiency in patients *with hip fractures*

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DOI 10.1007/s11999-016-5036-4 **PMID** 27549989

Abstract

BACKGROUND: Acute hip fractures carry a high risk of morbidity and are associated with low vitamin D levels. Improvements in screening and treating low vitamin D levels may lead to lower fall rates and a lower likelihood of additional fragility fractures. However, patients with low vitamin D levels often remain unassessed and untreated, even after they experience these fractures.

QUESTIONS/PURPOSES: We wished to determine whether a resident-led initiative can improve (1) screening for and (2) treatment of vitamin D deficiency in patients with acute hip fractures.

METHODS: Our department initiated a housestaff-led, quality improvement project focused on screening and treating vitamin D deficiency in patients with acute hip fractures. Screening encompassed checking serum 25-hydroxyvitamin D level during the acute hospitalization, and treating was defined as starting supplementation before discharge when the serum 25-hydroxyvitamin D level was less than 30 ng/mL. To evaluate the efficacy of this program, an administrative database identified 283 patients treated surgically for an acute hip fracture between July 2010 and June 2014. This period included 2 years before program initiation (Year 1, n = 65 patients; Year 2, n = 61 patients), the initial program year (Year 3, n = 66 patients), and the subsequent program year (Year 4, n = 91 patients). Followup was extended to 6 weeks after treatment with 9.2% (26/282) of patients lost to followup. Eight patients were excluded owing to documented intolerance of vitamin D supplementation. There were no differences regarding patient demographics, fracture type, or treatment rendered across these 4 years. The primary endpoints were the proportion of patients screened and treated for vitamin D deficiency. The secondary endpoint was the continuation of vitamin D supplementation at the patient's 6 week followup, according to the patient's medication list at that visit. This analysis included all patients, assuming those lost to followup had not continued supplementation. ANOVA and chi-square tests were used to evaluate the differences in demographic data and in screening and treating rates.

RESULTS: Screening for vitamin D deficiency improved after initiation of the resident-led quality improvement program, with screening performed for 31% of patients in Year 1 (20/65; odds ratio [OR], 0.44; 95% CI, 0.26-0.75), 20% of patients in Year 2 (12/61; OR, 0.24; 95% CI, 0.13-0.46), 46% of patients in Year 3 (30/66; OR, 0.83; 95% CI, 0.51-1.35), and 88% of patients in Year 4 (80/91; OR, 7.27; 95% CI, 3.87-13.7) ($p < 0.001$). Vitamin D supplementation was initiated for 33% of patients in Year 1 (21/63; OR, 0.5; 95% CI, 0.30-0.84), 28% in Year 2 (17/61; OR, 0.39; 95% CI, 0.22-0.68), 50% in Year 3 (32/64; OR,1.00; 95% CI, 0.61-1.63), and 76% in Year 4 (65/86; OR, 3.10; 95% CI, 1.89-5.06) ($p < 0.001$). At early postoperative followup, we saw substantial improvement in the proportion of patients who continued receiving vitamin D supplementation: Year 1, 12% (8/64; OR, 0.14; 95% CI, 0.07-0.30); Year 2, 15% (9/61; OR, 0.17; 95% CI, 0.09-0.35); Year 3, 26% (16/64; OR, 0.33; 95% CI, 0.19-0.59); and Year 4, 46% (40/86; OR, 0.87; 95% CI, 0.57-1.33) ($p < 0.001$).

CONCLUSIONS: Implementation of a resident-led quality improvement program resulted in higher

rates of screening and treating vitamin D deficiency for patients with acute hip fractures. Housestaff-based initiatives may be an effective way to improve care processes that target improvements in bone health.

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An evaluation of supervised, novelty-based and hybrid approaches to fall detection using Silmee accelerometer data

Lisowska A, Wheeler G, Inza VC, Poole I.

2015 IEEE International Conference on Computer Vision Workshop (ICCVW); 2015; pp. 402-408. New York, NY, USA: IEEE, 2015.

Abstract

Elderly people often experience a fear of falling. A reliable fall detector could increase their confidence in receiving prompt help after a fall, thus reducing their mental distress. A wearable sensors such as Toshiba's Silmee device can gather accelerometer data, which can be used to detect falls. We collected data from 20 volunteers wearing Silmee during simulated falls and activities of daily living (ADL). This gave 168 fall and 375 ADL recordings. We used these recordings in three experiments conducted to compare the performance of machine learning techniques for the detection of falls from accelerometer data. These experiments evaluate supervised methods, novelty based fall detection techniques, and finally our proposed hybrid techniques which use supervised methods for feature learning, but can be applied in the context of novelty detection. We found that the best performing supervised method was the Convolutional Neural Network (CNN) and the best performing unsupervised method was the one-class Nearest Neighbour Classifier. The best performing hybrid approach resulted from a combination of the CNN and the one-class Support Vector Machine. It draws on the strengths of the CNN (appropriate feature learning) and may offer more accurate real world fall identification.

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Assessing gait and balance impairment in elderly residents of nursing homes

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J. Phys. Ther. Sci. 2016; 28(9): 2486-2490.

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DOI 10.1589/jpts.28.2486 **PMID**27799676

Abstract

PURPOSE: The risk of falls in the elderly is an important public health problem. Suitable tests may help detect those at risk of falling. This study determined which balance test for older adults generates the most reliable results in terms of fall risk assessment, based on the number of falls over the last 12 months.

SUBJECTS AND METHODS: A total of 153 individuals (31 males, 122 females, aged 76.67 ± 8.3 years; median 76.5, range 65-94) were investigated. The subjects were subdivided between fallers (a fall over the last 12 months) and non-fallers (no falls over the last 12 months). All participants were assessed with the following: Barthel Scale, Mini-Mental State Examination, Timed Up and Go, Tinetti Performance-Oriented Mobility Assessment), Berg Balance Test, and One-Legged Stance Test.

[Results] Statistically significant differences were detected between fallers and non-fallers in TUG, POMA, BBS, and OLST scores. The number of falls correlated positively with the results for TUG, POMA, and OLST. [Conclusion] TUG and POMA were the most useful screening tests for balance and gait impairment in elderly nursing home residents. Two or more tests should be performed for more precise assessment of the risk of falling.

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Association between falls and brain subvolumes: results from a cross-sectional analysis in healthy older adults

Beauchet O, Launay CP, Barden J, Liu-Ambrose T, Chester VL, Szturm T, Grenier S, Léonard G, Bherer L, Annweiler C, Helbostad JL, Verghese J, Allali G.

Brain Topogr. 2016; ePub(ePub): ePub.

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DOI 10.1007/s10548-016-0533-z **PMID** 27785698

Abstract

Falls are a consequence of gait instability. Cortical and subcortical abnormalities have been associated with gait instability but not yet with falls. This study aims to compare the global and regional brain subvolumes between healthy older fallers and non-fallers. A total of 77 healthy older individuals (23 fallers and 54 non-fallers, 69.8 ± 3.5 years; 45.5 % female) were included in this study using a cross-sectional design. Based on an a priori hypothesis, the following brain subvolumes were quantified from three-dimensional T1-weighted MRI using FreeSurfer software: total white matter abnormalities, total white matter, total cortical and subcortical gray matter, hippocampus, motor cortex, somatosensory cortex, premotor cortex, prefrontal cortex and parietal cortex volumes. Gait performances were also recorded. Age, sex, body mass index, comorbidities, use of psychoactive drugs, far-distance visual acuity, lower-limb proprioception, depressive symptoms and cognitive scores (Mini-Mental State Examination, Frontal Assessment Battery) were used as covariates. Fallers have more frequently depressive symptoms (P = 0.048), a lower far distance visual acuity (P = 0.026) and a higher coefficient of variation of stride time (P = 0.008) compared to non-fallers. There was a trend to greater subvolumes for the somatosensory cortex (P = 0.093) and the hippocampus (P = 0.060) in the falls group. Multiple logistic regressions showed that subvolumes of the somatosensory cortex and the hippocampus (P < 0.042) were increased in fallers compared to non-fallers, even after adjustment for clinical and brain characteristics. The greater subvolumes of the somatosensory cortex and hippocampus reported in fallers compared to non-fallers suggests a possible brain compensatory mechanism involving spatial navigation and integration of sensory information.

PDF Y Endnote Y

Cognitive training among cognitively impaired older adults: a feasibility study assessing the potential improvement in balance

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Front. Public Health 2016; 4: e219.

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(Copyright © 2016, Frontiers Editorial Office)
DOI 10.3389/fpubh.2016.00219 **PMID** 27800473
Abstract
BACKGROUND: Emerging literature suggests that mobility and cognition are linked. Epidemiological data support a negative association between cognition and falls among cognitively intact older adults. A small number of intervention studies found that regimented cognitive training (CT) improves mobility among this population, suggesting that CT may be an under-explored approach toward reducing falls. To date, no studies have examined the impact of CT on balance among those who are cognitively impaired. The purpose of this study was to assess the feasibility of implementing a CT program among cognitively impaired older adults and examine whether there are potential improvements in balance following CT.
METHOD: A single group repeated measures design was used to identify change in balance, depressive symptoms, and global cognition. A mixed method approach was employed to evaluate the feasibility of a CT intervention among a cohort of cognitively impaired older adults. CT was delivered in a group 2 days/week over 10 weeks using an online brain exercise program, Posit Science Brain HQ (20 h). All participants completed a one-on-one data collection interview at baseline and post-program.
RESULTS: Participants (N = 20) were on average 80.5 years old and had mild to moderate cognitive impairment. Following the 10-week CT intervention, mean scores on 4 of the 5 balance measures improved among CT participants. Although none of the balance improvements reached significance, these findings are promising given the small sample size. Depressive symptoms significantly improved between baseline and 10 weeks ($p = 0.021$). Mean global cognition also improved across the study period, but neither of these improvements were statistically significant. Based on participant responses, the CT program was feasible for this population.
CONCLUSION: This study provides support for the feasibility of implementing a CT program among cognitively impaired older adults in an adult day setting. Our findings also add to emerging literature that CT may be a novel and innovative approach to fall prevention among older adults.
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Dual tasking for the differentiation between depression and mild cognitive impairment
Metzger FG, Hobert MA, Ehlis AC, Hasmann SE, Hahn T, Eschweiler GW, Berg D, Fallgatter AJ, Maetzler W.
Front. Aging Neurosci. 2016; 8: 235.
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(Copyright © 2016, Frontiers Research Foundation)
DOI 10.3389/fnagi.2016.00235 **PMID** 27790136
Abstract
Differentiation of mild cognitive impairment from depression in elderly adults is a clinically relevant issue which is not sufficiently solved. Gait and dual task (DT) parameters may have the potential to complement current diagnostic work-up, as both dementia and depression are associated with changes of gait and DT parameters.
METHODS: Seven hundred and four participants of the TREND study (Tübinger evaluation of Risk

factors for Early detection of NeuroDegeneration) aged 50-80 years were assessed using the Consortium to Establish a Registry for Alzheimer's Disease Plus test battery for testing cognition and Beck's Depression Inventory for evaluation of depression. Based on these results, four groups were defined: acute depressed (N = 53), cognitively mildly impaired (N = 97), acute depressed, and cognitively mildly impaired (N = 15), and controls (N = 536). Participants underwent a 20 m walk and checking boxes task under single (ST) and DT conditions. ST and DT performance and dual task costs (DTC) were calculated. Due to the typical age of increasing incidence of depressive and also cognitive symptoms, the 7th decade was calculated separately.
RESULTS: ST speeds of gait and checking boxes, DT walking speed, and walking DTC were significantly different between groups. Healthy controls were the fastest in all paradigms and cognitively mildly impaired had higher DTC than depressed individuals. Additionally, we constructed a multivariate predictive model differentiating the groups on a single-subject level.
CONCLUSION: DT parameters are simply and comfortably measureable, and DTC can easily be determined. The combination of these parameters allows a differentiation of depressed and cognitively mildly impaired elderly adults.
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Higher order balance control: distinct effects between cognitive task and manual steadiness constraint on automatic postural responses
Coelho DB, Bourlinova C, Teixeira LA.
Hum. Mov. Sci. 2016; 50: 62-72.
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DOI 10.1016/j.humov.2016.10.008 **PMID** 27788372
Abstract
In the present experiment, we aimed to evaluate the interactive effect of performing a cognitive task simultaneously with a manual task requiring either high or low steadiness on APRs. Young volunteers performed the task of recovering upright balance following a mechanical perturbation provoked by unanticipatedly releasing a load pulling the participant's body backwards. The postural task was performed while holding a cylinder steadily on a tray. One group performed that task under high (cylinder' round side down) and another one under low (cylinder' flat side down) manual steadiness constraint. Those tasks were evaluated in the conditions of performing concurrently a cognitive numeric subtraction task and under no cognitive task. Analysis showed that performance of the cognitive task led to increased body and tray displacement, associated with higher displacement at the hip and upper trunk, and lower magnitude of activation of the GM muscle in response to the perturbation. Conversely, high manual steadiness constraint led to reduced tray velocity in association with lower values of trunk displacement, and decreased rotation amplitude at the ankle and hip joints. We found no interactions between the effects of the cognitive and manual tasks on APRs, suggesting that they were processed in parallel in the generation of responses for balance recovery.

Modulation of postural responses from the manual and cognitive tasks indicates participation of higher order neural structures in the generation of APRs, with postural responses being affected by

multiple mental processes occurring in parallel.
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Home-delivered meals and risk of self-reported falls: results from a randomized trial
Thomas KS, Parikh RB, Zullo AR, Dosa D.
J. Appl. Gerontol. 2016; ePub(ePub): ePub.
Affiliation: US Department of Veterans Affairs, Providence, RI, USA.

DOI 10.1177/0733464816675421 **PMID** 27798291
Abstract
The purpose of this study was to evaluate whether home-delivered meals, and the frequency of delivery, reduces self-reported falls among homebound older adults. Data come from a randomized parallel three-arm study of 371 older adults on seven Meals on Wheels programs' waiting lists. Participants were randomly assigned to receive (a) daily meal delivery (n = 139); (b) once weekly, frozen meal delivery (n = 106); or (c) control, remain on the waiting list for meals (n = 126). Participants were surveyed at baseline and 15 weeks post randomization. At follow-up, 36 (28.6%) in the control group, 29 (27.4%) receiving once weekly delivered meals, and 33 (23.7%) receiving daily delivered meals reported a fall (compared with control, daily meal risk ratio [RR] = 0.83, 95% confidence limits [CL] = [0.55, 1.25]; frozen meal RR = 0.96, 95%CL = [0.63, 1.45]). Our study suggests that daily delivered meals may reduce the risk of falls. Additional work is needed to understand the effect of meals on falls, particularly among previous fallers, a high-risk subgroup.
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Person-centered fall risk awareness perspectives: clinical correlates and fall risk
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J. Am. Geriatr. Soc. 2016; ePub(ePub): ePub.
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DOI 10.1111/jgs.14375 **PMID** 27801936
Abstract
OBJECTIVES: To identify clinical correlates of person-centered fall risk awareness and their validity for predicting falls.
DESIGN: Prospective cohort study.
SETTING: Community.
PARTICIPANTS: Ambulatory community-dwelling older adults without dementia (N = 316; mean age 78, 55% female).
MEASUREMENTS: Fall risk awareness was assessed using a two-item questionnaire that asked participants about overall likelihood of someone in their age group having a fall and their own personal risk of falling over the next 12 months. Incident falls were recorded over study follow-up.
RESULTS: Fifty-three participants (16.8%) responded positively to the first fall risk awareness question about being likely to have a fall in the next 12 months, and 100 (31.6%) reported being at personal risk of falling over the next 12 months. There was only fair correlation (κ = 0.370) between responses on the two questions. Prior falls and depressive symptoms were associated with positive responses on both fall risk awareness questions. Age and other established fall risk factors were not

associated with responses on either fall risk awareness question. The fall risk awareness questionnaire did not predict incident falls or injurious falls.
CONCLUSION: Fall risk awareness is low in older adults. Although person-centered fall risk awareness is not predictive of falls, subjective risk perceptions should be considered when designing fall preventive strategies because they may influence participation and behaviors.

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Ramadan fasting effects on postural control in the elderly: a comparison between fallers and non-fallers

Laatar R, Baccouch R, Borji R, Kachouri H, Rebai H, Sahli S.
J. Relig. Health 2016; ePub(ePub): ePub.
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DOI 10.1007/s10943-016-0323-7 **PMID** 27804006
Abstract
Our purpose was to compare the effects of Ramadan fasting on postural control in elderly fallers and non-fallers. The protocol involved twenty-four healthy old volunteer males divided into two groups: fallers (mean age = 75.43 ± 5.26 years, weight = 67.25 ± 5.30 kg and height = 1.65 ± 0.02 m) and non-fallers (mean age = 72.3 ± 6.42 years, weight = 65.5 ± 6.15 kg and height = 1.64 ± 0.03 m). Participants performed a simple reaction time test (SRT) and a postural control protocol on four different occasions: one week before Ramadan (BR), during the second (SWR) and the fourth week (FWR) of Ramadan and three weeks after Ramadan (AR). Center of pressure (CoP) parameters [the CoP medial-lateral length (CoPX), and the CoP antero-posterior length (CoPY)] were assessed using a force platform under two surface conditions: Firm surface and Foam surface. The results showed that Ramadan fasting influences similarly fallers and non-fallers. In fact, for both groups, the CoPX and the CoPY values increased significantly during the SWR and the FWR compared to BR. These CoP parameters decreased significantly in the Firm surface conditions in the FWR. Moreover, the CoP parameters were significantly higher during the FWR and AR in comparison with BR in the Foam surface conditions. However, the amplitude of increase of the CoP[X] % and the CoP[Y] % (ΔCoP[X] % and ΔCoP[Y] %) between BR and the SWR was significantly higher in the fallers than non-fallers. The SRT of elderly fallers and non-fallers was significantly higher in the SWR and in the FWR compared to BR. In conclusion, Ramadan fasting alters similarly postural control of elderly fallers and non-fallers, but the amplitude (ΔCoP[X] % and ΔCoP[Y] %) of this alteration seems to be more pronounced in fallers than non-fallers. A probable beginning of adaptation occurs at the FWR. However, three weeks seems to be insufficient to recover postural control alterations due to Ramadan fasting in difficult sensory conditions in elderly fallers and non-fallers.
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Social isolation and loneliness: prospective associations with functional status in older adults

Shankar A, McMunn A, Demakakos P, Hamer M, Steptoe A.
Health Psychol. 2016; ePub(ePub): ePub.

DOI 10.1037/hea0000437 **PMID**27786518
Abstract
OBJECTIVE: The present analysis aimed to examine the associations of isolation and loneliness, individually as well as simultaneously, with 2 measures of functional status (gait speed and difficulties in activities of daily living) in older adults over a 6-year period using data from the English Longitudinal Study of Ageing, and to assess if these associations differ by SES.
METHOD: Loneliness was measured using the short form of the Revised UCLA scale, and an index of social isolation was computed incorporating marital status; frequency of contact with friends, family, and children; and participation in social activities. Measures of functional status were assessed identically at baseline and 6 years later for 3070 participants (mean age 69 years). Wealth was used as an indicator of SES.
RESULTS: In fully and mutually adjusted models, social isolation and loneliness were found to be associated with a decrease in gait speed at follow-up, with stronger effects among more disadvantaged individuals. Loneliness was associated with an increase in difficulties with activities of daily living.
CONCLUSIONS: Isolation and loneliness were adversely associated with different aspects of functional status. Interventions to reduce isolation and loneliness may be particularly beneficial for individuals in disadvantaged groups. (PsycINFO Database Record
(c) 2016 APA, all rights reserved).
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The effect of unilateral osteoarthritis of the hip on postural balance disorders
Truszczyńska A, Trzaskoma Z, Białecki J, Drzał-Grabiec J, Dadura E, Rąpała K, Tarnowski A.
Hip Int. 2016; ePub(ePub): ePub.
Affiliation: Psychology Faculty, Warsaw University, Warsaw - Poland.

DOI 10.5301/hipint.5000395 **PMID** 27229165
Abstract
BACKGROUND: Postural stability is of great importance because imbalances and muscle weakness are significant risk factors for falls experienced by the elderly. Hip arthrosis, which causes pain and gait disorders that affect balance control, is common in the ageing population.
AIM: The aim of this study was to assess postural stability in patients with unilateral hip arthrosis before total hip arthroplasty.
METHODS: The study population consisted of 52 patients with hip arthrosis (study group) and 47 subjects with no history of clinical symptoms of hip pain. The groups did not differ statistically in terms of age and BMI. Static balance was assessed by conducting a quantitative analysis of balance reaction parameters in a quiet standing position with the eyes open and closed.
RESULTS: Analysis of the collected data revealed numerous statistically significant differences between patients with unilateral hip arthrosis before total hip arthoplasty and the asymptomatic group for parameters tested with eyes closed ($p<0.05$). We observed higher values of total length of centre of pressure (COP), sway path (SP), length of COP path in the medial-lateral plane (SPML), maximal amplitude between the 2 most distant points in the medial-lateral plane (MaxML), mean

COP velocity (MV), and mean COP velocity in medial-lateral (MVML) in the study group.
PDF Endnote

The evolution of gerontology and geriatrics in an era of a politics of aging
Torres-Gil FM.
Gerontol. Geriatr. Educ. 2016; ePub(ePub): 1-5.
Affiliation: Departments of Social Welfare and Public Policy , UCLA , Los Angeles , California , USA.

DOI 10.1080/02701960.2016.1232594 **PMID** 27648865
Abstract
The fields of gerontology and geriatrics are facing unprecedented changes, pressures, and opportunities. The 21st century requires that we utilize contemporary approaches to modernizing these disciplines for new populations, new cohorts and new social, economic and political demands. This article draws on the authors professional, academic, and public policy experiences to suggest initiatives and paradigms that can set a road map to both change the last centuries' notions of longevity and social supports to one that accounts for technology, varied cohorts, a public/private sector divide, and the nexus of aging and diversity.
PDF Y Endnote Y

A study on the reliability of measuring dynamic balance ability using a smartphone
Han S, Lee D, Lee S.
J. Phys. Ther. Sci. 2016; 28(9): 2515-2518.
Affiliation: Department of Physical Therapy, U1 University, Republic of Korea.

DOI 10.1589/jpts.28.2515 **PMID**27799682
Abstract [
PURPOSE: Evaluation of the reliability of smartphones as measuring equipment for dynamic balance ability was the goal of this study.
[SUBJECTS AND METHODS: Subjects were 30 healthy young students in their 20s. The first and second rounds of measurements were taken at a one-day interval to confirm test-retest reliability. The subjects stood on the footboard of the Biodex Balance System. Balance was measured using a smart phone.
RESULTS: Acceleration rates corresponding to subjects with open eyes were 2.7 ± 2.2 (first measurement) and 3.3 ± 1.5 (second measurement), and the interclass correlation coefficient ICC (1,1) was 0.8. Acceleration rates corresponding to subjects with closed eyes were 4.1 ± 2.4 (first measurement) and 4.5 ± 1.8 (second measurement), and the ICC (1,1) was 0.9. Gyroscope rates corresponding to subjects with open eyes were 1.7 ± 1.2 (first measurement) and 2.3 ± 1.5 (second measurement), and the ICC (1,1) was 0.7. Gyroscope rates corresponding to subjects with closed eyes were 6.7 ± 2.4 (first measurement) and 6.6 ± 2.3 (second measurement), and the ICC (1,1) was 0.6.
CONCLUSION: The results of this study suggest that smartphones have sufficient potential as measuring equipment for dynamic balance ability.
PDF Y Endnote Y

Accelerometer and camera-based strategy for improved human fall detection

Zerrouki N, Harrou F, Sun Y, Houacine A.

J. Med. Syst. 2016; 40(12): e284.

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DOI 10.1007/s10916-016-0639-6 **PMID** 27796842

Abstract

In this paper, we address the problem of detecting human falls using anomaly detection. Detection and classification of falls are based on accelerometric data and variations in human silhouette shape. First, we use the exponentially weighted moving average (EWMA) monitoring scheme to detect a potential fall in the accelerometric data. We used an EWMA to identify features that correspond with a particular type of fall allowing us to classify falls. Only features corresponding with detected falls were used in the classification phase. A benefit of using a subset of the original data to design classification models minimizes training time and simplifies models. Based on features corresponding to detected falls, we used the support vector machine (SVM) algorithm to distinguish between true falls and fall-like events. We apply this strategy to the publicly available fall detection databases from the university of Rzeszow's.

RESULTS indicated that our strategy accurately detected and classified fall events, suggesting its potential application to early alert mechanisms in the event of fall situations and its capability for classification of detected falls. Comparison of the classification results using the EWMA-based SVM classifier method with those achieved using three commonly used machine learning classifiers, neural network, K-nearest neighbor and naïve Bayes, proved our model superior.

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Objective gait and balance impairments relate to balance confidence and perceived mobility in people with Parkinson disease

Curtze C, Nutt JG, Carlson-Kuhta P, Mancini M, Horak FB.

Phys. Ther. 2016; 96(11): 1734-1743.

Affiliation: F.B. Horak, PhD, Department of Neurology, School of Medicine, Oregon Health & Science University, and Veterans Affairs Portland Health Care System, Portland, Oregon.

DOI 10.2522/ptj.20150662 **PMID** 27149959 **PMCID** PMC5088223

Abstract

BACKGROUND: Body-worn, inertial sensors can provide many objective measures of balance and gait. However, the objective measures that best reflect patient perception of mobility disability and clinician assessment of Parkinson disease (PD) are unknown.

OBJECTIVE: The purposes of this study were: (1) to determine which objective measures of balance and gait are most related to patient perception of mobility disability and disease severity in people with PD and (2) to examine the effect of levodopa therapy on these correlates.

DESIGN: This was an experimental correlation study.

METHODS: One hundred four people with idiopathic PD performed 3 trials of the Instrumented Stand and Walk Test (ISAW) in the "on" and "off" medication states. The ISAW consists of quiet standing (30 seconds), gait initiation, straight walking (7 m), and turning (180°), yielding 34 objective measures of mobility from body-worn inertial sensors. Patient perception of mobility disability was

assessed with the Activities-specific Balance Confidence (ABC) scale and the mobility subscale of the Parkinson's Disease Questionnaire (PDQ-39). Disease severity was assessed with the Unified Parkinson's Disease Rating Scale, part III (motor UPDRS). Spearman correlations were used to relate objective measures of mobility to patient perception and disease severity.
RESULTS: Turning speed, gait speed, and stride length were most highly correlated to severity of disease and patient perception of mobility disability. The objective measures of mobility in the off-medication state were more indicative of patient perception of mobility disability and balance confidence compared with on-medication state measures. LIMITATIONS: Causation is an inherent problem of correlation studies.
CONCLUSION: Physical therapists should evaluate mobility in people with PD in the off-medication state because the off-medication state is more related to disease severity and patient perception of mobility disability than the on-medication state mobility. Assessment and treatment of mobility in people with PD should target specific measures (ie, turning, gait speed, and stride length) because these measures best reflect patients' quality of life and balance confidence.

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Preoperative and postoperative serial assessments of postural balance and fall risk in patients with arthroscopic anterior cruciate ligament reconstruction
Gokalp O, Akkaya S, Akkaya N, Büker N, Gungor HR, Ok N, Yorukoglu C.
J. Back Musculoskelet. Rehabil. 2016; 29(2): 343-350.
Affiliation: Department of Orthopedics and Traumatology, Medicine Faculty, Pamukkale University, Denizli, Turkey.

DOI 10.3233/BMR-160659 **PMID** 26836842
Abstract
BACKGROUND: Impaired postural balance due to somatosensory data loss with mechanical instability has been shown in patients with ACL deficiency.
OBJECTIVE: To assess postural balance in patients with ACL insufficiency prior to surgery and following reconstruction with serial evaluations.
METHODS: Thirty patients (mean age of 27.7 ± 6.7 years) who underwent arthroscopic reconstruction of ACL with bone-patellar tendon-bone autograft were examined for clinical and functional variables at preoperative day and postoperative 12th week. Posturographic analysis were performed by using Tetrax Interactive Balance System (Sunlight Medical Ltd, Israel) at preoperative day, at 4th, 8th, and 12th weeks following reconstruction. Data computed by posturographic software by the considerations of the oscillation velocities of body sways is fall risk as a numeric value (0-100, lower values indicate better condition).
RESULTS: All of the patients (mean age of 27.7 ± 6.7 years) had significant improvements for clinical, functional evaluations and fall risk ($p< 0.05$). Mean fall risk was within high-risk category (59.9 ± 22.8) preoperatively. The highest fall risk was detected at postoperative 4th week. Patients had high fall risk at 8th week similar to preoperative value. Mean fall risk decreased to low level risk at 12th week. Preoperative symptom duration had relationships with preoperative fall risk and postoperative improvement of fall risk ($p= 0.001$, $r= -0.632$, $p= 0.001$, $r= -0.870$, respectively). The improvement of fall risk was higher in patients with symptoms shorter than 6 months ($p= 0.001$).

CONCLUSIONS: According to these results, mean fall risk of patients with ACL insufficiency was within high risk category preoperatively, and fall risk improves after surgical reconstruction, but as the duration of complaints lengthens especially longer than 6 months, the improvement of fall risk decreases following reconstruction.

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Primary and secondary gait deviations of stroke survivors and their association with gait performance

Kim HS, Chung SC, Choi MH, Gim SY, Kim WR, Tack GR, Lim DW, Chun SK, Kim JW, Mun KR.

J. Phys. Ther. Sci. 2016; 28(9): 2634-2640.

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DOI 10.1589/jpts.28.2634 **PMID**27799710

Abstract

PURPOSE: Stroke survivors exhibit abnormal pelvic motion and significantly deteriorated gait performance. Although the gait of stroke survivors has been evaluated at the primary level pertaining to ankle, knee, and hip motions, secondary deviations involving the pelvic motions are strongly related to the primary level. Therefore, the aim of this study was to identify the kinematic differences of the primary and secondary joints and to identify mechanism differences that alter the gait performance of stroke survivors.

SUBJECTS AND METHODS: Five healthy subjects and five stroke survivors were recruited. All the subjects were instructed to walk at a self-selected speed. The joint kinematics and gait parameters were calculated.

RESULTS: For the stroke survivors, the range of motion of the primary-joint motions were significantly reduced, and the secondary-joint motions were significantly increased. Additionally, for the healthy subjects, the primary joint kinematics were the main factors ensuring gait performance, whereas for the stoke survivors, the secondary-joint motions were the main factors.

CONCLUSION: The results indicate that while increasing the range of motion of primary-joint movements is the main target to achieve, there is a strong need to constrain and support pelvic motions in order to improve the outcome of gait rehabilitation.

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Risk factors related to caregivers in hospitalized children's falls

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J. Pediatr. Nurs. 2016; ePub(ePub): ePub.

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DOI 10.1016/j.pedn.2016.10.006 **PMID** 27802878

Abstract

PURPOSE: This study aimed to evaluate the risk factors for falls in hospitalized children in relation to their caregivers.

METHODS: This was a case control study to evaluate the risk factors for falls in hospitalized children in relation to their caregivers. The children included in our study were at the hospital between June

2014 and June 2015. Demographic data of patients, caregivers, some habits; education level; and number of siblings were recorded.
RESULTS: The data of 117 patients were evaluated, and there were 39 patients with a fall event and 78 patients who did not experience a fall. The mean age for the fall group and the non-fall group were 14.71±9.36 and 15.62±10.65months, respectively. The mean age for the caregivers of the fall group and the non-fall group were 29.33±5.89 and 29.53±5.56years, respectively. There was a statistically significant difference in fall risk related to the caregivers' education level ($p<0.01$) and caregivers' habit of smoking ($p<0.01$). The analysis of risk factors related to caregivers for pediatric inpatient falls, by multivariate logistic regression, showed that low educational level of caregivers (OR=0.361; CI=0.196-0.665; $p<0.01$), caregivers' smoking (OR=4.863; CI=1.058-22.358; $p<0.05$) and increased length of stay for the children (OR=1.994; CI=1.475-2.696; $p<0.01$) carried a higher risk for pediatric inpatient falls.
CONCLUSIONS AND PRACTICE IMPLICATIONS: The data obtained in our study have shown that caregivers play a key role in fall events in hospitalized children. Nurses and other health workers should consider children's caregivers educational level and habits for prevention of hospitalized children falls.

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Study of acceleration of center of mass during sit-to-stand and stand-to-sit in patients with stroke
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*J. Phys. Ther. Sc*i. 2016; 28(9): 2457-2460.
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DOI 10.1589/jpts.28.2457 **PMID**27799669
Abstract
PURPOSE: The purpose of this study was to compare the center of mass during sit-to-stand and stand-to-sit activities in the timed up and go test between healthy subjects and patients with stroke.
SUBJECTS AND METHODS: Thirty healthy participants and thirty patients with stroke volunteered for this study. Acceleration of the center of mass was measured using a wireless tri-axial accelerometer during sit-to-stand and stand-to-sit activities in the timed up and go test. Accelerometer data were analyzed using BTS G-studio software.
RESULTS: The phase duration was significantly longer and the anterior-posterior, mediolateral, and vertical acceleration ranges were significantly lower during sit-to-stand for patients with stroke than for healthy controls. Further, phase duration and the mediolateral acceleration range during stand-to-sit differed significantly between healthy controls and subjects with stroke.
CONCLUSIONS: During training for the sit-to-stand activity, the focus should be all three balance dimensions, but during training for the stand-to-sit activity, the focus should be on improving mediolateral balance and asymmetrical foot positioning should be recommended.
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The diagnostic accuracy of the Berg balance scale in predicting falls
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West. J. Nurs. Res. 2016; ePub(ePub): ePub.

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DOI 10.1177/0193945916670894 **PMID** 27784833
Abstract

This study aimed to evaluate the predictive validity of the Berg Balance Scale (BBS) as a screening tool for fall risks among those with varied levels of balance. A total of 21 studies reporting predictive validity of the BBS of fall risk were meta-analyzed. With regard to the overall predictive validity of the BBS, the pooled sensitivity and specificity were 0.72 and 0.73, respectively; the accuracy curve area was 0.84. The findings showed statistical heterogeneity among studies. Among the sub-groups, the age group of those younger than 65 years, those with neuromuscular disease, those with 2+ falls, and those with a cutoff point of 45 to 49 showed better sensitivity with statistically less heterogeneity. The empirical evidence indicates that the BBS is a suitable tool to screen for the risk of falls and shows good predictability when used with the appropriate criteria and applied to those with neuromuscular disease.

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The weight-bearing exercise for better balance program improves strength and balance in osteopenia: a randomized controlled trial

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J. Phys. Ther. Sci. 2016; 28(9): 2576-2580.
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DOI 10.1589/jpts.28.2576 **PMID**27799698
Abstract

PURPOSE: This study investigated the effect of the Weight-bearing Exercise for Better Balance program on the strength of hip flexors, extensors, abductors, adductors, and knee flexors and extensors and balance in osteopenia.

SUBJECTS AND METHODS: Twenty-four postmenopausal females with osteopenia volunteered to participate in this study and were randomly assigned into two equal groups of 12: the experimental and control groups. The Weight-bearing Exercise for Better Balance program was applied to the experimental group, while the control group did not receive any treatment. Isokinetic peak torque per body weight values of the hip flexors, extensors, abductors, adductors, and knee flexors and extensors were measured by Biodex System 3 isokinetic dynamometer for both groups before and after six weeks of the program. Balance was assessed in both groups using the Berg Balance Scale.

RESULTS: There was a statistically significant increase in post-intervention mean values of all measured variables compared with pre-intervention values in the experimental group. Also, there was a statistically significant increase in post-intervention mean values of all measured variables except for those of the hip extensors in the experimental group compared with the control group.

CONCLUSION: The weight-bearing exercise for better balance program has significant effects on lower extremity muscle strength and body balance in postmenopausal females with osteopenia.
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Validating the BTrackS Balance Plate as a low cost alternative for the measurement of sway-induced center of pressure

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

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DOI 10.1016/j.jbiomech.2016.10.020 **PMID** 27789036

Abstract

The BTrackS Balance Plate (BBP) is a low-cost force plate that provides objective balance assessment and true portability for the user. Given that this technology is relatively new, the purpose of the present study was to provide the first center of pressure (COP) validation of the BBP. Two BBP devices (one new and one used) were compared with a laboratory-grade force plate (LFP) during simultaneous collection of COP that was induced by an inverted pendulum device with human-like sway characteristics. The results of this study showed almost perfect agreement between the BBP devices and the LFP (ICC>0.999), as well as a high degree of BBP accuracy (<1% error magnitude) and precision (<0.2mm regression residuals). These results suggest the BBP can serve as an effective, low-cost solution for objective balance testing in the laboratory or clinic.

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Virtual reality reflection therapy improves balance and gait in patients with chronic stroke: randomized controlled trials

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DOI unavailable **PMID** 27791207

Abstract

BACKGROUND Virtual reality reflection therapy (VRRT) is a technically enhanced version of the mirror therapy concept. The aim of this study was to investigate whether VRRT could improve the postural balance and gait ability of patients with chronic stroke. MATERIAL AND METHODS Twenty-five patients with chronic stroke were randomly allocated into the VRRT group (n=13) and the control group (n=12). The participants in both groups performed a conventional rehabilitation program for 30 minutes. The VRRT group also performed a VRRT program for 30 minutes, five times a week for 4 weeks. The control group performed conventional rehabilitation program and a placebo VRRT program. Outcome measures included Berg Balance Scale (BBS), the Functional Reaching Test (FRT), and the Timed Up and Go (TUG) test (for dynamic balance ability), postural sway (for static balance ability), and 10 meter walking velocity (10 mWV) for gait ability.

RESULTS There were statistically significant improvements in the VRRT group compared with the control group for BBS, FRT, TUG, postural sway (mediolateral sway distance with eyes open and eyes closed, anteroposterior and total sway distance with eyes open but not with eyes closed), and 10 mWV ($p<0.05$).

CONCLUSIONS Applying VRRT (even as a home treatment) along with a conventional rehabilitation program for patients with chronic stroke might be even more beneficial than conventional rehabilitation program alone in improving affected lower limb function. Future studies should investigate the effectiveness of VRRT with optimal patient selection, and duration and intensity of training.

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