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Association of walk ratio during normal gait speed and fall in community-dwelling elderly people

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Abstract

BACKGROUND: Walk ratio (WR), calculated by dividing step length by cadence, can be used to represent the gait characteristics of human beings to maintain their gait speed.

RESEARCH QUESTION: The aim of this study was to examine whether WR could distinguish fallers from community-dwelling elderly people.

METHODS: We recruited 9205 elderly people (mean age: 73.7 ± 5.6 years, 4218 men and 4987 women) from the National Center for Geriatrics and Gerontology - Study of Geriatric Syndromes. Fall history was assessed by face-to-face interview, and "fallers" were defined as people who had fallen at least once within the past year. WR was calculated as corrected step length divided by corrected cadence, and we divided the subjects into three groups according to the tertile of WR (T1, T2, and T3). We also stratified the participants by gait speed (<1.0 or ≥1.0 m/s).

RESULTS: With reference to the T3 group, the T1 group had a higher odds ratio (OR) of falling in the past year [OR: 1.24, 95% confidence interval (CI): 1.09-1.41], even after adjusting for other covariates. After stratification by gait speed, the same multivariate analyses were conducted. In the participants who walked at 1.0 m/s or faster, the T1 group had a higher OR [1.27, 95% confidence interval (CI): 1.10-1.48], while there was no significant association with fall rate among those who walked slower than 1.0 m/s. **SIGNIFICANCE:** This study revealed that the smallest WR was independently associated with falling in the past year among community-dwelling elderly people, especially elderly people with no deterioration of gait speed. These results suggest that intervention regarding gait pattern, especially WR, would help to prevent falls.

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Associations between gait speed and well-known fall risk factors among community-dwelling older adults

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Abstract

BACKGROUND AND PURPOSE: Exercise interventions are effective at preventing falls in community-dwelling older adults, especially before disability is present. Gait speed below 1.0 m/s is a strong predictor for falls in the elderly. However, evidence is sparse for gait speed alone being sufficient to identify individuals at a high risk of falling. This study aimed to describe the prevalence of fall risk



factors among community-dwelling older adults in their late 70s and to investigate the associations between these risk factors and low gait speed in this population.

METHODS: This cross-sectional cohort study comprised 108 elderly living in a small Norwegian municipality, born between 1936 and 1938. Exclusion criteria were living in residential care, inability to walk 4 m, and severe cognitive impairment. Measurements included gait speed, depressive symptoms, executive functions, fear of falling, vision function, fall history, body mass index, medications, and comorbidity. Gait speed was dichotomized using a cut-off of 1 m/s, and associations between different risk factors and low gait speed was explored using logistic regression analysis.

RESULTS: Mean gait speed was 1.0 ± 0.3 m/s. In 44.4% of the participants, gait speed was below 1.0 m/s, indicating increased fall risk. Low gait speed was significantly associated with a history of multiple falls (odds ratio [OR] = 3.70, 95% CI [1.18, 11.65]), low educational level (OR = 3.58, 95% CI [1.10, 11.66]), higher number of medications (OR = 4.28, 95% CI [1.63, 11.2]), and higher number of depressive symptoms (OR = 1.31, 95% CI [1.09, 1.58]). We found no significant associations between gait speed and comorbidity, sex, vision, executive functions, or fear of falling.

CONCLUSION: Our results indicate that gait speed with cut-off 1.0 m/s could represent a useful tool for identifying individuals who are vulnerable but not yet disabled and could benefit from fall-preventive exercise. However, extended assessment is probably needed to personalize interventions.

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Can occupational therapist-led home environmental assessment prevent falls in older people? A modified cohort randomised controlled trial protocol

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Abstract

INTRODUCTION: Falls and fall-related injuries are a serious cause of morbidity and cost to society. Environmental hazards are implicated as a major contributor to falls among older people. A recent Cochrane review found an environmental assessment, undertaken by an occupational therapist, to be an effective approach to reducing falls. However, none of the trials included a cost-effectiveness evaluation in the UK setting. This protocol describes a large multicentre trial investigating the clinical and cost-effectiveness of environmental assessment and modification within the home with the aim of preventing falls in older people.

METHODS AND ANALYSIS: A two-arm, modified cohort randomised controlled trial, conducted within England, with 1299 community-dwelling participants aged 65 years and above, who are at an increased risk of falls. Participants will be randomised 2:1 to receive either usual care or home assessment and modification. The primary outcome is rate of falls (falls/person/time) over 12 months assessed by monthly patient self-report falls calendars. Secondary self-reported outcome measures include: the proportion of single and multiple fallers, time to first fall over a 12-month

period, quality of life (EuroQoL EQ-5D-5L) and health service utilisation at 4, 8 and 12 months. A nested qualitative study will examine the feasibility of providing the intervention and explore barriers, facilitators, workload implications and readiness to employ these interventions into routine practice. An economic evaluation will assess value for money in terms of cost per fall averted.

ETHICS AND DISSEMINATION: This study protocol (including the original application and subsequent amendments) received a favourable ethical opinion from National Health Service West of Scotland REC 3. The trial results will be published in peer-reviewed journals and at conference presentations. A summary of the findings will be sent to participants. **TRIAL REGISTRATION NUMBER:** ISRCTN22202133; Pre-results.

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Correlates of changes in walking during the retirement transition: the Multi-Ethnic Study of Atherosclerosis

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Abstract

Retirement from employment involves disruption in daily routines and has been associated with positive and negative changes in physical activity. Walking is the most common physical activity among older Americans. The factors that influence changes in walking after retirement are unknown. The study objective was to identify correlates of within-person change in recreational walking (for leisure) and transport walking (to get places) during the retirement transition among a multi-ethnic cohort of adults (N = 928) from six US communities. Correlates were measured at the individual (e.g., gender), interpersonal (e.g., social support), and community (e.g., density of walking destinations) levels at study exams between 2000 and 2012. Comparing pre- and post-retirement measures (average 4.5 years apart), 50% of participants increased recreational walking by 60 min or more per week, 31% decreased by 60 min or more per week, and 19% maintained their recreational walking. Forty-one percent of participants increased transport walking by 60 min or more per week, 40% decreased by 60 min or more per week, and 19% maintained their transport walking after retirement. Correlates differed for recreational and transport walking and for increases compared to decreases in walking. Self-rated health, chronic conditions, and perceptions of the neighborhood walking environment were associated with changes in both types of walking after retirement. Further, some correlates differed by gender and retirement age. **FINDINGS** can inform the targeting of interventions to promote walking during the retirement transition.

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Difference scores between single-task and dual-task gait measures are better than clinical measures for detection of fall-risk in community-dwelling older adults

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Gait Posture 2018; 66: 155-159.



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Abstract

BACKGROUND: As the proportion of older adults in the population increases, so does the associated prevalence of falls, making falls the leading cause of fatal and nonfatal injuries among adults aged ≥ 65 years. In response, researchers and clinicians seek to develop a clinical tool that accurately predicts fall risk. These investigations have included measures of clinical mobility and balance tests, strength, physiologically based tests, postural sway, and mean and variability of gait measures. To date, no study has concurrently explored all these measures to determine which measures, alone or in combination, emerge as the most predictive of fall risk. While there is evidence that dual-task gait conditions are sensitive indicators of fall risk, difference scores between dual-task and single-task gait conditions (DS) have not been explored.

RESEARCH QUESTION: This study included outcome measures representing diverse domains (clinical mobility and balance, strength, physiological, postural sway, and mean and variability of difference scores between dual- and single-task gait conditions) to determine the combination of measures that were the most sensitive for retrospectively classifying fallers from non-fallers.

METHODS: Forty-two (mean: 75.8 yrs \pm 3.3) community-dwelling older adults completed a comprehensive battery of 76 measures and classified into two groups based on self-report of having one or more falls in the previous year.

RESULTS: Results suggest that 11 measures captured the salient characteristics of the total cohort (fallers (N = 27) and non-fallers (N = 15) and that five gait measures were sufficient for correctly classifying fallers and non-fallers with 92.3% sensitivity and 66.7% specificity with a total model classification of 82.9%.

SIGNIFICANCE: The five variables comprise mean DS of stride timing, stride width, and stride length and DS in variability for stride width and stride velocity demonstrating that difference in performance between dual-task and single-task gait trials was essential for discriminating fallers and superior to other measures.

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Evaluation of the Tinetti score and fall risk assessment via accelerometry-based movement analysis

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Artif. Intell. Med. 2018; ePub(ePub): ePub.

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Abstract



Gait and balance disorders are among the main predisposing factors of falls in elderly. Clinical scales are widely employed to assess the risk of falling, but they require trained personnel. We investigate the use of objective measures obtained from a wearable accelerometer to evaluate the fall risk, determined by the Tinetti clinical scale. Seventy-nine patients and eleven volunteers were enrolled in two rehabilitation centers and underwent a full Tinetti test, while wearing a triaxial accelerometer at the chest. Tinetti scores were assessed by expert physicians and those subjects with a score ≤ 18 were considered at high risk. First, we analyzed 21 accelerometer features by means of statistical tests and correlation analysis. Second, one regression and one classification problem were designed and solved using a linear model (LM) and an artificial neural network (ANN) to predict the Tinetti outcome. Pearson's correlation between the Tinetti score and a subset of 9 features (mainly related with standing and walking) was 0.71. The misclassification error of high risk patient was 0.21 and 0.11, for LM and ANN, respectively. The work might foster the development of a new generation of applications meant to monitor the time evolution of the fall risk using low cost devices at home. Copyright © 2018 Elsevier B.V. All rights reserved.

PDF Endnote

Interventions for preventing falls in older people in care facilities and hospitals

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Cochrane Database Syst. Rev. 2018; 9: CD005465.

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DOI 10.1002/14651858.CD005465.pub4 **PMID** 30191554

Abstract

BACKGROUND: Falls in care facilities and hospitals are common events that cause considerable morbidity and mortality for older people. This is an update of a review first published in 2010 and updated in 2012.

OBJECTIVES: To assess the effects of interventions designed to reduce the incidence of falls in older people in care facilities and hospitals.

SEARCH METHODS: We searched the Cochrane Bone, Joint and Muscle Trauma Group Specialised Register (August 2017); Cochrane Central Register of Controlled Trials (2017, Issue 8); and MEDLINE, Embase, CINAHL and trial registers to August 2017.

SELECTION CRITERIA: Randomised controlled trials of interventions for preventing falls in older people in residential or nursing care facilities, or hospitals.

DATA COLLECTION AND ANALYSIS: One review author screened abstracts; two review authors screened full-text articles for inclusion. Two review authors independently performed study selection, 'Risk of bias' assessment and data extraction. We calculated rate ratios (RaR) with 95% confidence intervals (CIs) for rate of falls and risk ratios (RRs) and 95% CIs for outcomes such as risk of falling (number of people falling). We pooled results where appropriate. We used GRADE to assess the quality of evidence.

MAIN RESULTS: Thirty-five new trials (77,869 participants) were included in this update. Overall, we included 95 trials (138,164 participants), 71 (40,374 participants; mean age 84 years; 75% women) in care facilities and 24 (97,790 participants; mean age 78 years; 52% women) in hospitals. The majority of trials were at high risk of bias in one or more domains, mostly relating to lack of blinding.

With few exceptions, the quality of evidence for individual interventions in either setting was generally rated as low or very low. Risk of fracture and adverse events were generally poorly reported and, where reported, the evidence was very low-quality, which means that we are uncertain of the estimates. Only the falls outcomes for the main comparisons are reported here.

Care facilities Seventeen trials compared exercise with control (typically usual care alone). We are uncertain of the effect of exercise on rate of falls (RaR 0.93, 95% CI 0.72 to 1.20; 2002 participants, 10 studies; $I^2 = 76\%$; very low-quality evidence). Exercise may make little or no difference to the risk of falling (RR 1.02, 95% CI 0.88 to 1.18; 2090 participants, 10 studies; $I^2 = 23\%$; low-quality evidence). There is low-quality evidence that general medication review (tested in 12 trials) may make little or no difference to the rate of falls (RaR 0.93, 95% CI 0.64 to 1.35; 2409 participants, 6 studies; $I^2 = 93\%$) or the risk of falling (RR 0.93, 95% CI 0.80 to 1.09; 5139 participants, 6 studies; $I^2 = 48\%$). There is moderate-quality evidence that vitamin D supplementation (4512 participants, 4 studies) probably reduces the rate of falls (RaR 0.72, 95% CI 0.55 to 0.95; $I^2 = 62\%$), but probably makes little or no difference to the risk of falling (RR 0.92, 95% CI 0.76 to 1.12; $I^2 = 42\%$). The population included in these studies had low vitamin D levels.

Multifactorial interventions were tested in 13 trials. We are uncertain of the effect of multifactorial interventions on the rate of falls (RaR 0.88, 95% CI 0.66 to 1.18; 3439 participants, 10 studies; $I^2 = 84\%$; very low-quality evidence). They may make little or no difference to the risk of falling (RR 0.92, 95% CI 0.81 to 1.05; 3153 participants, 9 studies; $I^2 = 42\%$; low-quality evidence).

Hospitals Three trials tested the effect of additional physiotherapy (supervised exercises) in rehabilitation wards (subacute setting). The very low-quality evidence means we are uncertain of the effect of additional physiotherapy on the rate of falls (RaR 0.59, 95% CI 0.26 to 1.34; 215 participants, 2 studies; $I^2 = 0\%$), or whether it reduces the risk of falling (RR 0.36, 95% CI 0.14 to 0.93; 83 participants, 2 studies; $I^2 = 0\%$). We are uncertain of the effects of bed and chair sensor alarms in hospitals, tested in two trials (28,649 participants) on rate of falls (RaR 0.60, 95% CI 0.27 to 1.34; $I^2 = 0\%$; very low-quality evidence) or risk of falling (RR 0.93, 95% CI 0.38 to 2.24; $I^2 = 0\%$; very low-quality evidence). Multifactorial interventions in hospitals may reduce rate of falls in hospitals (RaR 0.80, 95% CI 0.64 to 1.01; 44,664 participants, 5 studies; $I^2 = 52\%$). A subgroup analysis by setting suggests the reduction may be more likely in a subacute setting (RaR 0.67, 95% CI 0.54 to 0.83; 3747 participants, 2 studies; $I^2 = 0\%$; low-quality evidence). We are uncertain of the effect of multifactorial interventions on the risk of falling (RR 0.82, 95% CI 0.62 to 1.09; 39,889 participants; 3 studies; $I^2 = 0\%$; very low-quality evidence).

AUTHORS' CONCLUSIONS: In care facilities: we are uncertain of the effect of exercise on rate of falls and it may make little or no difference to the risk of falling. General medication review may make little or no difference to the rate of falls or risk of falling. Vitamin D supplementation probably reduces the rate of falls but not risk of falling. We are uncertain of the effect of multifactorial interventions on the rate of falls; they may make little or no difference to the risk of falling. In hospitals: we are uncertain of the effect of additional physiotherapy on the rate of falls or whether it reduces the risk of falling. We are uncertain of the effect of providing bed sensor alarms on the rate of falls or risk of falling. Multifactorial interventions may reduce rate of falls, although subgroup analysis suggests this may apply mostly to a subacute setting; we are uncertain of the effect of these interventions on risk of falling.

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Predicting an unfavorable course of dizziness in older patients

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Abstract

PURPOSE: Because dizziness in older people is often chronic and can substantially affect daily functioning, it is important to identify those at risk for an unfavorable course of dizziness to optimize their care. We aimed to develop and externally validate a prediction model for an unfavorable course of dizziness in older patients in primary care, and to construct an easy-to-use risk prediction tool.

METHODS: We used data from 2 prospective cohorts: a development cohort with 203 patients aged 65 years or older who consulted their primary care physician for dizziness and had substantial dizziness-related impairment (Dizziness Handicap Inventory [DHI] ≥ 30), and a validation cohort with 415 patients aged 65 years or older who consulted their primary care physician for dizziness of any severity. An unfavorable course was defined as presence of substantial dizziness-related impairment (DHI ≥ 30) after 6 months.

RESULTS: Prevalence of an unfavorable course of dizziness was 73.9% in the development cohort and 43.6% in the validation cohort. Predictors in the final model were the score on the screening version of the DHI, age, history of arrhythmia, and looking up as a provoking factor. The model showed good calibration and fair discrimination (area under the curve = 0.77). On external validation, discriminative ability remained stable (area under the curve = 0.78). The constructed risk score was strongly correlated with the prediction model. Performance measures for risk score cut-off values are presented to determine the optimal cut-off point for clinical practice.

CONCLUSIONS: We developed an easy-to-use risk score for dizziness-related impairment in primary care. The risk score, consisting of only 4 predictors, will help primary care physicians identify patients at high risk for an unfavorable course of dizziness.

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The association of built environment and physical activity in older adults: using a citywide public housing scheme to reduce residential self-selection bias

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Abstract

Previous studies have documented numerous health benefits of conducting regular physical activity among older adults. The built environment is believed to be a key factor that can hinder or facilitate daily physical activity, such as walking and exercising. However, most empirical studies focusing on



environment-physical activity associations exhibited residential self-selection bias with cross-sectional research design, engendering doubts about the impact of built environment on physical activity. To reduce this bias, we assessed physical activity behaviors of 720 Hong Kong older adults (≥ 65 years) residing in 24 public housing estates. The Hong Kong public housing scheme currently provides affordable rental flats for 2.1 million people or approximate 30% of total population. The applicants were allocated to one of 179 housing estates largely by family size and flat availability. Built environment characteristics were measured following the '5Ds' principle: (street network) design, (land-use) diversity, density, distance to transit, and destination accessibility. Multilevel mixed models were used to explore the associations between the built environment and the different domains of physical activity (transportation walking, recreational walking, and recreational moderate-to-vigorous physical activity (MVPA) while controlling for potential estate-level socioeconomic and individual confounders. We found that transportation walking was positively associated with the number of bus stops and the presence of Mass Transit Railway (MTR) stations. Recreational MVPA was positively related to the number of recreational facilities. However, land-use mix was negatively related to transportation walking, recreational walking, and recreational MVPA. The findings of this study support a threshold effect in the environment-physical activity associations. Furthermore, large-scale public housing schemes involving random or semi-random residence assignment in many cities may provide opportunities to explore built environments and physical activity behavior, with the potential to overcome residential self-selection bias.

PDF Y Endnote Y

The impact of first and second eye cataract surgeries on falls: a prospective cohort study

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Clin. Interv. Aging 2018; 13: 1457-1464.

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DOI 10.2147/CIA.S164419 **PMID** 30197507 **PMCID** PMC6112809

Abstract

PURPOSE: The purpose of this study was to investigate the impact of the first and second eye cataract surgeries on the risk of falls in participants with bilateral cataract and to determine which changes in visual measures are associated with changes in the number of falls throughout the cataract surgery process.

PATIENTS AND METHODS: Fifty-five older adults with bilateral cataract aged 55+ years were assessed at three time points during the cataract surgery process, and they completed a falls diary. Two separate generalized estimating equation-negative binomial models were undertaken to assess changes in the number of falls before first eye cataract surgery, between first and second eye surgeries, and after second eye cataract surgery and which changes in visual measures were associated with changes in the number of falls.

RESULTS: After adjusting for potential confounding factors, the risk of falls decreased by 54% (incidence rate ratio (IRR) =0.458, 95% CI=0.215-0.974, $p=0.04$) after first eye cataract surgery only, compared with the period before first eye surgery. The risk of falls decreased by 73% (IRR =0.268, 95% CI =0.114-0.628, $p=0.002$) after second eye cataract surgery, compared with the period before first eye surgery. Improved binocular visual acuity (IRR =5.488, 95% CI =1.191-25.282, $p=0.029$) and

contrast sensitivity (IRR =0.257, 95% CI =0.070-0.939, $p=0.040$) were associated with a decrease in the number of falls.

CONCLUSION: The study found that first and second eye cataract surgeries reduced the risk of falls among a cohort of bilateral cataract patients with relatively good baseline vision. This suggests that timely first and second eye cataract surgeries could play an important role in reducing the burden due to falls among older adults with cataract.

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The prevalence, circumstances and consequences of unintentional falls among elderly Iranians: a population study

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Arch. Gerontol. Geriatr. 2018; 79: 123-130.

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Abstract

BACKGROUND AND AIM: Falling threatens the health, independence and quality of life of older adults. Information about characteristics and predisposing factors of falls is essential to develop and implement effective preventing measure. The aim of this study was to examine the prevalence, circumstances and consequences of falls among community-dwelling older adults in Tehran, Iran, and scrutinize factors (e.g. demographics) associated with falls.

METHODS: A cross-sectional study was conducted in Tehran. A total of 653 individuals aged 65 years and over were selected by a stratified random sampling as representing older adults in Tehran. All required data were collected through face-to-face interviews using questionnaires.

RESULTS: The prevalence of falls was 39.7% and higher in women than in men. For both sexes, most of the falls occurred in the afternoon ($n = 135$, 52.1%) and at home ($n = 209$, 80.7%). One-fourth of the falls (23.2%) occurred in a forward direction, mostly among women (60%). For both sexes, one-third of the causes of falls were loss of balance, mostly among women and the oldest persons. Two-hundred and twelve of the fallers reported injuries. The logistic regression showed that female gender, low education and constant worries about living expenses were significantly associated with falls.

CONCLUSIONS: This study may have provided new insights into the characteristics/ circumstances/ consequences of injurious falls and their relation with age, gender and injury severity in Iran. It may be useful for health policy makers and health providers when designing falls intervention and prevention programs at the community level.

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Threshold-based fall detection using the hybrid of tri-axial accelerometer and gyroscope

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Abstract

OBJECTIVE: Falling is an important health maintenance issue for the elderly and people with movement disorders, strokes and multiple sclerosis. With the development of light, low-cost wearable technology, inertia-based fall detection has gained much attention. However, some large movements, such as jumping and postural changes, are frequently confounded with falls. For example, commonly used fall detection methods based on acceleration amplitude produce a large number of false alerts unless they are combined with post-fall posture identification. In this paper, we propose two new inertial parameters to improve the selectivity of threshold-based fall detection methods, and evaluate strategies to distinguish falls from other activities of daily life (ADLs).

APPROACH: We define two new inertial parameters, acceleration cubic-product-root magnitude (ACM) and angular velocity cubic-product-root magnitude (AVCM). Along with acceleration magnitude (AM), we test threshold-based fall detection methods based on single parameters and combinations. We collected inertial data on four types of simulated falls and eight types of ADLs from a study with 15 participants wearing a chest-mounted sensor with accelerometer and gyroscope. Two public datasets, UMAFall and Cognent Labs, were also included to evaluate fall detection methods.

MAIN RESULTS: We choose the detection threshold with 99% sensitivity and the best possible specificity. The hybrid of AM, ACM and AVCM method had a lower rate of misclassification than single-parameter methods. Leave-one-out cross-validation shows that the hybrid fall detection method can achieve both high specificity and high sensitivity.

SIGNIFICANCE: Using multiple inertial parameters improves the specificity of fall detection.

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"You can tell by the way I use my walk." Predicting the presence of cognitive load with gait measurements

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Abstract

BACKGROUND: There is considerable evidence that a person's gait is affected by cognitive load. Research in this field has implications for understanding the relationship between motor control and neurological conditions in aging and clinical populations. Accordingly, this pilot study evaluates the cognitive load based on gait accelerometry measurements of the walking patterns of ten healthy individuals (18-35 years old).

METHODS: Data points were collected using six triaxial accelerometer sensors and treadmill pressure reports. Stride and window extraction methods were used to process these data points and separate into statistical features. A binary classification was created by using logistic regression, support vector machine, random forest, and learning vector quantization to classify cognitive load



vs. no cognitive load.

RESULTS: Within and between subjects, a cognitive load was predicted with accuracy values ranged of 0.93-1 by all four models. Various feature selection methods demonstrated that only 2-20 variables could be used to achieve similar levels of accuracies.

CONCLUSION: Coupling sensors with machine learning algorithms to detect the most minute changes in gait patterns, most of which are too subtle to identify with the human eye, may have a remarkable impact on the potential to detect potential neuromotor illnesses and fall risks. In doing so, we can open a new window to human health and safety prevention.

PDF Y Endnote Y

Effectiveness of the computerized balance rehabilitation after hip fracture surgery: A study protocol of a prospective and open-label clinical trial

Kim IH, Lee SU, Jung SH, Lee SJ, Lee SY.

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Abstract

INTRODUCTION: Although balance problems in older populations are directly correlated with hip fractures, the overall physical gain afforded by balance rehabilitation itself has not yet been fully investigated. Here we describe a protocol for an open-label clinical trial to evaluate the effectiveness of computer-based balance-specific exercise (BSE) on the performance and balance of elderly women who underwent hip fracture surgery (HFS).

METHODS AND ANALYSIS: Elderly female patients (≥ 65 years old) who underwent surgery for femoral neck, intertrochanteric, or subtrochanteric fracture regardless of surgery type will be included. The BSE will be conducted using a computed posturographic system for a 2-week intervention period following HFS. The primary outcome of this study is Berg balance scale score. All functional outcomes will be measured at 1 and 3 weeks and at 3 and 6 months after the surgical intervention. The data will be analyzed using the intention-to-treat principle.

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Fall risk program for oncology inpatients: addition of the "traffic light" fall risk assessment tool

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J. Nurs. Care Qual. 2018; ePub(ePub): ePub.

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Abstract

BACKGROUND: The incidence of falls on inpatient oncology units indicated the need for quality improvement. This project aimed to reduce falls by implementing a fall reduction plan including the "Traffic Light" Fall Risk Assessment Tool (TL-FRAT). **LOCAL PROBLEM:** We retrospectively reviewed the oncology unit fall data from January 2013 to September 2014 and found that the average fall

incidence was high.

METHODS: The project used a program evaluation design, and the process was guided by Kotter's 8-step change model. **INTERVENTIONS:** We implemented the TL-FRAT to classify oncology inpatients at a high risk of falling in advance.

RESULTS: The average fall incidence and falls with injury during the project were reduced.

CONCLUSIONS: Adding the TL-FRAT to the fall protocol on the units effectively reduced the incidence of falls related to impaired mobility. The TL-FRAT can improve nurses' sensitivity to falls related to impaired mobility and, subsequently, guide corresponding fall prevention strategies.

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Individualized fall prevention program in an acute care setting: an evidence-based practice improvement

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J. Nurs. Care Qual. 2018; ePub(ePub): ePub.

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Abstract

BACKGROUND: A 245-bed community hospital established patient fall prevention as its patient safety priority. **PROBLEM:** The hospital's fall prevention program was not consistently effective. The baseline fall rate was 3.21, higher than the National Database of Nursing Quality Indicators' median of 2.91.

APPROACH: An interprofessional fall prevention team evaluated the hospital's fall program using the evidence-based practice improvement model. A clinical practice guideline with 7 key practices guided the development of an individualized fall prevention program with interventions to address 4 fall risk categories and an algorithm to identify interventions. Interventions included nurse-driven mobility assessment, purposeful hourly rounding, and video monitoring for confused and impulsive fall-risk patients.

OUTCOMES: The fall rate decreased to 1.14, with a 72% expense reduction based on decreased sitter usage.

CONCLUSIONS: An interprofessional team successfully reduced falls with an evidence-based fall prevention program.

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Multi-system balance training reduces injurious fall risk in Parkinson's disease - A randomized trial

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Am. J. Phys. Med. Rehabil. 2018; ePub(ePub): ePub.

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Abstract

Previous studies have shown that balance training could reduce falls in people with Parkinson's disease (PD). However, it remains unclear whether exercise can reduce injurious falls. The objective of present study was to determine whether multi-system balance training could reduce injurious falls and modify targeted fall risk factors in PD non-fallers and single fallers. Participants were randomly assigned to an 8-week balance group [Experimental (EXP), N=41] or an upper limbs group [Control (CON), N=43]. Outcomes examined at post-training (Post) and 12-month follow-up (FU12m) were: 1) injurious fall risk (ratio of non-injurious fallers to injurious fallers); 2) two potential fall risk factors based on Balance Evaluation Systems Test (BESTest) scores and dual-task timed-up-and-go (DTUG) times. At Post, results indicated that there were no injurious falls, and fewer EXP participants were found in high fall-risk cohorts based on BESTest scores and DTUG times ($p < 0.05$). At FU12m, the number of injurious fallers was lower in EXP group ($p < 0.05$). There was also a marginally lower percentage of EXP group in the high fall-risk cohort based on BESTest scores ($p = 0.059$). The findings conclude that multi-system balance training potentially reduces injurious fall risk up to 12 months post-training and lowers balance-related fall risks in people with PD.

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Prevalence of balance impairment among stroke survivors undergoing neurorehabilitation in Nigeria

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J. Stroke Cerebrovasc. Dis. 2018; ePub(ePub): ePub.

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Abstract

BACKGROUND: Poststroke balance impairment adversely affects stroke outcomes and addressing the impairment is expected to constitute an important focus of neurorehabilitation. **AIMS:** To examine the prevalence and factors associated with balance impairment after stroke.

METHODS: Ninety-five stroke survivors undergoing neurorehabilitation at 2 government hospitals in Northern Nigeria participated in this cross-sectional study. Berg Balance Scale (BBS) was used to assess the presence of balance impairment (BBS score of 0-20). Prevalence of balance impairment was presented as frequency and percentage while demographic and stroke-related determinants of balance impairments were identified using logistic regression analysis.

RESULTS: Thirty-five (36.8%) stroke survivors had balance impairment, and age, gender, and poststroke duration were statistically significant determinants. Stroke survivors aged less than 40 years (odds ratio [OR] = .14 [confidence interval [CI] = .20-.94]) and 40-59 years (OR = .23 [CI = .06-.81]) had a lower likelihood of having balance impairment compared to stroke survivors aged 60 years and above. Similarly, males had a lower likelihood of having balance impairment (OR = 1.60 [CI = .05-.55]) compared to females while those in the acute/subacute phase of stroke had a 7-fold likelihood of having balance impairment (OR = 7.74 [CI = 2.63-22.79]) compared to those with chronic stroke.

CONCLUSIONS: Poststroke balance impairment appears to be significantly influenced by stroke survivors' age, gender, and poststroke duration. Hence, these variables should be considered when

planning rehabilitation strategies for improving balance after stroke.

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Treadmill-based gait-slip training with reduced training volume could still prevent slip-related falls

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Abstract

BACKGROUND: Treadmill-based gait-slip training shows to be effective in reducing the risk of slip-related falls. In previous relevant studies, the number of repeated slip perturbations ranged from 12 to 30.

RESEARCH QUESTION: It is unclear if a reduced number of treadmill-slips can still yield adaptive strategies to lower the likelihood of falls after a slip over ground. This study examined if eight repeated slips on a treadmill reduced the risk of falls among young adults when they were exposed to a novel overground slip.

METHODS: Forty-three healthy young adults were randomized into either training or control group. The training group underwent an 8-slip perturbation training procedure on a treadmill while the control group received the same number of normal walking trials on the same treadmill. Following the training, both groups were exposed to an unrehearsed slip during overground walking. Their body's reactions to the novel overground slip were collected by a motion capture system.

RESULTS: The training group exhibited significantly better reactions to the slip than did the control group, evidenced by the lower fall proportion and improved dynamic stability at recovery foot touchdown during the overground slip. No improvement in dynamic stability was detected in the training group at the slipping foot touchdown and recovery foot liftoff.

SIGNIFICANCE: The results suggested that the shortened perturbation training program may be efficacious in improving responses to a novel overground slip but may not be as effective as protocols using greater number of slips. This study could provide guidance for selecting the number of slips for future perturbation-based training protocols.

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Video monitoring for fall prevention and patient safety: process evaluation and improvement

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Abstract

BACKGROUND: Although video monitoring has been shown to reduce falls among at-risk hospitalized patients, there are no identified best practices for the monitoring process.



PURPOSE: The purpose of this study was to evaluate the monitoring process at a large teaching hospital, with the goal of making improvements and standardizing monitoring practices.

METHODS: Patients and nursing staff perceptions about the video monitoring process were elicited via survey, and perceptions of monitor technicians were obtained through structured interview.

RESULTS: Video monitoring was perceived by all groups as effective in promoting patient safety. Nursing staff and monitor technicians also indicated that monitoring protects patient safety in other high-risk situations. Suggestions for improvement and standardization in the monitoring process were made by study participants.

CONCLUSIONS: Suggested changes and standardization of the monitoring process have been implemented in the study facility. Insights are provided for other facilities considering video monitoring for patient safety.

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Walking balance on a treadmill changes during pregnancy

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Gait Posture 2018; 66: 146-150.

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Abstract

BACKGROUND: Altered standing balance during pregnancy has been previously reported. To date, body center of mass (bCOM) motion has not been used to track balance changes in this population. We recently compared three methods to determine the torso center of mass (tCOM) location (via force plate acquired center of pressure calculation, using Pavol surface anthropometry measurements, and a combination of the two) to use in calculating the bCOM during pregnancy.

RESEARCH QUESTION: This current research explored two questions: (1) does walking balance change during pregnancy, and (2) do the methods for identifying tCOM location affect the resulting balance measures?

METHODS: Fifteen pregnant women were recruited to perform 60-second trial of treadmill walking at 4-week intervals from 12 weeks gestation until delivery. Walking balance was measured as bCOM motion within the base of support. Gestation time and anthropometric model (force plate, Pavol, and combination) were repeated-measures independent variables in a general linear mixed model analysis.

RESULTS: There was a significant decrease in walking balance during pregnancy. As gestation progressed, we observed non-linear changes in the bCOM motion within the base of support over time, with some changes starting early in pregnancy and others not starting until late 2nd trimester. The anthropometric model used to locate the bCOM significantly influences balance measures. The results of this study indicate that the force plate method is more appropriate for locating the tCOM in the anterior and lateral directions.

SIGNIFICANCE: The results of this study will inform clinicians and patients about the gestational stage-associated changes in balance during pregnancy that increase the risk of falling and injury.

Researchers should also carefully consider the method for locating the bCOM. Copyright © 2018.
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