

Safety Literature 26th February 2023**Association between age-related hearing loss and gait disorders in older fallers**

Teplitxky A, Gautier J, Lievre M, Duval G, Annweiler C, Boucher S. Aging Clin. Exp. Res. 2023; ePub(ePub): ePub.

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DOI 10.1007/s40520-023-02350-w **PMID** 36786968

Abstract

INTRODUCTION: Falls are associated with hearing loss, which might be explained by the onset of gait disorders. The objective of this study was to examine the association between Age-Related Hearing Loss (ARHL) and gait disorders assessed with GAITrite(®) walkway in a population of fallers aged 75 and over while accounting for the vestibular function.

METHODS: We examined data from 53 older patients (mean 84.2 ± 5.1 years; 64% women) included after a GAITrite(®) walkway assessment together with hearing and vestibular tests. People with high-frequency hearing loss, higher than 10% of the age and sex-matched population with the worst hearing, composed untimely ARHL group ($n = 30$), whereas all others had expected ARHL ($n = 23$). Presbyvestibulopathy was assessed accordingly to Barany Society criteria.

RESULTS: After adjustment for age, sex, body mass index, Mini-Mental State Examination score and presbyvestibulopathy, we found an increase in stride length mean in the untimely ARHL group ($p = 0.046$), but no between-group differences in stride length variability, cadence or velocity. Untimely ARHL was not associated with presbyvestibulopathy.

CONCLUSIONS: Untimely ARHL in older fallers was not associated with gait disorders in the studied population.

Language: en

Keywords

Aging; Gait; Age-related hearing loss; Older people; Presbycusis; Walk

Automated step detection with 6-minute walk test smartphone sensors signals for fall risk classification in lower limb amputees

Juneau P, Lemaire ED, Bavec A, Burger H, Baddour N. PLOS Digit. Health 2022; 1(8): e0000088.

(Copyright © 2022, Public Library of Science)

DOI 10.1371/journal.pdig.0000088 **PMID** 36812591

Abstract

Predictive models for fall risk classification are valuable for early identification and intervention. However, lower limb amputees are often neglected in fall risk research despite having increased fall risk compared to age-matched able-bodied individuals. A random forest model was previously shown to be effective for fall risk classification of lower limb amputees, however manual labelling of foot strikes was required. In this paper, fall risk classification is evaluated using the random forest model, using a recently developed automated foot strike detection approach. 80 participants (27 fallers, 53 non-fallers) with lower limb amputations completed a six-minute walk test (6MWT) with a smartphone at the posterior pelvis. Smartphone signals were collected with The Ottawa Hospital Rehabilitation Centre (TOHRC) Walk Test app. Automated foot strike detection was completed using a novel Long Short-Term Memory (LSTM) approach. Step-based features were calculated using manually labelled or automated foot strikes. Manually labelled foot strikes correctly classified fall risk for 64 of 80 participants (accuracy 80%, sensitivity 55.6%, specificity 92.5%). Automated foot strikes correctly classified 58 of 80 participants (accuracy 72.5%, sensitivity 55.6%, specificity 81.1%). Both approaches had equivalent fall risk classification results, but automated foot strikes had 6 more false positives. This research demonstrates that automated foot strikes from a 6MWT can be used to calculate step-based features for fall risk classification in lower limb amputees. Automated foot strike detection and fall risk classification could be integrated into a smartphone app to provide clinical assessment immediately after a 6MWT.

Language: en

Characterisation of institutionalised Portuguese older adult fallers: is there a place for pharmacist intervention? A preliminary study

Ferreira CR, Mascarenhas-Melo F, Rodrigues AR, Lima MJR, Pinheiro JP, Chaves C, Teixeira-Lemos E, Bell V. Pharm. Pract. (Granada) 2022; 20(4): e2717.

(Copyright © 2022, Centro de Investigaciones y Publicaciones Farmaceuticas)

DOI 10.18549/PharmPract.2022.4.2717 **PMID** 36793917

Abstract

BACKGROUND: Falls are a major public health issue, given their prevalence and social impact. Older adults living in long-term care facilities (LTCF) are at greater risk of injury resulting from a fall due to multiple factors, such as nutritional, functional/cognitive impairment, postural instability, polypharmacy, and the presence of potentially inappropriate medications (PIMs). Medication management in LTCF is complex and often sub-optimal and might be crucial for falls. Pharmacist intervention is important, since they have a unique knowledge of medication. However, studies mapping the impact of pharmaceutical activities in Portuguese LTC settings are scarce.

OBJECTIVE: This study aims to assess the characteristics of older adult fallers living in LTFCs and examine the relationship between falling and several factors in this population. We also intend to explore the prevalence of PIMs and their relationship with the occurrence of falls.

METHODS: The study was conducted in two long-term care facilities for elderly people, in the central region of Portugal. We included patients aged 65 and older with no reduced mobility or physical weakness and with the ability to understand spoken and written Portuguese. The following information was assessed: sociodemographic characteristics, comorbidities, polypharmacy, fear of falling, functional, nutritional and cognitive status. PIMs were evaluated according to the Beers criteria (2019).

RESULTS: A total of 69 institutionalised older adults, 45 women and 24 men, with a mean age of 83.14 ± 8.87 years were included. The prevalence of falls was 21.74%. Out of these, 46.67% (n=7) fell once, 13.33% (n=2) fell twice, and 40% (n=6) fell 3 or more times. Fallers were mainly women, had lower levels of education, were well nourished, had moderate to severe levels of dependence, and displayed moderate cognitive impairment. All adult fallers had a fear of falling. The main comorbidities of this population were related to the cardiovascular system. Polypharmacy was present in every patient, and at least one PIM was identified in 88.41% of the subjects. Fear of falling (FOF) and cognitive impairment (in subjects with 1 to 11 years of education) showed statistically significant associations with the occurrence of falls ($p=0.005$ and $p=0.05$, respectively). No significant differences were found between fallers and non-fallers for any other factors.

CONCLUSIONS: This present study is a preliminary contribution to characterise a group of older adult fallers living in Portuguese LTFCs and demonstrated that fear of falling and cognitive impairment are associated with the occurrence of falls in this population. The high

prevalence of polypharmacy and PIMs emphasises the need for tailored interventions featuring the collaboration of a pharmacist to optimise medication management in this population.

Language: en

Keywords

older adults; falls; long-term care facilities; pharmacist; polypharmacy; potentially inappropriate medications (PIMs)

Evaluation of a novel technology-supported fall prevention intervention - study protocol of a multi-centre randomised controlled trial in older adults at increased risk of falls

Morat T, Snyders M, Kroeber P, De Luca A, Squeri V, Hochheim M, Ramm P, Breitkopf A, Hollmann M, Zijlstra W. BMC Geriatr. 2023; 23(1): e103.

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DOI 10.1186/s12877-023-03810-8 **PMID** 36803459

Abstract

BACKGROUND: Increasing number of falls and fall-related injuries in an aging society give rise to the need for effective fall prevention and rehabilitation strategies. Besides traditional exercise approaches, new technologies show promising options for fall prevention in older adults. As a new technology-based approach, the hunova robot can support fall prevention in older adults. The objective of this study is to implement and evaluate a novel technology-supported fall prevention intervention using the hunova robot compared to an inactive control group. The presented protocol aims at introducing a two-armed, multi-centre (four sites) randomised controlled trial, evaluating the effects of this new approach on the number of falls and number of fallers as primary outcomes.

METHODS: The full clinical trial incorporates community-dwelling older adults at risk of falls with a minimum age of 65 years. Including a one-year follow-up measurement, all participants are tested four times. The training programme for the intervention group comprises 24-32 weeks in which training sessions are scheduled mostly twice a week; the first 24 training sessions use the hunova robot, these are followed by a home-based programme of 24 training sessions. Fall-related risk factors as secondary endpoints are measured using the hunova robot. For this purpose, the hunova robot measures the participants' performance in several dimensions. The test outcomes are input for the calculation of an overall score which indicates the fall risk. The hunova-based measurements are accompanied by the timed-up-and-go test as a standard test within fall prevention studies.

DISCUSSION: This study is expected to lead to new insights which may help establish a new approach to fall prevention training for older adults at risk of falls. First positive results on risk factors can be expected after the first 24 training sessions using the hunova robot. As primary outcomes, the number of falls and fallers within the study (including the one-year follow-up period) are the most relevant parameters that should be positively influenced by our new approach to fall prevention. After the study completion, approaches to examine the cost-effectiveness and develop an implementation plan are relevant aspects for further steps. **TRIAL REGISTRATION:** German Clinical Trial Register (DRKS), ID: DRKS00025897. Prospectively registered 16 August 2021, <https://drks.de/search/de/trial/DRKS00025897>.

Language: en

Keywords

RCT; Fall prevention; Randomised controlled trial; Robot device; Technology-based

Implementation fidelity of a multifactorial in-hospital fall prevention program and its association with unit systems factors: a single center, cross-sectional study

Wyss-Hänecke R, Lauener SK, Sluka C, Deschodt M, Siqeca F, Schwendimann R. BMC Health Serv. Res. 2023; 23(1): e158.

(Copyright © 2023, Holtzbrinck Springer Nature Publishing Group - BMC)

DOI 10.1186/s12913-023-09157-5 **PMID** 36793084

Abstract

BACKGROUND: Falls are a common, costly global public health burden. In hospitals, multifactorial fall prevention programs have proved effective in reducing falls' incidence; however, translating those programs accurately into daily clinical practice remains challenging. This study's aim was to identify ward-level system factors associated with implementation fidelity to a multifactorial fall prevention program (StuPA) targeting hospitalized adult patients in an acute care setting.

METHODS: This retrospective cross-sectional study used administrative data on 11,827 patients admitted between July and December 2019 to 19 acute care wards at the University Hospital Basel, Switzerland, as well as data on the StuPA implementation evaluation survey conducted in April 2019. Data were analysed using descriptive statistics, Pearson's coefficients and linear regression modelling for variables of interest.

RESULTS: The patient sample had an average age of 68 years and a median length of stay of 8.4 (IQR: 2.1) days. The mean care dependency score was 35.4 points (ePA-AC scale: from 10 points (totally dependent) to 40 points (totally independent)); the mean number of transfers per patient -(e.g., change of room, admission, discharge) was 2.6 (range: 2.4- 2.8). Overall, 336 patients (2.8%) experienced at least one fall, resulting in a rate of 5.1 falls per 1'000 patient days. The median inter-ward StuPA implementation fidelity was 80.6% (range: 63.9-91.7%). We found the mean number of inpatient transfers during hospitalisation and the mean ward-level patient care dependency to be statistically significant predictors of StuPA implementation fidelity.

CONCLUSION: Wards with higher care dependency and patient transfer levels showed higher implementation fidelity to the fall prevention program. Therefore, we assume that patients with the highest fall prevention needs received greater exposure to the program. For the StuPA fall prevention program, our results suggest a need for implementation strategies contextually adapted to the specific characteristics of the target wards and patients.

Language: en

Keywords

Adult; Aged; Humans; Cross-Sectional Studies; Retrospective Studies; Accidental falls; Implementation science; *Hospitalization; Fall prevention program; Hospitals, University; Implementation outcomes; Patient safety; Preventive health services; Routinely collected health data

Is waist circumference associated with fear of falling in community-dwelling older adults? A cross-sectional study

Prado BH, de Souza LF, Canevar JB, Moreira BS, Danielewicz AL, Avelar NCP. *Geriatr. Nurs.* 2023; 50: 203-207.

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DOI 10.1016/j.gerinurse.2023.01.010 **PMID** 36796144

Abstract

INTRODUCTION: Fear of falling (FOF) is a prevalent condition among older adults and several variables have been pointed out as risk factors.

OBJECTIVES: To identify the cut-off point on waist circumference (WC), capable of discriminating between older adults with and without FOF, and to test the association between WC and FOF.

METHODS: A cross-sectional observational study was carried out with older adults of both sexes from Balneário Arroio do Silva, Brazil. We used Receiver Operating Characteristic (ROC) curves to determine the cut-off point on WC and logistic regression adjusted for potential confounding variables to test the association.

RESULTS: Older women with WC >93.5 cm [area under the curve: 0.61 (95%CI 0.53; 0.68)] had 3.30 (95%CI 1.53; 7.14) greater chances of having FOF compared with older women with WC ≤93.5 cm. WC was not able to discriminate FOF in older men.

CONCLUSION: WC values >93.5 cm are associated with higher chances of FOF in older women.

Language: en

Keywords

Anthropometry; Fear of falling; Risk factors; Obesity; Waist circumference

Patients' experience with a community pharmacy fall prevention service

Gemmeke M, Koster ES, van der Velde N, Taxis K, Bouvy ML. *Explor. Res. Clin. Soc. Pharm.* 2023; 9: e100223.

(Copyright © 2023, Elsevier Publishing)

DOI 10.1016/j.rcsop.2023.100223 **PMID** 36785796

Abstract

BACKGROUND: Pharmacists can contribute to fall prevention, by offering services such as fall risk screenings, counselling, and medication reviews. Patient acceptance of the role of pharmacists in fall prevention is crucial.

OBJECTIVES: The aim of this study was to explore patients' experience with a community pharmacy fall prevention service.

METHODS: Interviews were conducted with patients one month after they participated in a pharmacy fall prevention service, in the Netherlands. Patient inclusion criteria for the service were: age ≥ 70 years, use of ≥ 5 drugs including ≥ 1 fall risk-increasing drug. The service included a fall risk screening followed by counselling and a medication review. The semi-structured interview guide was based on the consolidated framework for implementation research and included the following topics: outcomes, patient's motivation, and contact with the pharmacy technician.

RESULTS: Of the 91 participants of the fall prevention service, 87 patients were interviewed with a median age of 78.0 years (first quartile [Q1] - third quartile [Q3]: 74.0-84.75) and 46.3% were female. Many patients expressed positive feedback about receiving a medication review. Most patients whose medication was deprescribed expressed to be positive about this. Others were reassured about the appropriateness of their medication use. Patients reported that the service enhanced their awareness about fall prevention. Only a few patients were motivated to adapt their lifestyle. Patients appreciated the attention and contact.

CONCLUSIONS: Patients see a potential benefit for a community pharmacy falls prevention service, including a medication review. Patient education appeared to enhance their fall risk awareness.

Language: en

Keywords

Accidental falls; CFIR, Consolidated Framework for Implementation Research; COREQ, COnsolidated criteria for REporting Qualitative research; CPS, cognitive pharmaceutical service; FRID, fall risk-increasing drug; GP, general practitioner; Implementation science; Medication therapy management; Patient participation; Pharmacies; Q1, first quartile; Q3, third quartile

Quantifying the impact of comorbidities on length of stay in geriatric fall-related injuries

McLaughlin CJ, Waldron OJ, Staszak RM, Gish JS, Armen SB. Am. Surg. 2023; ePub(ePub): ePub.

(Copyright © 2023, Southeastern Surgical Congress)

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Abstract

Geriatric patients who fall are among the most common mechanisms of injury presenting to trauma centers. We sought to quantify the impact of various comorbidities on length of stay (LOS) in these patients to identify areas for intervention. A level 1 trauma center's registry was queried for patients ≥ 65 years old with fall related injuries admitted with LOS greater than 2 days. Over 7 years, 3714 patients were included. Mean age was 80.9 ± 8.7 years. All patients fell from heights of 6 feet or less. Median total LOS was 5 days, interquartile range [3,8]. Overall mortality rate was 3.3%. The most common comorbidities were cardiovascular (57.1%), musculoskeletal (31.4%), and diabetes (20.8%). Multivariate linear regression modeling LOS identified diabetes, pulmonary, and psychiatric diseases associated with longer lengths of stay ($P < .05$). As trauma centers refine care for geriatric trauma patients, comorbidity management represents an opportunity for proactive intervention.

Language: en

Keywords

geriatrics; trauma; length of stay; falls; comorbidities

Role of perceived physical and mental fatigability severity on prospective, recurrent, and injurious fall risk in older men

Welburn SC, Fanning EE, Cauley JA, Brown PJ, Strotmeyer ES, Boudreau RM, Bear TM, Moored KD, Cawthon PM, Stone KL, Glynn NW. J. Gerontol. A Biol. Sci. Med. Sci. 2023; ePub(ePub): ePub.

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DOI 10.1093/gerona/glad061 **PMID** 36801938

Abstract

BACKGROUND: Falls occur annually in 25% of adults aged ≥ 65 years. Fall-related injuries are increasing, highlighting the need to identify modifiable risk factors.

METHODS: Role of fatigability on prospective, recurrent, and injurious fall risk was examined in 1,740 men aged 77-101 years in the MrOS Study. The 10-item Pittsburgh Fatigability Scale (PFS) measured perceived physical and mental fatigability (0-50/subscale) at Year 14 (2014-2016); established cut-points identified men with more severe perceived physical (≥ 15 , 55.7%), more severe mental (≥ 13 , 23.7%) fatigability, or having both (22.8%). Prospective, recurrent (≥ 2), and injurious falls were captured by triannual questionnaires ≥ 1 year after fatigability assessment; risk of any fall was estimated with Poisson generalized estimating equations and likelihood of recurrent/injurious falls with logistic regression. Models adjusted for age, health condition and other confounders.

RESULTS: Men with more severe physical fatigability had a 20% ($p=.03$) increased fall risk compared with men with less physical fatigability, with increased odds of recurrent and injurious falls, 37% ($p=.04$) and 35% ($p=.035$), respectively. Men with both more severe physical and mental fatigability had a 24% increased risk of a prospective fall ($p=.026$), and 44% ($p=.045$) increased odds of recurrent falling compared with men with less severe physical and mental fatigability. Mental fatigability alone was not associated with fall risk. Additional adjustment for previous fall history attenuated associations.

CONCLUSION: More severe fatigability may be an early indicator to identify men at high-risk for falls. Our findings warrant replication in women, as they have higher rates of fatigability and prospective falls.

Language: en

Keywords

epidemiology; risk factors; fatigue

Assessment of mental fatigue using electroencephalography (EEG) and virtual reality (VR) for construction fall hazard prevention

Tehrani BM, Wang J, Truax D. Eng. Const. Arch. Man. 2022; 29(9): 3593-3616.

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DOI 10.1108/ECAM-01-2021-0017 **PMID** unavailable

Abstract

PURPOSE Despite the importance of cognitive monitoring, limited studies attempted to continuously monitor cognitive status of workers regarding mental fatigue effects on fall hazard. Thus, the objective of this study is to investigate and understand the effects of working at height on mental fatigue development for fall hazard prevention.

DESIGN/METHODOLOGY/APPROACH A quantitative framework using two well-known methods, i.e. Wavelet Packet Decomposition and Sample entropy, is developed to analyze the captured brain signals from Electroencephalography (EEG) to quantitatively assess mental fatigue levels, and seven mental fatigue indices were obtained. Between-subjects lab experiment was designed and conducted to assess mental fatigue in Virtual Reality (VR) environment.

FINDINGS Both of the quantitative methods confirmed that height exposure can adversely affect subjects' vigilance levels and indicated higher levels of mental fatigue. Significant differences were found between the two tested groups (i.e. working at height or on the ground) for six out of seven indices. The results suggested that working-at-height group had higher mental fatigue levels. **Research limitations/implications** One limitation of this study is the limited number of subjects recruited for the experiment. Overall, this study is a preliminary and exploratory work towards mental fatigue monitoring and assessment in subjects exposed to fall risk.

ORIGINALITY/VALUE This is the first study to explore and focus on mental fatigue assessment, particularly for construction falling-from-height hazard prevention by continuously monitoring mental fatigue levels of workers. The research provides insight into construction safety enhancement using smart technologies.

Language: en

Beyond physiology: acute effects of side-alternating whole-body vibration on well-being, flexibility, balance, and cognition using a light and portable platform a randomized controlled trial

Faes Y, Rolli Salathé C, Herlig ML, Elfering A. *Front. Sports Act. Living* 2023; 5: e1090119.

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DOI 10.3389/fspor.2023.1090119 **PMID** 36793620

Abstract

A good body-balance helps to prevent slips, trips and falls. New body-balance interventions must be explored, because effective methods to implement daily training are sparse. The purpose of the current study was to investigate acute effects of side-alternating whole-body vibration (SS-WBV) training on musculoskeletal well-being, flexibility, body balance, and cognition. In this randomized controlled trial, participants were randomly allocated into a verum (8.5 Hz, SS-WBV, N = 28) or sham (6 Hz, SS-WBV, N = 27) condition. The training consisted of three SS-WBV series that lasted one-minute each with two one-minute breaks in between. During the SS-WBV series, participants stood in the middle of the platform with slightly bent knees. During the breaks in between, participants could loosen up. Flexibility (modified fingertip-to-floor method), balance (modified Star Excursion Balance Test), and cognitive interference (Stroop Color Word Test) were tested before and after the exercise. Also, musculoskeletal well-being, muscle relaxation, sense of flexibility, sense of balance, and surefootedness were assessed in a questionnaire before and after the exercise. Musculoskeletal well-being was significantly increased only after verum. Also, muscle relaxation was significantly higher only after verum. The Flexibility-Test showed significant improvement after both conditions. Accordingly, sense of flexibility was significantly increased after both conditions. The Balance-Test showed significant improvement after verum, and after sham. Accordingly, increased sense of balance was significant after both conditions. However, surefootedness was significantly higher only after verum. The Stroop-Test showed significant improvement only after verum. The current study shows that one SS-WBV training session increases musculoskeletal well-being, flexibility, body balance and cognition. The abundance of improvements on a light and portable platform has great influence on the practicability of training in daily life, aiming to prevent slip trips and falls at work.

Language: en

Keywords

cognition; balance; musculoskeletal; flexibility; inhibition; SLIP trip and fall accidents; stroop-color-word interference task; whole-body vibration (WBV)

Fall prevention training for service members with an amputation or limb salvage following lower extremity trauma

Kaufman KR, Miller EJ, Deml CM, Sheehan RC, Grabiner MD, Wyatt M, Zai CZ, Kingsbury T, Tullos ML, Acasio JC, Mahon CE, Hendershot BD, Dearth CL. Mil. Med. 2023; ePub(ePub): ePub.

(Copyright © 2023, Association of Military Surgeons of the United States)

DOI 10.1093/milmed/usad005 PMID 36794799

Abstract

INTRODUCTION: Recent military conflicts have resulted in a significant number of lower extremity injuries to U.S. service members that result in amputation or limb preservation (LP) procedures. Service members receiving these procedures report a high prevalence and deleterious consequences of falls. Very little research exists to improve balance and reduce falls, especially among young active populations such as service members with LP or limb loss. To address this research gap, we evaluated the success of a fall prevention training program for service members with lower extremity trauma by (1) measuring fall rates, (2) quantifying improvements in trunk control, and (3) determining skill retention at 3 and 6 months after training.

MATERIALS AND METHODS: Forty-five participants (40 males, mean [\pm SD] age, 34 ± 8 years) with lower extremity trauma (20 with unilateral transtibial amputation, 6 with unilateral transfemoral amputation, 5 with bilateral transtibial amputation, and 14 with unilateral LP procedures) were enrolled. A microprocessor-controlled treadmill was used to produce task-specific postural perturbations which simulated a trip. The training was conducted over a 2-week period and consisted of six 30-minute sessions. The task difficulty was increased as the participant's ability progressed. The effectiveness of the training program was assessed by collecting data before training (baseline; repeated twice), immediately after training (0 month), and at 3 and 6 months post-training. Training effectiveness was quantified by participant-reported falls in the free-living environment before and after training. Perturbation-induced recovery step trunk flexion angle and velocity was also collected.

RESULTS: Participants reported reduced falls and improved balance confidence in the free-living environment following the training. Repeated testing before training revealed that there were no pre-training differences in trunk control. The training program improved trunk control following training, and these skills were retained at 3 and 6 months after training.

CONCLUSION: This study showed that task-specific fall prevention training reduced falls across a cohort of service members with diverse types of amputations and LP procedures following lower extremity trauma. Importantly, the clinical outcome of this effort (i.e., reduced falls and improved balance confidence) can lead to increased participation in occupational, recreational, and social activities and thus improved quality of life.

Language: en

Open-source dataset reveals relationship between walking bout duration and fall risk classification performance in persons with multiple sclerosis

Meyer BM, Tulipani LJ, Gurchiek RD, Allen DA, Solomon AJ, Cheney N, McGinnis RS. PLOS Digit. Health 2022; 1(10): e0000120.

(Copyright © 2022, Public Library of Science)

DOI 10.1371/journal.pdig.0000120 **PMID** 36812538

Abstract

Falls are frequent and associated with morbidity in persons with multiple sclerosis (PwMS). Symptoms of MS fluctuate, and standard biannual clinical visits cannot capture these fluctuations. Remote monitoring techniques that leverage wearable sensors have recently emerged as an approach sensitive to disease variability. Previous research has shown that fall risk can be identified from walking data collected by wearable sensors in controlled laboratory conditions however this data may not be generalizable to variable home environments. To investigate fall risk and daily activity performance from remote data, we introduce a new open-source dataset featuring data collected from 38 PwMS, 21 of whom are identified as fallers and 17 as non-fallers based on their six-month fall history. This dataset contains inertial-measurement-unit data from eleven body locations collected in the laboratory, patient-reported surveys and neurological assessments, and two days of free-living sensor data from the chest and right thigh. Six-month ($n = 28$) and one-year repeat assessment ($n = 15$) data are also available for some patients. To demonstrate the utility of these data, we explore the use of free-living walking bouts for characterizing fall risk in PwMS, compare these data to those collected in controlled environments, and examine the impact of bout duration on gait parameters and fall risk estimates. Both gait parameters and fall risk classification performance were found to change with bout duration. Deep learning models outperformed feature-based models using home data; the best performance was observed with all bouts for deep-learning and short bouts for feature-based models when evaluating performance on individual bouts. Overall, short duration free-living walking bouts were found to be the least similar to laboratory walking, longer duration free-living walking bouts provided more significant differences between fallers and non-fallers, and an aggregation of all free-living walking bouts yields the best performance in fall risk classification.

Language: en