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Bayesian classification of falls risk

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Abstract

BACKGROUND: Prior research in falls risk prediction often relies on qualitative and/or clinical methods. There are two challenges with these methods. First, qualitative methods typically use falls history to determine falls risk. Second, clinical methods do not quantify the uncertainty in the classification decision. In this paper, we propose using Bayesian classification to predict falls risk using vectors of gait variables shown to contribute to falls risk.

RESEARCH QUESTIONS: (1) Using a vector of risk ratios for specific gait variables shown to contribute to falls risk, how can older adults be classified as low or high falls risk? and (2) how can the uncertainty in the classifier decision be quantified when using a vector of gait variables?

METHODS: Using a pressure sensitive walkway, biomechanical measurements of gait were collected from 854 adults over the age of 65. In our method, we first determine low and high falls risk labels for vectors of risk ratios using the k-means algorithm. Next, the posterior probability of low or high falls risk class membership is obtained from a two component Gaussian mixture model (GMM) of gait vectors, which enables risk assessment directly from the underlying biomechanics. We classify the gait vectors using a threshold based on Youden's J statistic.

RESULTS: Through a Monte Carlo simulation and an analysis of the receiver operating characteristic (ROC), we demonstrate that our Bayesian classifier, when compared to the k-means falls risk labels, achieves an accuracy greater than 96% at predicting low or high falls risk. **SIGNIFICANCE:** Our analysis indicates that our approach based on a Bayesian framework and an individual's underlying biomechanics can predict falls risk while quantifying uncertainty in the classification decision.

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Central nervous system medication burden and risk of recurrent serious falls and hip fractures in veterans affairs nursing home residents

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J. Am. Geriatr. Soc. 2018; ePub(ePub): ePub.

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Abstract

OBJECTIVES: To examine the association between central nervous system (CNS) medication dosage burden and risk of serious falls, including hip fractures, in individuals with a history of a recent fall.



DESIGN: Nested case-control study. SETTING: Veterans Health Administration (VHA) Community Living Centers (CLCs).

PARTICIPANTS: CLC residents aged 65 and older with a history of a fall or hip fracture in the year before a CLC admission between July 1, 2005, and June 30, 2009. Each case (n = 316) was matched to four controls (n = 1264) on age, sex, and length of stay.

MEASUREMENTS: Outcomes were serious falls identified using International Classification of Diseases, Ninth Revision (ICD-9) or Current Procedural Terminology (CPT) E codes, diagnosis codes, or procedure codes associated with a VHA emergency department visit or hospitalization during the CLC stay. Bar code medication administration data were used to calculate CNS standardized daily doses (SDDs) for opioid and benzodiazepine receptor agonists, some antidepressants, antiepileptics, and antipsychotics received in the 6 days before the outcome date by dividing residents' actual CNS daily doses by the minimum effective geriatric daily doses and adding the results. Multivariable conditional logistic regression models were used to evaluate the association between total CNS medication dosage burden, categorized as 0, 1 to 2, and 3 or more SDDs, and the outcome of recurrent serious falls.

RESULTS: More cases (44.3%) than controls (35.8%) received 3.0 or more CNS SDDs ($p = .02$). Risk of serious falls was greater in residents with 3.0 or more SDDs than in those with 0 (adjusted odds ratio (aOR)=1.49, 95% confidence interval (CI)=1.03-2.14). Those with 1.0 to 2.9 SDDs had a risk similar to that of those with 0 SDDs (aOR=1.03, 95%CI=0.72-1.48).

CONCLUSION: Nursing home residents with a history of a fall or hip fracture receiving 3.0 or more CNS SDDs were more likely to have a recurrent serious fall than those taking no CNS medications. Interventions targeting this vulnerable population may help reduce serious falls.

Published 2018. This article is a U.S. Government work and is in the public domain in the USA.

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Effect of exercise on drug-related falls among persons with Alzheimer's disease: a secondary analysis of the FINALEX study

Perttola NM, Öhman H, Strandberg TE, Kautiainen H, Raivio M, Laakkonen ML, Savikko N, Tilvis RS, Pitkälä KH.

Drugs Aging 2018; ePub(ePub): ePub.

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DOI 10.1007/s40266-018-0594-7 **PMID** 30315403

Abstract

INTRODUCTION: No study has investigated how exercise modifies the effect of fall-related drugs (FRDs) on falls among people with Alzheimer's disease (AD).

OBJECTIVE: The aim of this study was to investigate how exercise intervention and FRDs interact with fall risk among patients with AD.

METHODS: In the FINALEX trial, community-dwelling persons with AD received either home-based or group-based exercise twice weekly for 1 year (n =129); the control group received normal care (n =65). The number of falls was based on spouses' fall diaries. We examined the incidence rate ratios (IRRs) for falls among both non-users and users of various FRDs (antihypertensives,



psychotropics, drugs with anticholinergic properties [DAPs]) in both control and combined intervention groups.

RESULTS: Between the intervention and control groups, there was no difference in the number of falls among those without antihypertensives or psychotropics. In the intervention group taking antihypertensives, the IRR was 0.5 falls/person-year (95% confidence interval [CI] 0.4-0.6), while in the control group, the IRR was 1.5 falls/person-year (95% CI 1.2-1.8) [$p < 0.001$ for group, $p = 0.067$ for medication, $p < 0.001$ for interaction]. Among patients using psychotropics, the intervention group had an IRR of 0.7 falls/person-year (95% CI 0.6-0.9), while the control group had an IRR of 2.0 falls/person-year (95% CI 1.6-2.5) [$p < 0.001$ for group, $p = 0.071$ for medication, $p < 0.001$ for interaction]. There was a significant difference in falls between the intervention and control groups not using DAPs (0.6, 95% CI 0.5-0.7; 1.2, 95% CI 1.0-1.4), and between the intervention and control groups using DAPs (1.1, 95% CI 0.8-1.3; 1.5, 95% CI 1.0-2.1) [$p < 0.001$ for group, $p = 0.014$ for medication, $p = 0.97$ for interaction].

CONCLUSION: Exercise has the potential to decrease the risk for falls among people with AD using antihypertensives and psychotropics. **TRIAL REGISTRATION:** ACTRN12608000037303.

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Effects of a vestibular physiotherapy protocol on adults with intellectual disability in the prevention of falls: A multi-centre clinical trial

Cortés-Amador S, Carrasco JJ, Sempere-Rubio N, Igual-Camacho C, Villaplana-Torres LA, Pérez-Alenda S.

J. Appl. Res. Intellect. Disabil. 2018; ePub(ePub): ePub.

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DOI 10.1111/jar.12531 **PMID** 30306670

Abstract

BACKGROUND: Balance alterations are one of the main problems in people with intellectual disabilities (ID), increasing their risk of falls and impacting their life. **AIMS:** To describe a vestibular rehabilitation programme (VRP) and evaluate its effects on the ability to maintain balance and risk of suffering a fall.

METHODS: Forty-seven adults with mild to moderate ID were randomly assigned to two groups: a control group (CG, $N = 24$), which performed a general physical exercise only, and an experimental group (EG, $N = 23$) which also completed a VRP. The variables, used pre- and post-training and 1 month after the intervention, were as follows: Center of Pressure Displacement, Berg Scale, Timed Up and Go Test, and the Modified Clinical Test of Sensory Interaction and Balance.

RESULTS: The EG improved significantly in each variable. The CG did not show changes for any of the parameters.

CONCLUSIONS: A programme based on VRP may improve balance and reduce the risk of falling.

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Fear of falling: a hidden burden with or without a history of falls

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Evid. Based Nurs. 2018; ePub(ePub): ePub.

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Abstract [Abstract unavailable]

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Health practitioners' perceptions of falls and fall prevention in older people: a metasynthesis

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Abstract

Fall prevention has received a great deal of consideration and funding, however fall rates have not reduced accordingly. Health practitioners are key stakeholders in the process of implementing fall prevention evidence into their clinical assessment and management of older people at risk of falling. Investigating health practitioners' clinical experiences and perceptions has been identified as a means to enhance the translation of knowledge. Four databases were searched for studies exploring health practitioners' perceptions of falls and fall prevention. A metasynthesis of eight qualitative studies was conducted. The findings suggest that health practitioners face substantial barriers in the implementation of fall prevention practices. These include personal, interpersonal, and clinical barriers in addition to limitations of the research evidence. This knowledge hopes to enhance targeted dissemination of knowledge, reducing the research-practice gap and improving clinical outcomes for older people at risk of falls.

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Impact of physical and social environments on the walking behaviour of Hong Kong's older adults

Leung KM, Chung PK, Wang D, Liu JD.

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Abstract

INTRODUCTION: This study examined the associations between physical environment (facilitators and barriers), social environment, and walking among older adults in Hong Kong.

METHODS: Between April and December 2016, a sample of 679 adults aged 65 years or above was recruited in Neighbourhood Elderly Centres from across the 18 council districts of Hong Kong.

Participants were asked to complete validated questionnaires that were used to assess the above constructs; participants were asked to track their daily step counts over 7 days using an accelerometer. Structural Equation Modelling was performed to examine the studied relationships

by using maximum likelihood estimation in LISREL 9.3.

RESULTS: The initial model did not fit the data adequately. The item 'companionship' was deleted because of its low standardised factor loading. A standardised residual of items was correlated with reference to the modification indices and high standardised residuals. The data were analysed again. The modified structural model fitted the data sufficiently, as indicated by the fit indices. Only physical environment-facilitators (i.e., land use mix, access, street connectivity, infrastructure, indoor facilities, presence of people, and easy access to residential entrances) were predictive of older adults' steps per day. The findings provide a reference for policy makers seeking to provide supportive physical walking environments and promote active ageing among older adults.

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Long-term evaluation of the implementation of a large fall and fracture prevention program in long-term care facilities

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DOI 10.1186/s12877-018-0924-y **PMID** 30285637

Abstract

BACKGROUND: Falls and fractures are extremely frequent in long-term care facilities (LTCFs). Therefore, a fall and fracture prevention program was started in nearly 1000 LTCFs in Bavaria/Germany between 2007 and 2010. The components of the program were exercise classes, the documentation of falls, environmental adaptations, medication reviews, the recommendation to use hip protectors and education of staff. The present study aimed to provide a comprehensive evaluation of the implementation process of the program regarding results of the implementation phase and the follow-up of 3-9 years after start of implementation.

METHODS: Data from numerous sources were used, including data from published studies, statistical data, health insurance claims data and unpublished data from an online questionnaire. To incorporate different aspects, time periods and results, the RE-AIM framework was applied.

RESULTS: The program was adopted by 942 of the 1150 eligible LTCFs and reached about 62,000 residents. During the implementation phase exercise classes and recommendation about environmental adaptations were offered in nearly all LTCFs. 13.5% of the residents participated in exercise classes. Hip protectors were available for 9.2% of all residents. In the first implementation wave, femoral fracture rate was significantly reduced by 18% in the first year. At follow-up nearly 90% of all LTCFs still offered exercise classes, which were attended by about 11% of residents. However, only 10% of the exercise classes completely fulfilled the requirements of an effective strength and balance training. Individual advice about environmental adaptations was provided in 74.3% of the LTCFs and nearly all LTCFs claimed to offer hip protectors to their residents. A long-term effect of the program on femoral fractures could not be detected.

CONCLUSIONS: The program did not affect the femoral fracture rate in the long run. Possible reasons could be a high turn-over of the staff, a reduced fidelity of training components or a shift in daily priorities among the staff.

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Low blood pressure levels for fall injuries in older adults: the Health, Aging and Body Composition Study

Sagawa N, Marcum ZA, Boudreau RM, Hanlon JT, Albert SM, O'Hare C, Satterfield S, Schwartz AV, Vinik AI, Cauley JA, Harris TB, Newman AB, Strotmeyer ES.

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Abstract

Fall injuries cause morbidity and mortality in older adults. We assessed if low blood pressure (BP) is associated with fall injuries, including sensitivity analyses stratified by antihypertensive medications, in community-dwelling adults from the Health, Aging and Body Composition Study ($N = 1819$; age 76.6 ± 2.9 years; 53% women; 37% black). Incident fall injuries ($N = 570$ in 3.8 ± 2.4 years) were the first Medicare claims event from clinic visit (7/00-6/01) to 12/31/08 with an ICD-9 fall code and non-fracture injury code, or fracture code with/without a fall code. Participants without fall injuries ($N = 1249$) were censored over 6.9 ± 2.1 years. Cox regression models for fall injuries with clinically relevant systolic BP (SBP; ≤ 120 , ≤ 130 , ≤ 140 , > 150 mmHg) and diastolic BP (DBP; ≤ 60 , ≤ 70 , ≤ 80 , > 90 mmHg) were adjusted for demographics, body mass index, lifestyle factors, comorbidity, and number and type of medications. Participants with versus without fall injuries had lower DBP (70.5 ± 11.2 vs. 71.8 ± 10.7 mmHg) and used more medications (3.8 ± 2.9 vs. 3.3 ± 2.7); all $P < 0.01$. In adjusted Cox regression, fall injury risk was increased for DBP ≤ 60 mmHg (HR = 1.25; 95% CI 1.02-1.53) and borderline for DBP ≤ 70 mmHg (HR = 1.16; 95% CI 0.98-1.37), but was attenuated by adjustment for number of medications (HR = 1.22; 95% CI 0.99-1.49 and HR = 1.12; 95% CI 0.95-1.32, respectively). Stratifying by antihypertensive medication, DBP ≤ 60 mmHg increased fall injury risk only among those without use (HR = 1.39; 95% CI 1.02-1.90). SBP was not associated with fall injury risk. Number of medications or underlying poor health may account for associations of low DBP and fall injuries.

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Not all falls are equal: risk factors for unplanned readmission in older patients after moderate and severe injury-a national cohort study

Wong TH, Wong YJ, Lau ZY, Nadkarni N, Lim GH, Seow DCC, Ong MEH, Tan KB, Nguyen HV, Wong CH.

J. Am. Med. Dir. Assoc. 2018; ePub(ePub): ePub.

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Abstract

OBJECTIVES: Readmission after acute care is a significant contributor to health care costs, and has been proposed as a quality indicator. Our earlier studies showed that patients aged ≥ 55 years who are injured by falls from heights of ≤ 0.5 m were at increased risk for long-term mortality, compared to patients by high-velocity blunt trauma (higher fall heights, road injuries, and other blunt trauma). We hypothesized that these patients are also at higher risk of readmission, compared to patients injured by high-velocity mechanisms.

DESIGN AND MEASURES: Competing risks regression (all-cause unplanned readmission or death) was performed.

SETTING AND PARTICIPANTS: Data for 5671 patients from the Singapore National Trauma Registry data who were injured from 2011-2013 and aged 55 and over were matched to Ministry of Health admissions data. The registry uses standardized conversion metrics to convert patient histories to fall heights.

RESULTS: Patients injured after a low fall were more likely to be readmitted to a hospital, compared to those sustaining injuries by high-velocity blunt trauma. On competing risks analysis, low fall [subdistribution hazard ratio (SHR) 1.52, 95% confidence interval (CI) 1.20-1.93, $P < .01$], Charlson Comorbidity Score (CCS ≥ 3 relative to CCS = 0, SHR 1.46, 95% CI 1.04-2.04, $P = .03$), and Modified Frailty Index (MFI ≥ 3 relative to MFI = 0, SHR 1.98, 95% CI 1.44-2.72, $P < .001$) were associated with higher risk of 30-day readmission. Rehabilitation was associated with reduced 30-day (SHR 0.64, 95% CI 0.48-0.86, $P < .001$) and 1-year (SHR 0.84, 95% CI 0.72-0.99, $P = .04$) readmission.

CONCLUSIONS/IMPLICATIONS: Our study sheds light on the interpretation of trauma data in aging populations. The detailed fall height information in our registry makes it uniquely placed to facilitate understanding of the paradoxical finding that injuries sustained by low-energy falls are higher risk than those sustained by higher-velocity mechanisms. Low-fall patients should be prioritized for rehabilitation and postdischarge support. The proportion of low-fall patients in a trauma registry should be included in the factors considered for benchmarking.

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Nutritional assessment and intervention to prevent and treat malnutrition for fall risk reduction in elderly populations

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Am. J. Lifestyle Med. 2018; 12(2): 107-112.

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Abstract

The aging US population is increasing, and it is estimated that adults older than 65 years will make up 20% of the population by 2029 and the proportion of individuals in the United States older than 65 years will outnumber individuals younger than 18 years. In older adults, accidental falls are the



leading cause of fatal and nonfatal injuries. Prevalence of chronic conditions such as sarcopenia and frailty contribute to the increased risk for fall observed in this population. Nutritional status in elderly individuals is a key predictor of both frailty and sarcopenia, thus ensuring adequacy in these populations has the potential for preventing falls. Poor nutritional status is associated with the onset of frailty. Nutrition screening, assessment and interventions can be targeted at this age group to overcome treat and prevent malnutrition to minimize fall risk.

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Older adult fall prevention practices among primary care providers at accountable care organizations: a pilot study

Howland J, Hackman H, Taylor A, O'Hara K, Liu J, Bruschi J.

PLoS One 2018; 13(10): e0205279.

Affiliation: Cambridge Health Alliance, Cambridge, Massachusetts, United States of America. (Copyright © 2018, Public Library of Science)

DOI 10.1371/journal.pone.0205279 **PMID** 30307974

Abstract

BACKGROUND: Falls are a serious and common problem among older adults. Low-tech, inexpensive, community-based fall prevention programs have been shown to be both effective and cost effective, however, these programs are not well-integrated into clinical practice. **RESEARCH DESIGN:** We surveyed primary care providers at a convenience sample of two accountable care organizations in Massachusetts to assess their beliefs, attitudes, knowledge, and practices relative to fall risk assessment and intervention for their older patients.

RESULTS: Response rate was 71%. Providers' beliefs about the efficacy of fall risk assessment and intervention were mixed. Eighty-seven percent believed that they could be effective in reducing fall risk among their older adult patients. Ninety-six percent believed that all older adults should be assessed for fall risk; and, 85% believed that this assessment would identify fall risk factors that could be modified. Nonetheless, only 52% believed that they had the expertise to conduct fall risk assessment and only 68% believed that assessing older adult patients for fall risk was the prevailing standard of practice among their peer providers. Although most providers believed it likely that an evidence-based program could reduce fall risk among their patients, only 14% were aware of the Centers for Disease Control and Prevention's fall risk assessment algorithm (STEADI Toolkit), and only 15% were familiar with Matter of Balance, the most widely disseminated community fall risk prevention program in Massachusetts.

DISCUSSION: New strategies that more directly target providers are needed to accelerate integration of fall risk assessment and intervention into primary care practice.

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Perceptions of walkability and determinants of walking behaviour among urban seniors in

Toronto, Canada

Lee E, Dean J.

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(Copyright © 2018, Elsevier Publishing)

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Abstract

Research has indicated the built environment strongly influences active transportation, though the specific mechanisms through which active transport occurs differ in findings. This study investigated the relationship between objective and subjective measures of walkability for seniors living in Toronto through a multi-phased, mixed-methods approach. Two neighbourhoods within the city were selected as case study areas. Wychwood represented a high walkability neighbourhood and Edenbridge-Humber Valley represented a neighbourhood lower in walkability. The walkability audit, the Senior Walking Environmental Assessment Tool - Revised (SWEAT-R), served as the objective measure. Subjective measures included the use of focus groups, go-along interviews, and traditional interviews with twenty-eight seniors across both neighbourhoods. The findings of this research highlighted the efficacy of objective measures existing in literature, but these did not adequately capture the holistic relationships between seniors and their surrounding environments. The subjective measures of walkability proved especially important for understanding perceptions of walkability and walking behaviour. Additionally, the findings echo recent study findings that recommend theory-based approaches to walkability research may be more effective in accounting for human behaviour in active transportation. This study concludes with practical and theoretical recommendations for planners, public health specialists, and other experts interested in promoting active transportation for seniors.

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Pharmacological and non-pharmacological means for prevention of fractures among elderly

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Int. J. Prev. Med. 2018; 9: e78.

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(Copyright © 2018, Isfahan University of Medical Sciences)

DOI 10.4103/ijpvm.IJPVM_114_18 **PMID** 30283610 **PMCID** PMC6151973

Abstract

Fractures are major cause of morbidity, mortality, and healthcare and social services expenditure in elderly. Fractures often have multifactorial etiologies and the condition emerges due to the interaction between the different predisposing and precipitating factors. One of the most common causes leading to fractures after minimal trauma in older people is osteoporosis. The objective of this article is to describe the clinical concept and summarize the evidence and to explain the future directions for research, focusing on specific issues related to prevent fracture in the elderly. This study reviewed the scientific literature addressing strategies for primary and secondary prevention of fractures among elderly in the context of pharmacological and non-pharmacological means. A growing body of scientific evidence supports the use of both non-pharmacological and pharmacological interventions for the prevention of fracture. Research on these interventions has yielded positive outcomes in fracture rates. The bisphosphonates and vitamin D and calcium supplements are the preferred therapy for prevention of osteoporotic fractures. Weight-bearing exercise and reducing home hazards have beneficial effects in reducing the incidence of falls and consequently reduce fractures. Prevention of fractures in elderly consists of therapy and prevention of osteoporosis, fall prevention, and using injury-site protection by high-risk elderly patients. Special

consideration needs to be taken to reduce home hazard, and falls prevention education can be recommended to the elderly with history of fall or mobility limitations. Future research to prevent fractures in elderly population should not only concentrate on improving bone density and strength but also need to be focused on falls reduction strategies.

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Epidemiology, treatment and mortality of trochanteric and subtrochanteric hip fractures: data from the Swedish fracture register

Mattisson L, Bojan A, Enocson A.

BMC Musculoskelet. Disord. 2018; 19(1): e369.

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DOI 10.1186/s12891-018-2276-3 **PMID** 30314495

Abstract

BACKGROUND: Hip fractures are a major worldwide public health problem and includes two main types of fractures: the intracapsular (cervical) and the extracapsular (trochanteric and subtrochanteric) fractures. The aim of this study on patients with trochanteric and subtrochanteric hip fractures was to describe the epidemiology, treatment and outcome in terms of mortality within the context of a large register study.

METHODS: A descriptive epidemiological register study including patients registered in the national Swedish Fracture Register from January 2014 to December 2016. Inclusion criteria were all primary surgically treated traumatic non-pathological trochanteric and subtrochanteric femoral fractures in patients aged 18 years and above. Individual patient data (age, gender, injury location, injury cause, fracture type, treatment and timing of surgery) were retrieved from the register database. Mortality data was obtained via linkage to the Swedish Death Register.

RESULTS: A total of 10,548 consecutive patients were identified and included in the study. The mean (\pm SD) age for all patients was 82 ± 11 years and the majority of the patients were females (69%). Most of the fractures were caused by a fall at the same level (83%) at the patients' accommodation (75%). Fractures were classified using the AO/OTA classification as 31-A1 in 29%, as 31-A2 in 49% and as 31-A3 in 22% of the cases. The most commonly used implant was a short antegrade intramedullary nail (42%), followed by a plate with sliding hip screw (37%). With increasing fracture complexity, the proportion of intramedullary nails was increasing, and also the use of long versus short nails. The majority of the patients were operated within 36 h (90%). There was a higher mortality at 30 days and 1 year for males, and for all those who were delayed to surgery > 36 h.

CONCLUSION: Safety measures to prevent fall at elderly patient's accommodation might be a way to reduce the number of trochanteric and subtrochanteric hip fractures. Surgery as soon as possible without delay should be considered to reduce the mortality rate. The selection of surgical methods depends on the fracture complexity.

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Joint pain and falls among women with breast cancer on aromatase inhibitors

Basal C, Vertosick E, Gillis TA, Li Q, Bao T, Vickers A, Mao JJ.

Support. Care Cancer 2018; ePub(ePub): ePub.

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(Copyright © 2018, Springer International)

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Abstract

PURPOSE: Arthralgia is common among women with breast cancer on adjuvant aromatase inhibitor (AI) therapy. Pain is associated with falls in the general population; however, little is known about the relationship between arthralgia and falls among AI users. Our objective was to determine whether joint pain severity and interference predict future falls.

METHODS: We conducted a prospective cohort study of postmenopausal women with stage I-III estrogen receptor-positive breast cancer who were prescribed a third-generation AI. Arthralgia symptoms were measured at baseline using a modified version of the Brief Pain Inventory. Fall occurrence was obtained at 24-month follow-up.

RESULTS: Among 667 participants (median age 63 years, interquartile range 57-69 years), 232 (35%, 95% CI 31 to 39%) reported falls 12-24 months after baseline. Among women who fell, 65 (28%) reported seeking medical assistance. After controlling for multiple fall risk factors, we found significant non-linear associations between baseline joint pain severity and risk of falls ($p = 0.001$). Women with joint pain severity scores ≥ 4 had a more than twofold increase in fall risk compared to those without pain (41% vs. 20%). We observed a similar relationship for pain interference and fall risk ($p < 0.001$). Fewer than half of participants reported having been asked about falls in the past 12 months by their primary care physician (44%) or oncologist (36%).

CONCLUSION: Joint pain increases the risk of falls among women with breast cancer on adjuvant AI therapy. Health care providers should evaluate and manage arthralgia symptoms and implement fall-prevention strategies for those who are at increased risk.

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Persistent postural-perceptual dizziness-a systematic review of the literature for the balance specialist

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Otol. Neurotol. 2018; ePub(ePub): ePub.

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(Copyright © 2018, Lippincott Williams and Wilkins)

DOI 10.1097/MAO.0000000000002010 **PMID** 30289841

Abstract

OBJECTIVE: To present a systematic review of the current data on persistent postural-perceptual dizziness (PPPD), a useful and relatively new diagnosis for a disorder that has previously been known by many different names. In addition, to discuss diagnostic criteria and management strategies for this condition with the otologist in mind. **DATA SOURCES:** CINAHL, Embase, PubMed, Medline, PsycINFO, PubMed, Google Scholar. **REVIEW METHOD:** The phrase "persistent postural-perceptual dizziness" and its acronym "PPPD" were used.

RESULTS: From 318 articles, 15 were selected for full analysis with respect to PPPD. Most were case-control studies, with one consensus paper from the Bárány Society available. Overall, the pathophysiology of PPPD remains relatively poorly understood, but is likely to be a maladaptive state to a variety of insults, including vestibular dysfunction and not a structural or psychiatric one. Cognitive behavioral therapy, vestibular rehabilitation, selective serotonin uptake inhibitors (SSRIs), and serotonin-norepinephrine reuptake inhibitors (SNRIs) all seem to have a role in its management.

CONCLUSIONS: PPPD is useful as a diagnosis for those treating dizziness as it helps to define a conglomeration of symptoms that can seem otherwise vague and allows for more structured management plans in those suffering from it.

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Powered ankle-foot orthoses: the effects of the assistance on healthy and impaired users while walking

Molledo M, Baček T, Verstraten T, Rodriguez-Guerrero C, Vanderborght B, Lefeber D.

J. Neuroengineering Rehabil. 2018; 15(1): e86.

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Abstract

In the last two decades, numerous powered ankle-foot orthoses have been developed. Despite similar designs and control strategies being shared by some of these devices, their performance in terms of achieving a comparable goal varies. It has been shown that the effect of powered ankle-foot orthoses on healthy users is altered by some factors of the testing protocol. This paper provides an overview of the effect of powered walking on healthy and weakened users. It identifies a set of key factors influencing the performance of powered ankle-foot orthoses, and it presents the effects of these factors on healthy subjects, highlighting the similarities and differences of the results obtained in different works. Furthermore, the outcomes of studies performed on elderly and impaired subjects walking with powered ankle-foot orthoses are compared, to outline the effects of powered walking on these users. This article shows that several factors mutually influence the performance of powered ankle-foot orthoses on their users and, for this reason, the determination of their effects on the user is not straightforward. One of the key factors is the adaptation of users to provided assistance. This factor is very important for the assessment of the effects of powered ankle-foot orthoses on users, however, it is not always reported by studies. Moreover, future works should report, together with the results, the list of influencing factors used in the protocol, to facilitate the comparison of the obtained results. This article also underlines the need for a standardized method to benchmark the actuators of powered ankle-foot orthoses, which would ease the comparison of results between the performed studies. In this paper, the lack of studies on elderly and impaired subjects is highlighted. The insufficiency of these studies makes it difficult to assess the effects of powered ankle-foot orthoses on these users. To summarize, this article provides

a detailed overview of the work performed on powered ankle-foot orthoses, presenting and analyzing the results obtained, but also emphasizing topics on which more research is still required.

PDF Y Endnote Y

Prevalence, risk factors and therapeutic aspects of injuries and accidents in women with epilepsy

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Abstract

BACKGROUND: Epilepsy-related injuries and accidents (ERIA) are a frequent cause of hospitalisation and represent a relevant burden for patients with epilepsy. In particular, osteoporosis and other gender-specific aspects may increase the risk of seizure-related fractures and injuries in women with epilepsy.

AIM AND SCOPE: The aim of this analysis is to determine the prevalence and clinical nature of ERIA in a cohort of women with epilepsy, to identify possible determinants including osteoporosis and to give an overview of the current knowledge of clinically important prophylactic and therapeutic aspects.

RESULTS: In total, 167 women (mean age 39.0 years, range 18-67 years) with established diagnosis of epilepsy (mean disease duration 18.2 years, range 0-64) were analysed for the occurrence of ERIA. Overall, 22 patients (13.2%) reported at least one ERIA (mean number 3.4, \pm 3.1) during the last three months prior to enrollment. The most frequent types of ERIA were lacerations ($n = 7/22$; 31.8%), abrasions, cuts, bruises or hematoma ($n = 6/22$, 27.3%), burns ($n = 3/22$, 13.6%), and fractures ($n = 3/22$, 13.6%). Moreover, one seizure-related road traffic accident with consecutive trauma (4.5%) was reported. Ictal falls, periictal abnormalities of behaviour and missing seizure freedom were associated with ERIA. Furthermore, female patients with ERIA had a significantly reduced quality of life (QoL, $p = 0.002$) and increased anxiety ($p = 0.008$) compared to patients without ERIA. A review of the pertinent literature suggests decreased bone mineral density and use of enzyme-inducing AEDs to be risk factors for ERIA in women with epilepsy.

CONCLUSION: ERIA represent relevant complications for women with epilepsy and are associated with a lower QoL and anxiety compared with non-affected controls. Improvement of anticonvulsive treatment and therapy for osteoporosis or osteomalacia may help to decrease ERIA and the associated burden.

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SmartFall: a smartwatch-based fall detection system using deep learning

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Abstract

This paper presents SmartFall, an Android app that uses accelerometer data collected from a commodity-based smartwatch Internet of Things (IoT) device to detect falls. The smartwatch is paired with a smartphone that runs the SmartFall application, which performs the computation necessary for the prediction of falls in real time without incurring latency in communicating with a cloud server, while also preserving data privacy. We experimented with both traditional (Support Vector Machine and Naive Bayes) and non-traditional (Deep Learning) machine learning algorithms for the creation of fall detection models using three different fall datasets (Smartwatch, Notch, Farseeing). Our results show that a Deep Learning model for fall detection generally outperforms more traditional models across the three datasets. This is attributed to the Deep Learning model's ability to automatically learn subtle features from the raw accelerometer data that are not available to Naive Bayes and Support Vector Machine, which are restricted to learning from a small set of extracted features manually specified. Furthermore, the Deep Learning model exhibits a better ability to generalize to new users when predicting falls, an important quality of any model that is to be successful in the real world. We also present a three-layer open IoT system architecture used in SmartFall, which can be easily adapted for the collection and analysis of other sensor data modalities (e.g., heart rate, skin temperature, walking patterns) that enables remote monitoring of a subject's wellbeing.

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