

**SafetyLit September 3, 2017****A systematic review of balance and fall risk assessments with mobile phone technology**

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*Arch. Gerontol. Geriatr.* 2017; 73: 222-226.

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**DOI** 10.1016/j.archger.2017.08.002 **PMID** 28843965

**Abstract**

Falls are a major health concern for older adults. Preventative measures can help reduce the incidence and severity of falls.

**METHODS** for assessing balance and fall risk factors are necessary to effectively implement preventative measures. Research groups are currently developing mobile applications to enable seniors, caregivers, and clinicians to monitor balance and fall risk. The following systematic review assesses the current state of mobile health apps for testing balance as a fall risk factor. Thirteen studies were identified and included in the review and analyzed based on study design, population, sample size, measures of balance, main outcome measures, and evaluation of validity and reliability. All studies successfully tested their applications, but only 38% evaluated the validity, and 23% evaluated the reliability of their applications. Of those, all applications were found to accurately and reliably measure balance on select variables. Four of the 13 studies included special populations groups. Out of the 13 studies, 12 reported clinicians as their intended user and seven reported seniors as their intended user. Further research should examine the validity of mobile health applications as well as report on the application's usability.

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**PDF Y Endnote Y****Attitudes to ageing and change in frailty status: the English Longitudinal Study of Ageing**

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*Gerontology* 2017; ePub(ePub): ePub.

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(Copyright © 2017, Karger Publishers)

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**Abstract**

**BACKGROUND:** Older people with more negative attitudes to ageing are at increased risk of several adverse outcomes, including decline in physical function and increased difficulties with activities of daily living.

**OBJECTIVE:** We investigated whether negative attitudes to ageing increase the risk of the onset or progression of frailty.

**METHOD:** Participants were 3,505 men and women aged 60 years and over from the English Longitudinal Study of Ageing. They completed a 12-item questionnaire on attitudes to ageing. Exploratory factor analysis was used to examine the structure of these items, and a single factor was derived which we labelled "physical and psychological loss." Frailty was assessed by the Fried phenotype of physical frailty at waves 2 and 4, and by a frailty index at waves 2-5.

**RESULTS:** Having a more positive attitude to ageing as regards "physical and psychological loss" was associated with a decreased risk of becoming physically frail or pre-frail at follow-up. For a standard

deviation increment in score, the relative risk ratios (95% confidence interval), adjusted for age, sex and baseline level of physical frailty, were 0.86 (0.79, 0.94) for pre-frailty and 0.72 (0.63, 0.83) for frailty. Further adjustment for other potential confounding variables had only slight attenuating effects on these associations: multivariable-adjusted relative risk ratios were 0.89 (0.81, 0.98) for pre-frailty and 0.78 (0.68, 0.91) for frailty. Attitude to ageing was not associated with change in the frailty index over time after adjustment for potential confounding variables.

**CONCLUSION:** Older people who have a more positive attitude to ageing are at reduced risk of becoming physically frail or pre-frail. Future research needs to replicate this finding and discover the underlying mechanisms. Attitude to ageing was not a risk factor for change in the more broadly defined frailty index.

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#### PDF Y Endnote Y

#### **Building capacity through a grants program. Is it possible? (Safety-2016 abstract #97)**

Wells V, Meade R, Anderson E, Summers J, Crawford G, Dinnes A.

*Inj. Prev.* 2016; 22(Suppl 2): A37.

(Copyright © 2016, BMJ Publishing Group)

DOI 10.1136/injuryprev-2016-042156.97 PMID unavailable

#### **Abstract**

**BACKGROUND:** The Injury Control Council of Western Australia (ICCWA) has delivered a grants program as part of the Stay On Your Feet® falls prevention program since 2006. Historically grants were available to community groups and local government for projects that raise awareness of the Stay On Your Feet® program, and increase access to falls prevention projects for the community.

**PROBLEM:** Research into the effectiveness and value of the grants program conducted in 2013 by Collaboration for Evidence, Research and Impact in Public Health (CERIPH) recommended an increased focus on supporting grants recipients to implement appropriate, evidence informed and sustainable projects.

**RESULTS:** In 2014 a revised pilot program was implemented as a strategy to build the capacity of health professionals in identifying and implementing effective falls prevention initiatives. Financial support is provided to deliver local falls prevention strategies. The program also incorporates free, non-compulsory coaching that aims to develop applicant's skills in; writing grants applications and reports, program planning, implementation, evaluation and partnerships.

Evaluation of the grants and coaching program explores the implementation and value of the approach. Preliminary results identify the program provides a valuable engagement opportunity when working with new stakeholders. Initial challenges included limited uptake of the coaching.

**CONCLUSIONS:** The grants and coaching program supports innovative and local solutions to preventing falls in older adults. It recognises the diversity of needs and the vital role local services and community group's play in preventing falls. The pilot will run in five phases until 2017. This will enable program refinement and improve implementation. Future considerations include; whether the demand and outcomes of coaching merit the investment, additional resource requirements, and whether the experience gained by ICCWA will enrich support provided to the sector.

Abstract from Safety 2016 World Conference, 18-21 September 2016; Tampere, Finland. Copyright © 2016 The author(s), Published by the BMJ Publishing Group Limited. For permission to use (where not already granted under a licence) please go to <http://group.bmj.com/group/rights-licensing/permissions>

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##### **Contributions to lateral balance control in ambulatory older adults**

Sparto PJ, Newman AB, Simonsick EM, Caserotti P, Strotmeyer ES, Kritchevsky SB, Yaffe K, Rosano C. *Aging Clin. Exp. Res.* 2017; ePub(ePub): ePub.

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(Copyright © 2017, Editrice Kurtis)

**DOI** 10.1007/s40520-017-0819-3 **PMID** 28836178

##### **Abstract**

**BACKGROUND:** In older adults, impaired control of standing balance in the lateral direction is associated with the increased risk of falling. Assessing the factors that contribute to impaired standing balance control may identify areas to address to reduce falls risk.

**AIM:** To investigate the contributions of physiological factors to standing lateral balance control.

**METHODS:** Two hundred twenty-two participants from the Pittsburgh site of the Health, Aging and Body Composition Study had lateral balance control assessed using a clinical sensory integration balance test (standing on level and foam surface with eyes open and closed) and a lateral center of pressure tracking test using visual feedback. The center of pressure was recorded from a force platform. Multiple linear regression models examined contributors of lateral control of balance performance, including concurrently measured tests of lower extremity sensation, knee extensor strength, executive function, and clinical balance tests. Models were adjusted for age, body mass index, and sex.

**RESULTS:** Larger lateral sway during the sensory integration test performed on foam was associated with longer repeated chair stands time. During the lateral center of pressure tracking task, the error in tracking increased at higher frequencies; greater error was associated with worse executive function. The relationship between sway performance and physical and cognitive function differed between women and men.

**DISCUSSION:** Contributors to control of lateral balance were task-dependent. Lateral standing performance on an unstable surface may be more dependent upon general lower extremity strength, whereas visual tracking performance may be more dependent upon cognitive factors.

**CONCLUSIONS:** Lateral balance control in ambulatory older adults is associated with deficits in strength and executive function.

#### PDF Y Endnote Y

##### **Cost-benefit analysis of fall injuries prevented by a programme of home modifications (Safety-2016 abstract #206)**

Keall MD, Pierse N, Howden-Chapman P, Guria J, Cunningham C, Baker MG. *Inj. Prev.* 2016; 22(Suppl 2): A75.

(Copyright © 2016, BMJ Publishing Group)

**DOI** 10.1136/injuryprev-2016-042156.206 **PMID** unavailable

##### **Abstract**

**BACKGROUND** Injuries due to falls in the home amongst the general population impose a huge social and economic cost on society. We previously found important safety benefits of home modifications such as handrails for steps and stairs, grab rails for bathrooms, outside lighting, edging for outside steps and slip-resistant surfacing for outside surfaces such as decks.

**METHODS** Following a single-blinded cluster randomised controlled trial (the HIPI trial), we analysed insurance payments for medically-treated home fall injuries. The benefits in terms of the value of DALYs averted and social costs of injuries were extrapolated to a national level and compared with the costs of the intervention.

**RESULTS** Costs per injury per time exposed to the modified homes compared to the unmodified homes showed a reduction in the insurer costs of home fall injuries of 36% (95% CI: 5%-59%). The social benefits of injuries prevented were estimated to be at least 9 times the costs of the intervention. The benefit cost ratio can be at least doubled for older people and those with a prior history of fall injuries.

**CONCLUSIONS** This is the first randomised controlled trial to our knowledge to examine the benefits of home modification for reducing fall injury costs in the general population. The

**RESULTS** show a convincing economic justification for undertaking relatively low-cost home repairs and installation of safety features.

Abstract from Safety 2016 World Conference, 18-21 September 2016; Tampere, Finland.

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### **Cost-effectiveness of vitamin D and exercise in preventing injurious falls among older women (Safety-2016 abstract #101)**

Patil R, Kolu P, Raitanen J, Valvanne J, Kannus P, Karinkanta S, Sievänen H, Uusi-Rasi K.

*Inj. Prev.* 2016; 22(Suppl 2): A38.

(Copyright © 2016, BMJ Publishing Group)

**DOI** 10.1136/injuryprev-2016-042156.101 **PMID** unavailable

#### **Abstract**

**BACKGROUND:** Costs of falling in older persons are high, both to individuals and to society. Both vitamin D and exercise are suggested to reduce the risk of falls. This study assessed the cost-effectiveness of vitamin D supplementation and exercise, separately and combined, in preventing medically attended injurious falls among older Finnish women.

**METHODS:** Economic evaluation was conducted alongside a previously published 2-year randomised controlled trial where 409 community-dwelling women aged 70 to 80 years were recruited into four groups: 1) no exercise + placebo (D-Ex-) 2) no exercise + vitamin D 800 IU/day (D+Ex-) 3) exercise + placebo (D-Ex+) 4) exercise + vitamin D 800 IU/day (D+Ex+). Outcomes were medically attended injurious falls and fall-related health care utilisation costs over the intervention period, the latter evaluated from a societal perspective based on 2011 unit costs. Incremental cost-effectiveness ratios (ICER) were calculated for the number of injurious falls per person-year prevented, and uncertainty estimated using bootstrapping.

**RESULTS:** Incidence rate ratios (95% CI) for medically attended injurious falls were lower in both Ex+ groups compared with D-Ex-: 0.46 (0.22 to 0.95) for D-Ex+, 0.38 (0.17 to 0.81) for D+Ex+. Step-wise calculation of ICERs resulted in exclusion of D+Ex- as more expensive and less effective.

Recalculated ICERs were €221 for D-Ex-, €708 for D-Ex+ and €3,820 for D+Ex+; bootstrapping indicated 93% probability that each injurious fall avoided by D-Ex+ per person-year costs €708. At a willingness to pay of €3,000 per injurious fall prevented, there was an 85.6% chance of the exercise intervention being cost-effective in this population.

**CONCLUSIONS:** Exercise was effective in reducing fall-related injuries among community dwelling older women at a moderate cost. Vitamin D supplementation had marginal additional benefit. The

results provide a firm basis for initiating feasible and cost-effective exercise interventions in this population.

Abstract from Safety 2016 World Conference, 18-21 September 2016; Tampere, Finland.

**PDF Y Endnote Y**

### **Dementia and fragility fractures: issues and solutions**

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*Injury* 2017; ePub(ePub): ePub.

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(Copyright © 2017, Elsevier Publishing)

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#### **Abstract**

Dementia and fragility fractures are two conditions that pose significant morbidity and mortality to the elderly population. The occurrence of the 'gerontic' boom as a result of improved healthcare meant a continued increase in the prevalence of fragility fractures and dementia. This represents a major public health problem with significant socioeconomic repercussions. It is therefore important for healthcare professionals to gain a better understanding on the relationship between these two commonly co-existing conditions. In this review, we present the available literature surrounding the relationship between fragility fractures and dementia, and the common challenges faced in the management of these two conditions. Combining evidence from the literature along with our current clinical practice, we propose a management pathway aimed at early diagnosis, prevention and management of these two often co-existing conditions. This alongside with a multidisciplinary approach will not only translate to improved patient outcomes and survivorship, but also reduced healthcare cost and socio-economic burden. To date, there is insufficient evidence from the literature to suggest whether dementia is the cause or effect for fragility fractures, or if indeed there is a bidirectional relationship between the two conditions. Further studies are required to shed light onto this important clinical topic.

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### **Differential trends in fall-related fracture and non-fracture hospitalisations for people with dementia (Safety-2016 abstract #95)**

Harvey L, Mitchell R, Draper B, Brodaty H, Close J.

*Inj. Prev.* 2016; 22(Suppl 2): A36.

(Copyright © 2016, BMJ Publishing Group)

**DOI** 10.1136/injuryprev-2016-042156.95 **PMID** unavailable

#### **Abstract**

**BACKGROUND:** Injury, predominantly fall-related injury, is the most common reason for hospitalisation for people with dementia. Trends in fall-related injury hospitalisations for older people generally have changed over the past decade. It is unknown what impact dementia has on these trends.

**METHODS:** Fall-related injury hospitalisations during 1 January 2003 to 31 December 2012 for people aged 65 and older admitted to a hospital in New South Wales, Australia were identified.

Hospitalisation records were probabilistically linked to provide comprehensive person-based records. Rates were age-standardised to the 2001 Australian Standard population. Trends over time were analysed using negative binomial regression analysis

**RESULTS:** There were 52,502 hospitalisations for people with dementia and 203,330 for people without dementia. People with dementia were more likely to be admitted for a hip fracture (ARR 1.76; 95% CI: 1.73-1.79,  $p < 0.0001$ ) and traumatic brain injury (TBI) (ARR 1.08; 95% CI: 1.03-1.14,  $p = 0.0027$ ), but less likely to be admitted for other (non-hip) fractures (ARR 0.72; 95% CI: 0.71-0.73,  $p < 0.0001$ ) or non-fracture injuries (ARR 0.96; 95% CI: 0.95-0.97,  $p < 0.001$ ). Hospitalisation rates for people with dementia decreased by 4.2% (95% CI: -5.6-2.7,  $p < 0.001$ ) per annum for hip fractures and 1.6% (95% CI: 2.3-0.8,  $p < 0.001$ ) per annum for other fractures, but increased by 7.5% (95% CI: 4.2-10.8%,  $p < 0.0001$ ) for TBI and 2.0% (95% CI: 0.1-4.0,  $p = 0.0388$ ) for other non-fracture injuries. In contrast, hip fracture hospitalisation rates remained constant and other fracture and non-fracture injuries increased for people without dementia.

**CONCLUSIONS:** Fall-related fracture rates, notably hip fractures, have decreased over the past ten years in people with dementia, whilst there has not been a corresponding decrease in people without dementia. Rates for non-fracture injuries including TBI have increased in both people with and without dementia. The reasons for these differences are not clear.

Abstract from Safety 2016 World Conference, 18-21 September 2016; Tampere, Finland.

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### **Ethnicity predicts falls among community-dwelling older adults in Singapore**

Chen TY, Tan PJ, Chan A.

*Geriatr. Gerontol. Int.* 2017; ePub(ePub): ePub.

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**DOI** 10.1111/ggi.13143 **PMID** 28857421

#### **Abstract**

**AIM:** The present study examined whether ethnicity independently predicted future falls among community-dwelling older Singaporeans, and whether ethnicity moderated the relationships between falls risk factors at baseline and falls at follow up.

**METHODS:** Data from a longitudinal survey of older Singaporeans were used. Baseline assessment included handgrip strength, global cognitive function, mobility difficulties, health and psychosocial status. One-year retrospective falls information at follow up was the primary outcome.

**RESULTS:** Final analysis included 1975 participants (mean age  $73.6 \pm 6.2$  years, 53% women). Indians, followed by Malays, had a higher risk of falling compared with Chinese at follow up. This association remained after controlling for falls risk factors. Self-reported pain and poor global cognitive function imposed a substantial increment in the risk of falling among Malays compared with Chinese, but not Indians.

**CONCLUSION:** Ethnicity was a significant predictor of future falls among older Singaporeans. Falls screening and intervention should take ethnicity into account to reach and support the appropriate target population.

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### **Fall prevention by nursing assistants among community-living elderly people. A randomised controlled trial**

Fahlström G, Kamwendo K, Forsberg J, Bodin L.

*Scand. J. Caring Sci.* 2017; ePub(ePub): ePub.

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**DOI** 10.1111/scs.12481 **PMID** 28851132

#### **Abstract**

Falls among elderly are a major public health issue in Sweden. The aim was to determine whether nursing assistants can prevent falls by supervising community-living elderly individuals with a history of falling in performing individually designed home exercise programmes. A randomised controlled trial was performed in Sweden, in eight municipalities in the county of Örebro, during 2007-2009. Community-living persons 65 years or older having experienced at least one fall during the last 12 months were included. The intervention group consisted of 76 participants, and there were 72 in the control group. The interventions were free of charge and were shared between a physiotherapist and a nursing assistant. The former designed a programme aiming to improve balance, leg strength and walking ability. The nursing assistant supervised the performance of activities during eight home visits during a 5-month intervention period. The measures and instruments used were health-related quality of life (SF-36), activity of daily living (ADL-staircase), balance, (Falls Efficacy Scale, and Berg Balance Scale), walking ability (Timed Up and Go and the 3-metre walking test), leg strength, (chair stand test). All participants were asked to keep a structured calendar of their physical exercise, walks and occurrence of falls during their 12-month study period. Hospital healthcare consumption data were collected. Although the 5-month intervention did not significantly decrease the risk for days with falls, RR 1.10 (95% CI 0.58, 2.07),  $p = 0.77$ , significant changes in favour of the intervention group were noted for balance ( $p = 0.03$ ), ADL ( $p = 0.035$ ), bodily pain ( $p = 0.003$ ) and reported health transition over time ( $p = 0.008$ ) as well as less hospital care due to fractures ( $p = 0.025$ ). Additional studies with more participants are needed to establish whether or not falls can be significantly prevented with this model which is workable in home-based fall prevention.

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#### **PDF Y Endnote Y**

### **Foot problems in older adults: associations with incident falls, frailty syndrome and sensor-derived gait, balance, and physical activity measures**

Muchna A, Najafi B, Wendel CS, Schwenk M, Armstrong DG, Mohler J.

*J. Am. Podiatr. Med. Assoc.* 2017; ePub(ePub): ePub.

**Affiliation:** University of Arizona Arizona Center on Aging.

(Copyright © 2017, American Podiatric Medical Association)

**DOI** 10.7547/15-186 **PMID** 28853612

#### **Abstract**

**BACKGROUND:** Research on the relationship between foot problems and frailty is sparse and could be elucidated via advances in wearable sensor-based measures of gait, balance, and physical activity (PA). This study examined the impact of foot problems on likelihood of falls, frailty syndrome, motor performance, and PA in community-dwelling older adults.

**METHODS:** Arizona Frailty Cohort Study participants (community-dwelling adults 65 years and older without baseline cognitive deficit, severe movement disorders, or recent stroke) underwent Fried frailty and foot assessment. Gait, balance (bipedal eyes open and closed), and spontaneous PA over 48 hours were measured using validated wearable sensor technologies.

**RESULTS:** Of 117 participants, 41 (35%) were non-frail, 56 (48%) pre-frail, and 20 (17%) frail. Prevalence of foot problems (pain, peripheral neuropathy, or deformity) increased significantly as frailty category worsened (any problem 63% in non-frail, 80% in pre-frail [OR=2.0], and 95% in frail [OR=8.3],  $p=.03$  for trend), due to associations between foot problems and both weakness and exhaustion. Foot problems were associated with fear of falling, but not with fall history or incident falls over 6-months. Foot pain and peripheral neuropathy were associated with lower gait speed and stride length; increased double support time; increased medial-lateral sway of center of mass during walking, age adjusted; decreased eyes open sway of center of mass and ankle during quiet standing, age adjusted; and lower percent walking, percent standing and total steps per day.

**CONCLUSIONS:** Foot problems were associated with frailty level and decreased motor performance and PA. Wearable technology is a practical way to screen for deterioration in gait, balance, and PA that may be associated with foot problems. Routine assessment and management of foot problems could promote earlier intervention to retain motor performance and manage fear of falling among older adults, which may ultimately improve healthy aging and reduce risk of frailty.

#### **PDF N Endnote Y**

#### **Multilevel comparisons of hospital discharge among older adults with a fall-related hospitalization**

Towne SD, Fair K, Smith ML, Dowdy DM, Ahn S, Nwaiwu O, Ory MG.

*Health Serv. Res.* 2017; ePub(ePub): ePub.

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**DOI** 10.1111/1475-6773.12763 **PMID** 28857156

#### **Abstract**

**OBJECTIVE:** We examined multilevel factors associated with hospital discharge status among older adults suffering a fall-related hospitalization.

**DATA SOURCES:** The 2011-2013 ( $n = 131,978$ ) Texas Inpatient Hospital Discharge Public-Use File was used.

**STUDY DESIGN/METHODS:** Multilevel logistic regression analyses estimated the likelihood of being discharged to institutional settings versus home. **PRINCIPAL FINDINGS:** Factors associated with a greater likelihood of being discharged to institutional settings versus home/self-care included being female, white, older, having greater risk of mortality, receiving care in a non-teaching hospital, having Medicare (versus Private) coverage, and being admitted from a non-health care facility (versus clinical referral).

**CONCLUSIONS:** Understanding risk factors for costly discharges to institutional settings enables targeted fall-prevention interventions with identification of at-risk groups and allows for identifying policy-related factors associated with discharge status.

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#### **PDF Y Endnote Y**



### **Older adult falls: effective approaches to prevention**

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*Curr. Trauma Rep.* 2017; 3(2): 118-123.

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**DOI** 10.1007/s40719-017-0087-x **PMID** 28845383 **PMCID** PMC5568681

#### **Abstract**

**PURPOSE:** The issue of older adult falls combines a problem with high incidence and high injury susceptibility with an increasing population at risk. A firm understanding of both fall risk factors and effective strategies is required to reduce risk and prevent these injuries.

**RECENT FINDINGS:** Each year, 28.7% of older adults aged  $\geq 65$  sustain a fall. At the national level, this represents 29 million falls resulting in 27,000 deaths and 7 million injuries requiring medical treatment or restricted activity for at least 1 day. There are several strategies that have been shown to effectively reduce the risk or the incidence of falls.

**SUMMARY:** More than 90% of older adults see a medical provider at least once a year providing an opportunity to identify and address fall risk factors. Comprehensive fall prevention in the primary care setting is both feasible and practical.

#### **PDF Y Endnote Y**

### **Older age, comorbid illnesses, and injury severity affect immediate outcome in elderly trauma patients**

Kirshenbom D, Ben-Zaken Z, Albilya N, Niyibizi E, Bala M.

*J. Emerg. Trauma Shock* 2017; 10(3): 146-150.

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**DOI** 10.4103/JETS.JETS\_62\_16 **PMID** 28855778 **PMCID** PMC5566026

#### **Abstract**

**INTRODUCTION:** Trauma in elderly population is frequent and is associated with significant mortality, not only due to age but also due to complicated factors such as the severity of injury, preexisting comorbidity, and incomplete general assessment. Our primary aim was to determine whether age, Injury Severity Score (ISS), and preexisting comorbidities had an adverse effect on the outcome in patients aged 65 years and above following blunt trauma.

**METHODS:** We included 1027 patients aged  $\geq 65$  years who were admitted to our Level I Trauma Center following blunt trauma. Patients' charts were reviewed for demographics, ISS, mechanism of injury, preexisting comorbidities, Intensive Care Unit and hospital length of stay, complications, and in-hospital mortality.

**RESULTS:** The mean age of injured patients was  $78.8 \pm 8.3$  years (range 65-109). The majority of patients had mild injury severity (ISS 9-14, 66.8%). Multiple comorbidities ( $\geq 3$ ) were found in 233 patients (22.7%). Mortality during the hospitalization stay ( $n = 35$ , 3.4%) was associated with coronary artery disease, renal failure, dementia, and warfarin use ( $P < 0.05$ ). Chronic anticoagulation treatment was recorded in 13% of patients. The addition of a single comorbidity increased the odds of wound infection to 1.29 and sepsis to 1.25. Both age and ISS increased the odds of death as -1.08

and -2.47, respectively.

**CONCLUSIONS:** Our analysis shows that age alone in elderly trauma population is not a robust measure of outcome, and more valuable predictors such as injury severity, preexisting comorbidities, and medications are accounted for adverse outcome. Trauma care in this population with special considerations should be tailored to meet their specific needs.

#### **PDF Y Endnote Y**

#### **One-year readmission risk and mortality after hip fracture surgery: a national population-based study in Taiwan**

Lee TC, Ho PS, Lin HT, Ho ML, Huang HT, Chang JK.

*Aging Dis.* 2017; 8(4): 402-409.

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**DOI** 10.14336/AD.2016.1228 **PMID** 28840055 **PMCID** PMC5524803

#### **Abstract**

Early readmission following hip fracture (HFX) is associated with high morbidity and mortality. We conducted a survival analysis of patients with readmission within 1 year after HFX to elucidate the trend and predictors for readmission. We used Taiwan National Health Insurance Database to recruit HFX patients who underwent operations between 2000 and 2009. Patients < 60 years; with pathological fractures; involved in major traffic accidents; with previous pelvis, femur, and hip operations; or who died during the index admission were excluded. We used the Chi-square test, logistic regression, Kaplan-Meier method, and Cox proportional hazards model to analyze variables, including age, gender, hospital stay duration, index admission time, and comorbidity on readmission. 5,442 subjects (61.2% female) met the criteria with mean age of 78.8 years. Approximately 15% and 43% HFX patients were readmitted within 30 days (early) and between 30 days and 1 year (late) after discharge, respectively. Highest readmission incidence was observed within the first 30 days. Most common causes of readmission in early and late groups were respiratory system diseases and injuries, respectively. Cox model showed male, old age, hospital stay > 9 days, Charlson Comorbidity Index  $\geq 1$ , index admission during 2000-2003, and internal fixation of HFX were independent predictors of readmission. One-year mortality of the early and the late readmission groups was 44.9% and 32.3%, much higher than overall mortality which was 16.8%. Predictive factors for readmission within 1 year included male, old age, comorbidities, and longer hospital stay. One-year mortality in readmitted patients was significantly higher. HFX patients with these factors need careful follow-up, especially within 30 days after discharge.

#### **PDF Y Endnote Y**

#### **Predictors of emergency department attendance by people with dementia in their last year of life: retrospective cohort study using linked clinical and administrative data**

Sleeman KE, Perera G, Stewart R, Higginson IJ.

*Alzheimers Dement.* 2017; ePub(ePub): ePub.

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**DOI** 10.1016/j.jalz.2017.06.2267 **PMID** 28838779

### Abstract

**INTRODUCTION:** A fall in hospital deaths in dementia has been interpreted as indicating an improvement in end-of-life care. Whether other indicators of quality of end-of-life care, such as emergency department (ED) attendance, show a similar trend is unclear.

**METHODS:** Retrospective cohort study using electronic medical records from a large mental health care provider, linked to national mortality and hospital use data (2008-2013).

**RESULTS:** Of 4867 patients, 78.6% (3824) had at least one ED attendance during their last year of life (mean 2.13, standard deviation 2.34, range 0-54). ED attendance increased over the time period (incidence rate ratio 1.62, 95% confidence interval 1.46-1.80 for 2012-2013 compared with 2008-2009).

**DISCUSSION:** ED attendance in the last year of life for people with dementia is common and is increasing. Policy makers must pay attention to a broader range of indicators of poor end-of-life care alongside the place of death.

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### PDF Y Endnote Y

#### Reading from the black box: what sensors tell us about resting and recovery after real-world falls

Schwickert L, Klenk J, Zijlstra W, Forst-Gill M, Sczuka K, Helbostad JL, Chiari L, Aminian K, Todd C, Becker C.

*Gerontology* 2017; ePub(ePub): ePub.

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**DOI** 10.1159/000478092 **PMID** 28848150

### Abstract

**BACKGROUND:** Lying on the floor for a long time after falls, regardless of whether an injury results, remains an unsolved health care problem. In order to develop efficient and acceptable fall detection and reaction approaches, it is relevant to improve the understanding of the circumstances and the characteristics of post-impact responses and the return or failure to return to pre-fall activities. Falls are seldom observed by others; until now, the knowledge about movement kinematics during falls and following impact have been anecdotal.

**OBJECTIVE:** This study aimed to analyse characteristics of the on-ground and recovery phases after real-world falls. The aim was to compare self-recovered falls (defined as returns to standing from the floor) and non-recovered falls with long lies.

**METHODS AND PARTICIPANTS:** Data from subjects in different settings and of different populations with high fall risk were included. Real-world falls collected by inertial sensors worn on the lower back were taken from the FARSEEING database if reliable information was available from fall reports and sensor signals. Trunk pitch angle and acceleration were analysed to describe different patterns of recovery movements while standing up from the floor after the impact of a fall.

**RESULTS:** Falls with successful recovery, where an upright posture was regained, were different from non-recovered falls in terms of resting duration (median 10.5 vs. 34.5 s,  $p = 0.045$ ). A resting duration longer than 24.5 s (area under the curve = 0.796) after the fall impact was a predictor for the inability to recover to standing. Successful recovery to standing showed lower cumulative angular pitch movement than attempted recovery in fallers that did not return to a standing position (median = 76°, interquartile range 24-170° vs. median = 308°, interquartile range 30-1,209°,  $p = 0.06$ ).

**CONCLUSION:** Fall signals with and without successful returns to standing showed different patterns during the phase on the ground. Characteristics of real-world falls provided through inertial sensors are relevant to improve the classification and the sensing of falls. The findings are also important for redesigning emergency response processes after falls in order to better support individuals in case of an unrecovered fall. This is crucial for preventing long lies and other fall-related incidents that require an automated fall alarm.

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### **Social environment of older people during the first year in senior housing and its association with physical performance**

Lotvonen S, Kyngäs H, Koistinen P, Bloigu R, Elo S.

Int. J. Environ. Res. Public Health 2017; 14(9): e14090960.

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#### **Abstract**

Increasing numbers of older people relocate into senior housing when their physical performance declines. The change in social environment is known to affect their wellbeing, providing both challenges and opportunities, but more information on the relations between social and physical parameters is required. Thus, we elicited perceptions of the social environment of 81 older people (aged 59-93 years, living in northern Finland) and changes in it 3 and 12 months after relocation to senior housing. We also measured their physical performance, then analysed associations between the social and physical variables. Participants reported that they had freedom to do whatever they liked and generally had enough contact with close people (which have recognized importance for older people's wellbeing), but changes in their physical condition limited their social activity. Moreover, their usual walking speed, dominant hand's grip strength and instrumental activities of daily living (IADL) significantly decreased. The pleasantness of the residential community, peer support, constraints on social activity imposed by changes in physical condition, meaningful activity at home and meeting close people all affected these physical performance parameters. Clearly, in addition to assessing physical performance and encouraging regular exercise, the complex interactions among social factors, physical performance and wellbeing should be considered when addressing individuals' needs.

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### **A multicomponent fall prevention strategy reduces falls at an academic medical center**

France D, Slayton J, Moore S, Domenico H, Matthews J, Steaban RL, Choma N.

*Jt. Comm. J. Qual. Patient Saf.* 2017; 43(9): 460-470.

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#### **Abstract**

**BACKGROUND:** While the reduction in fall rates has not kept pace with the reduction of other hospital-acquired conditions, patient safety research and quality improvement (QI) initiatives at the

system and hospital levels have achieved positive results and provide insights into potentially effective risk reduction strategies. An academic medical center developed a QI-based multicomponent strategy for fall prevention and pilot tested it for six months in three high-risk units-the Neuroscience Acute Care Unit, the Myelosuppression/Stem Cell Transplant Unit, and the Acute Care for the Elderly Unit-before implementing and evaluating the strategy hospitalwide. METHODS: The multicomponent fall strategy was evaluated using a pre-post study design. The main outcome measures were falls and falls with harm measured in events per 1,000 patient-days. Fall rates were monitored and compared for three classes of falls: (1) accidental, (2) anticipated physiologic, and (3) unanticipated physiologic.

RESULTS: Statistical process control charts showed that the pilot units had achieved significant reductions in falls with harm during the last five months of data collection. Wald test and segmented regression analyses revealed significant improvements in pooled postintervention fall rates, stratified by fall type. The hospitalwide implementation of the program resulted in a 47% overall reduction in falls in the postintervention period.

CONCLUSION: A fall prevention strategy that targeted the spectrum of risk factors produced measurable improvement in fall rates and rates of patient harm. Hospitals must continue developing, rigorously testing, and sharing their results and experiences in implementing and sustaining multicomponent fall prevention strategies.

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#### PDF Y Endnote Y

#### Association between asthma and falls: a nationwide population-based study

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#### Abstract

**OBJECTIVES:** We evaluated the relationship between asthma and falls in Koreans using data from a large population-based cross-sectional survey.

**METHODS:** Data were obtained from 228,642 participants, of whom 6,372 had asthma, who participated in the 2013 Korean Community Health Survey. We explored the risk of falls after adjusting for sociodemographic factors and comorbidities. Logistic regression was used to identify risk factors for falls in asthmatics. Patients with asthma who had been diagnosed by a physician were included after excluding those who did not respond to the self-reported questionnaire.

**RESULTS:** In all, 1,733/6,372 (27.1%) asthma patients and 258/788 (32.7%) patients with uncontrolled asthma (who had visited the emergency room because of asthma exacerbation in the prior 12 months) reported histories of falls. In asthmatics, the crude odds ratio (OR) for falls was 1.57 (95% confidence interval [CI]: 1.48-1.67); the OR for falls in the group with uncontrolled asthma was 2.13 (95% CI: 1.83-2.47). The multivariate OR for falls in the asthma group (compared to the non-asthma group) was 1.27 (95% CI, 1.18-1.35) and the OR for falls in the uncontrolled asthma group (again compared to the non-asthma group) was 1.55 (95% CI, 1.32-1.82). Subgroup analysis of the adjusted ORs for falls in asthmatics by age group revealed a significant difference between the presence of asthma and uncontrolled asthma, and falls, in each age group, similar to the relationship

evident in the total adult population.

**CONCLUSION:** Asthma is associated with falls, even after adjusting for sociodemographic and comorbid variables.

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### **Associations between bladder dysfunction and falls in people with relapsing-remitting multiple sclerosis**

Zelaya JE, Murchison C, Cameron M.

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(Copyright © 2017, Clinicians Group)

**DOI** 10.7224/1537-2073.2016-049 **PMID** 28835742 **PMCID** PMC5564279

#### **Abstract**

**BACKGROUND:** Bladder dysfunction and falls are common in people with multiple sclerosis (MS), but associations between these problems are unclear. We sought to clarify the association between specific types of bladder dysfunction and prospectively recorded falls in people with MS.

**METHODS:** Fifty-one people aged 18 to 50 years with relapsing-remitting MS and mild-to-moderate disability (Expanded Disability Status Scale score  $\leq 6.0$ ) completed a self-report questionnaire regarding urinary incontinence, urgency, and frequency at baseline and then prospectively recorded their falls daily for 3 months using fall calendars. Participants were classified as recurrent fallers (two or more falls) or nonrecurrent fallers (fewer than 2 falls) for one regression model and then as fallers (one or more falls) or nonfallers (no falls) for another regression model. Associations between baseline bladder dysfunction and faller status were assessed using logistic regression adjusted for the potential confounders of age, sex, and disability.

**RESULTS:** Fifteen participants were recurrent fallers, 36 were nonrecurrent fallers, 32 were fallers, and 19 were nonfallers. After adjusting for age, sex, and disability, there was a significant association between urinary urgency with incontinence and recurrent falls in the 3 months after baseline (odds ratio, 57.57; 95% CI, 3.43-966.05;  $P = .005$ ).

**CONCLUSIONS:** Urinary urgency with incontinence is associated with recurrent falls in people with relapsing-remitting MS with mild-to-moderate disability. Further research is needed to better understand the mechanisms underlying this association and to evaluate the effect of bladder management programs on falls.

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### **Falls requiring visit to emergency room in a population-based cohort of diabetic patients in Italy**

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*J. Inj. Violence Res.* 2017; 9(2): 83-90.

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#### **Abstract**

**BACKGROUND:** The aims were to assess the frequency of falls among the diabetic adult population of the Italian Northeastern region Friuli Venezia Giulia and to identify risk factors.



**METHODS:** This was a population-based retrospective cohort study using administrative data of the regional health information system as the source of information. In a cohort of diabetics 18 years of age or more, living in the region on December 31, 2014, the occurrence of falls requiring a visit to the regional Emergency Rooms was assessed. Multivariate logistic regression was used to identify factors associated with increased risk of falling.

**RESULTS:** Of 80,162 cohort subjects, 2967 (3.7%) had at least one fall requiring a visit to ER. Factors associated with increased risk of falling were female sex, older age, prescription of a thiazolidinedione as the last antidiabetic medication in 2014, increasing number of active principles prescribed in 2014, longer diabetes duration, and prescription of certain classes of medications other than antidiabetics in 2014.

**CONCLUSIONS:** In Friuli Venezia Giulia, injurious falls are a complication of diabetes relevant from the public health viewpoint. Efforts are needed to screen diabetic patients, review their prescriptions, provide appropriate care, and implement targeted interventions to minimize the individual risk of falls.

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### **Hyperglycemia induces attention and gait deficits in diabetic mellitus patients**

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*Acta Diabetol.* 2017; ePub(ePub): ePub.

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#### **Abstract**

**AIMS:** Patients with diabetes mellitus experience a large number of falls and bone fractures that are not related solely to complications of the disease. The purpose of our study was to determine whether transient hyperglycemia affects attentional functions and gait.

**METHODS:** This was a case-control study. We asked 17 patients with type 1 or type 2 diabetes mellitus to perform three visual tests and one visual and auditory attention test (Phasic Alert A1-4 and A2-3, Go/No Go, Intermodal Comparison). Mean response time (ms) and total number of errors were assessed. Ten of the patients also performed a tandem gait test consisting of three steps. The total distance travelled (TDT, in mm) by the center of pressure was measured with a pressure-sensitive calibrated platform. Transient hyperglycemia was defined as blood glucose level greater than 13, 8 mmol/L at the time of the test. These same patients were retested 1-3 days later at a blood glucose level at least 5, 5 mmol/L lower than the initial values (T24-72h). Nineteen patients with diabetes mellitus were matched with the original participants and performed the same test under normoglycemic conditions.

**RESULTS:** During transient hyperglycemia, the mean response time (ms) and the TDT were significantly longer. The mean response time for the four tests increased by 53, 5 ms ( $P < 0.001$ ). There was no increase in the number of errors. The TDT of the center of pressure increased significantly by 102 mm ( $P < 0.001$ ).

**CONCLUSIONS:** Transient hyperglycemia alters attention and gait in patients with diabetes mellitus.

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## **Incidence of bone protection and associated fragility injuries in patients with proximal femur fractures**

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*Injury* 2017; ePub(ePub): ePub.

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### **Abstract**

**OBJECTIVES:** Our aim was to investigate whether patients presenting with fragility fractures of the proximal femur are receiving osteoporosis treatment and to assess the number of other fragility fractures they have sustained prior to admission.

**METHODS:** All patients presenting to our institution with fragility fractures of the proximal femur within an 18-month period (January 2012-August 2013) were included. Patient demographics; fracture classification (AO/OTA); American Society of Anesthesiologists (ASA) grade; Abbreviated Mental Test Score (AMTS) on admission; type of operation; time to operation; peri-operative complications; length of hospital stay (LOS); walking status; osteoporotic medication; Dual-energy X-ray absorptiometry (DEXA) results; additional fragility fractures; and mortality were collected and analysed.

**RESULTS:** A total of 1004 patients (278 male) met the inclusion criteria and were included into the study. The mean age was 82.01 years and mean LOS was 19.54days. Fifty-four per cent of the patients were admitted from their own homes whereas 43% were capable to walk indoors without any aids before their injury. Mean time to surgery was 2.06days (Median: 1.31, range: 0-26days). Three hundred and six patients (30.5%) had at least another fragility fracture before the index episode (mean 1.40 fractures; SD: 0.71 fractures; range: 1-6 fractures). Only 16.4% were under complete osteoporosis treatment on admission, defined as receiving calcium with vitamin D and a bisphosphonate or an alternative agent. When we compared patients without a history of a previous fragility fracture (Group A) and patients with at least another previous fragility fracture (Group B), we found that patients in Group B had a significantly lower AMTS score, lower bone mineral density (BMD) as evident on the DEXA scan, an inferior mobility before admission and a higher incidence of extracapsular fractures ( $p<0.05$ ). On discharge, patients in Group B had a higher chance of receiving complete bone protection compared to group A (27.9% versus 41.7%;  $p<0.01$ ). Following discharge, 11.2% of the patients sustained an additional fragility fracture. The mean time from the index episode to the additional fracture was 0.65 years, whilst these injuries were more frequent in Group B (RR=1.638;  $p<0.05$ ).

**CONCLUSION:** Patients presenting with a hip fracture are generally under-treated for osteoporosis. Post-operative assessment by a designated geriatrician and use of a standardised protocol is of paramount importance for reducing the risk of additional fragility fractures. Additionally, screening of the elderly population for identifying the patients who suffer from osteoporosis can potentially reduce the risk of sustaining a further fragility fracture.

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## Near-falls in people with Parkinson's disease: circumstances, contributing factors and association with falling

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### Abstract

**OBJECTIVES:** To describe circumstances of near-falls among persons with Parkinson's disease (PD), assess factors associated with near-falling and assess whether near-falls in the first 6 months are associated with falling in the latter 6 months over one year of follow-up.

**MATERIALS AND METHODS:** In the period August 2011-December 2012, 120 consecutive persons with PD, who denied having fallen in the past 6 months, were recruited at Clinical center of Serbia in Belgrade. Occurrence of falling and near-falls was followed for one year.

**RESULTS:** A total of 31 persons with PD (25.8%) experienced near-falls, but did not fall. Of 42 fallers, 32 (76.2%) experienced near-falls. Tripping was the most common cause of near-falls among fallers, whereas postural instability was the most common in non-fallers. Regardless of falling experience, the most common manner to avoid fall was holding onto furniture or wall. After adjustment for multiple motor and non-motor PD features, more severe freezing of gait was associated with occurrence of near-falls over one year of follow-up (odds ratio [OR]=1.08, 95% confidence interval [CI] 1.01-1.16; p=0.043). Adjusted regression analysis did not show associations between near-falling in the first 6 months and falling in the latter 6 months of follow-up.

**CONCLUSION:** Near-falls commonly occur in persons with PD. More severe freezing of gait appears to predispose near-falling. Fall prevention programs focusing on balance maintenance when experiencing freezing of gait could potentially be useful in reduction of near-falls.

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