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A comparison of different ways of including baseline counts in negative binomial models for data from falls prevention trials

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Biom. J. 2017; ePub(ePub): ePub.

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Abstract

A common design for a falls prevention trial is to assess falling at baseline, randomize participants into an intervention or control group, and ask them to record the number of falls they experience during a follow-up period of time. This paper addresses how best to include the baseline count in the analysis of the follow-up count of falls in negative binomial (NB) regression. We examine the performance of various approaches in simulated datasets where both counts are generated from a mixed Poisson distribution with shared random subject effect. Including the baseline count after log-transformation as a regressor in NB regression (NB-logged) or as an offset (NB-offset) resulted in greater power than including the untransformed baseline count (NB-unlogged). Cook and Wei's conditional negative binomial (CNB) model replicates the underlying process generating the data. In our motivating dataset, a statistically significant intervention effect resulted from the NB-logged, NB-offset, and CNB models, but not from NB-unlogged, and large, outlying baseline counts were overly influential in NB-unlogged but not in NB-logged. We conclude that there is little to lose by including the log-transformed baseline count in standard NB regression compared to CNB for moderate to larger sized datasets.

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PDF Y Endnote Y

A history of falls is associated with a significant increase in acute mortality in women after stroke

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J. Clin. Neurol. 2017; 13(4): 411-421.

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(Copyright © 2017, Korean Neurological Association)

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Abstract

BACKGROUND AND PURPOSE: The risks of falls and fractures increase after stroke. Little is known about the prognostic significance of previous falls and fractures after stroke. This study examined whether having a history of either event is associated with poststroke mortality.

METHODS: We analyzed stroke register data collected prospectively between 2003 and 2015. Eight sex-specific models were analyzed, to which the following variables were incrementally added to examine their potential confounding effects: age, type of stroke, Oxfordshire Community Stroke Project classification, previous comorbidities, frailty as indicated by the prestroke modified Rankin Scale score, and acute illness parameters. Logistic regression was applied to investigate in-hospital and 30-day mortality, and Cox proportional-hazards models were applied to investigate longer-term

outcomes of mortality.

RESULTS: In total, 10,477 patients with stroke (86.1% ischemic) were included in the analysis. They were aged 77.7 ± 11.9 years (mean \pm SD), and 52.2% were women. A history of falls was present in 8.6% of the men (n=430) and 20.2% of the women (n=1,105), while 3.8% (n=189) of the men and 12.9% of the women (n=706) had a history of both falls and fractures. Of the outcomes examined, a history of falls alone was associated with increased in-hospital mortality [odds ratio (OR)=1.33, 95% confidence interval (CI)=1.03-1.71] and 30-day mortality (OR=1.34, 95% CI=1.03-1.73) in women in the fully adjusted models. The Cox proportional-hazards models for longer-term outcomes and the history of falls and fractures combined showed no significant results.

CONCLUSIONS: The history of falls is an important factor for acute stroke mortality in women. A previous history of falls may therefore be an important factor to consider in the short-term stroke prognosis, particularly in women.

PDF Y Endnote Y

Antithrombotics in trauma: management strategies in the older patients

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Abstract

The ageing population has resulted in a change in the demographics of trauma, and older adult trauma now accounts for a growing number of trauma admissions. The management of older adult trauma can be particularly challenging, and exhibits differences to that of the younger age groups affected by trauma. Frailty syndromes are closely related with falls, which are the leading cause of major trauma in older adults. Comorbid disease and antithrombotic use are more common in the older population. Physiological changes that occur with ageing can alter the expected clinical presentation of older persons after injury and their susceptibility to injury. Following major trauma, definitive control of hemorrhage remains essential for improving outcomes. In the initial assessment of an injured patient, it is important to consider whether the patient is taking anticoagulants or antiplatelets and if measures to promote hemostasis such as reversal are indicated. After hemostasis is achieved and bleeding has stopped, longer-term decisions to recommence antithrombotic agents can be challenging, especially in older people. In this review, we discuss one aspect of management for the older trauma patients in greater detail, that is, acute and longer-term management of antithrombotic therapy. As we consider the health needs of an ageing population, rise in elderly trauma and increasing use of antithrombotic therapy, the need for research in this area becomes more pressing to establish best practice and evidence-based care.

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Association between polypharmacy and falls in older adults: a longitudinal study from England

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(Copyright © 2017, BMJ Publishing Group)

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Abstract

OBJECTIVES: Assess the longitudinal association between polypharmacy and falls and examine the differences in this association by different thresholds for polypharmacy definitions in a nationally representative sample of adults aged over 60 years from England.

DESIGN: Longitudinal cohort study.

SETTING: The English Longitudinal Study of Ageing waves 6 and 7. **PARTICIPANTS:** 5213 adults aged 60 or older.

MAIN OUTCOME MEASURES: Rates, incidence rate ratio (IRR) and 95% CI for falls in people with and without polypharmacy.

RESULTS: A total of 5213 participants contributed 10 502 person-years of follow-up, with a median follow-up of 2.02 years (IQR 1.9-2.1 years). Of the 1611 participants with polypharmacy, 569 reported at least one fall within the past 2 years (rate: 175 per 1000 person-years, 95% CI 161 to 190), and of the 3602 participants without polypharmacy 875 reported at least one fall (rate: 121 per 1000 person-years, 95% CI 113 to 129). The rate of falls was 21% higher in people with polypharmacy compared with people without polypharmacy (adjusted IRR 1.21, 95% CI 1.11 to 1.31). Using ≥ 4 drugs threshold the rate of falls was 18% higher in people with polypharmacy compared with people without (adjusted IRR 1.18, 95% CI 1.08 to 1.28), whereas using ≥ 10 drugs threshold polypharmacy was associated with a 50% higher rate of falls (adjusted IRR 1.50, 95% CI 1.34 to 1.67).

CONCLUSIONS: We found almost one-third of the total population using five or more drugs, which was significantly associated with 21% increased rate of falls over a 2-year period. Further exploration of the effects of these complex drug combinations in the real world with a detailed standardised assessment of polypharmacy is greatly required along with pragmatic studies in primary care, which will help inform whether the threshold for a detailed medication review should be lowered.

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Can physical activity prevent falls in older adults with poor physical performance?

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Abstract Editorial [Abstract unavailable]

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Dual-task gait and incident dementia: a step forward, but not there yet

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(Copyright © 2017, American Medical Association)

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Abstract Letter to editor [Abstract unavailable]

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Dual-task gait and incident dementia: a step forward, but not there yet-reply

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Abstract [Abstract unavailable]

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Executive functioning, concern about falling and quadriceps strength mediate the relationship between impaired gait adaptability and fall risk in older people

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Gait Posture 2017; 59: 188-192.

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Abstract

BACKGROUND: Reduced ability to adapt gait, particularly under challenging conditions, may be an important reason why older adults have an increased risk of falling. This study aimed to identify cognitive, psychological and physical mediators of the relationship between impaired gait adaptability and fall risk in older adults.

METHODS: Fifty healthy older adults (mean±SD: 74±7years) were categorised as high or low fall risk, based on past falls and their performance in the Physiological Profile Assessment. High and low-risk groups were then compared in the gait adaptability test, i.e. an assessment of the ability to adapt gait in response to obstacles and stepping targets under single and dual task conditions. Quadriceps strength, concern about falling and executive function were also measured.

RESULTS: The older adults who made errors on the gait adaptability test were 4.76 (95%CI=1.08-20.91) times more likely to be at high risk of falling. Furthermore, each standard deviation reduction in gait speed while approaching the targets/obstacle increased the odds of being at high risk of falling approximately three fold: single task - OR=3.10,95%CI=1.43-6.73; dual task -

3.42,95%CI=1.56-7.52. Executive functioning, concern about falling and quadriceps strength substantially mediated the relationship between the gait adaptability measures and fall risk status.

CONCLUSION: Impaired gait adaptability is associated with high risk of falls in older adults. Reduced executive function, increased concern about falling and weaker quadriceps strength contribute significantly to this relationship. Training gait adaptability directly, as well as addressing the above mediators through cognitive, behavioural and physical training may maximise fall prevention efficacy.

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Exploring falls prevention capabilities, barriers and training needs among patient sitters in a hospital setting: a pilot survey

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Abstract

Older patients in hospitals are at high risk of falls. Patient sitters are sometimes employed to directly observe patients to reduce their risk of falling although there is scant evidence that this reduces falls. The primary aim of this pilot survey (n = 31) was to explore the patient sitters' falls prevention capability, self-efficacy and the barriers and enablers they perceived influenced their ability to care for patients during their shifts. Feedback was also sought regarding training needs. Most (90%) participants felt confident in their role. The most frequent reasons for falls identified were patient-related (n = 91, 64%), but the most frequent responses identifying preventive strategies were environment-related (n = 54, 64%), suggesting that the sitters' capability was limited. The main barriers identified to keeping patients safe from falling were patient-related (n = 36, 62%) such as cognitive impairment. However, opportunities that would enable sitters to do their work properly were most frequently categorized as being staff-related (n = 20, 83%), suggesting that the sitters have limited ability to address these barriers encountered. While 74% of sitters reported they had received previous training, 84% of participants would like further training. Patient sitters need more training, and work practice needs to be standardized prior to future research into sitter use for falls prevention.

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Fall-related mortality in southern Sweden: a multiple cause of death analysis, 1998-2014

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Abstract

OBJECTIVES: To investigate temporal trend in fall mortality among adults (aged ≥20 years) in southern Sweden using multiple cause of death data.

METHODS: We examined all death certificates (DCs, n=2 01 488) in adults recorded in the Skåne region during 1998-2014. We identified all fall deaths using International Statistical Classification of Diseases (ICD)-10 codes (W00-W19) and calculated the mortality rates by age and sex. Temporal trends were evaluated using joinpoint regression and associated causes were identified by age-adjusted and sex-adjusted observed/expected ratios.

RESULTS: Falls were mentioned on 1.0% and selected as underlying cause in 0.7% of all DCs, with the highest frequency among those aged ≥70 years. The majority (75.6%) of fall deaths were coded as unspecified fall (ICD-10 code: W19) followed by falling on or from stairs/steps (7.7%, ICD-10 code:

W10) and other falls on the same level (6.3%, ICD-10 code: W18). The mean age at fall deaths increased from 77.5 years in 1998-2002 to 82.9 years in 2010-2014 while for other deaths it increased from 78.5 to 79.8 years over the same period. The overall mean age-standardised rate of fall mortality was 8.3 and 4.0 per 1 00 000 person-years in men and women, respectively, and increased by 1.7% per year in men and 0.8% per year in women during 1998-2014. Head injury and diseases of the circulatory system were recorded as contributing cause on 48.7% of fall deaths. CONCLUSIONS: There is an increasing trend of deaths due to falls in southern Sweden. Further investigations are required to explain this observation particularly among elderly men.

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Physical limitations, walkability, perceived environmental facilitators and physical activity of older adults in Finland

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Abstract

The aim was to study objectively assessed walkability of the environment and participant perceived environmental facilitators for outdoor mobility as predictors of physical activity in older adults with and without physical limitations. 75-90-year-old adults living independently in Central Finland were interviewed (n = 839) and reassessed for self-reported physical activity one or two years later (n = 787). Lower-extremity physical limitations were defined as Short Physical Performance Battery score ≤9. Number of perceived environmental facilitators was calculated from a 16-item checklist. Walkability index (land use mix, street connectivity, population density) of the home environment was calculated from geographic information and categorized into tertiles. Accelerometer-based step counts were registered for one week (n = 174). Better walkability was associated with higher numbers of perceived environmental facilitators (p < 0.001) and higher physical activity (self-reported p = 0.021, step count p = 0.010). Especially among those with physical limitations, reporting more environmental facilitators was associated with higher odds for reporting at least moderate physical activity (p < 0.001), but not step counts. Perceived environmental facilitators only predicted self-reported physical activity at follow-up. To conclude, high walkability of the living environment provides opportunities for physical activity in old age, but among those with physical limitations especially, awareness of environmental facilitators may be needed to promote physical activity.

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Prevalence of multimorbidity in Germany: impact of age and educational level in a cross-sectional study on 19,294 adults

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Abstract

BACKGROUND: Multimorbidity is one of the most important and challenging aspects in public health. Multimorbid people are associated with more hospital admissions, a large number of drug prescriptions and higher risks of mortality. As there is evidence that multimorbidity varies with age and socioeconomic disparity, the main objective aimed at determining age-specific prevalence rates as well as exploring educational differences relating to multimorbidity in Germany.

METHODS: This cross-sectional analysis is based on the national telephone health interview survey "German Health Update" (GEDA2012) conducted between March 2012 and March 2013 with nearly 20,000 adults. GEDA2012 provides information on 17 self-reported health conditions along with sociodemographic characteristics. Multimorbidity was defined as the occurrence of two or more chronic conditions in one individual at the same time. Descriptive statistical analysis was used to examine multimorbidity according to age and education, which was defined by the International Standard Classification of Education (ISCED 1997).

RESULTS: Overall, 39.6% (95% confidence interval (CI) 38.7%-40.6%) of the 19,294 participants were multimorbid and the proportion of adults with multimorbidity increased substantially with age: nearly half (49.2%, 95% CI 46.9%-51.5%) of the adults aged 50-59 years had already two or more chronic health conditions. Prevalence rates of multimorbidity differed considerably between the levels of education. Low-level educated adults aged 40-49 years were more likely to be multimorbid with a prevalence rate of 47.4% (95% CI 44.2%-50.5%) matching those of highly educated men and women aged about ten years older.

CONCLUSIONS: Our findings demonstrate that both, age and education are associated with a higher risk of being multimorbid in Germany. Hence, special emphasis in the development of new approaches in national public health and prevention programs on multimorbidity should be given to low-level educated people aged <65 years.

PDF Endnote

Reduction in fall rate in dementia managed care through video incident review: pilot study

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J. Med. Internet. Res. 2017; 19(10): e339.

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(Copyright © 2017, Centre for Global eHealth Innovation)

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Abstract

BACKGROUND: Falls of individuals with dementia are frequent, dangerous, and costly. Early detection and access to the history of a fall is crucial for efficient care and secondary prevention in cognitively impaired individuals. However, most falls remain unwitnessed events. Furthermore, understanding why and how a fall occurred is a challenge. Video capture and secure transmission of real-world falls thus stands as a promising assistive tool.

OBJECTIVE: The objective of this study was to analyze how continuous video monitoring and review of falls of individuals with dementia can support better quality of care.

METHODS: A pilot observational study (July-September 2016) was carried out in a Californian memory care facility. Falls were video-captured (24x7), thanks to 43 wall-mounted cameras (deployed in all common areas and in 10 out of 40 private bedrooms of consenting residents and families). Video review was provided to facility staff, thanks to a customized mobile device app. The outcome measures were the count of residents' falls happening in the video-covered areas, the acceptability of video recording, the analysis of video review, and video replay possibilities for care practice.

RESULTS: Over 3 months, 16 falls were video-captured. A drop in fall rate was observed in the last month of the study. Acceptability was good. Video review enabled screening for the severity of falls and fall-related injuries. Video replay enabled identifying cognitive-behavioral deficiencies and environmental circumstances contributing to the fall. This allowed for secondary prevention in high-risk multi-faller individuals and for updated facility care policies regarding a safer living environment for all residents.

CONCLUSIONS: Video monitoring offers high potential to support conventional care in memory care facilities.

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Strategies to Reduce Injuries and Develop Confidence in Elders (STRIDE): a cluster-randomized pragmatic trial of a multifactorial fall injury prevention strategy: design and methods

Bhasin S, Gill TM, Reuben DB, Latham NK, Gurwitz JH, Dykes P, McMahon S, Storer TW, Duncan PW, Ganz DA et al

J. Gerontol. A Biol. Sci. Med. Sci. 2017; ePub(ePub): ePub.

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Abstract

BACKGROUND: Fall injuries are a major cause of morbidity and mortality among older adults. We describe the design of a pragmatic trial to compare the effectiveness of an evidence-based, patient-centered multifactorial fall injury prevention strategy to an enhanced usual care.

METHODS: Strategies to Reduce Injuries and Develop Confidence in Elders (STRIDE) is a 40-month cluster-randomized, parallel-group, superiority, pragmatic trial being conducted at 86 primary care practices in 10 healthcare systems across USA. The 86 practices were randomized to intervention or control group using covariate-based constrained randomization, stratified by healthcare system. Participants are community-living persons, ≥ 70 years, at increased risk for serious fall injuries. The intervention is a co-management model in which a nurse Falls Care Manager performs multifactorial risk assessments, develops individualized care plans, which include surveillance, follow-up evaluation, and intervention strategies. Control group receives enhanced usual care, with clinicians and patients receiving evidence-based information on falls prevention. Primary outcome is serious fall injuries, operationalized as those leading to medical attention (non-vertebral fractures, joint dislocation, head injury, lacerations, and other major sequelae). Secondary outcomes include all fall injuries, all falls, and well-being (concern for falling; anxiety and depressive symptoms; physical function and disability). Target sample size was 5,322 participants to provide 90% power to detect 20% reduction in primary outcome rate relative to control.

RESULTS: Trial enrolled 5451 subjects in 20 months. Intervention and follow-up are ongoing.

CONCLUSIONS: The findings of the STRIDE study will have important clinical and policy implications for the prevention of fall injuries in older adults.

PDF Y Endnote Y

The association between fall frequency, injury risk and characteristics of falls in older residents of long-term care: do recurrent fallers fall more safely?

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J. Gerontol. A Biol. Sci. Med. Sci. 2017; ePub(ePub): ePub.

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Abstract

BACKGROUND: Although a fall is a necessary prerequisite to a fall-related injury, previous studies suggest that frequent fallers are at lower injury risk for a given fall. We tested the hypotheses that differences in protective responses or the circumstances of falls underlie differences in injury risk with fall frequency.

METHODS: We analyzed video footage of 897 falls experienced by 220 long-term care residents (mean age 82±9 yrs) to identify the cause of imbalance, activity leading to falling, direction of fall initiation, balance recovery and fall protective responses, and occurrence of impact to the head or hip. We further obtained injury information from the facilities' fall registration. We used generalized estimating equation models to examine the association between quartiles of fall frequency, injury risk, and fall characteristics.

RESULTS: Residents with the highest fall frequency group (Q4; ≥5.6 falls/year) were less likely to sustain an injury per fall. They were less likely to fall during walking and more likely to fall during stand-to-sit transfers. Residents in the lowest fall frequency group (Q1; <1.15 falls/year) were more likely to fall during walking, and walking was associated with an increased risk for injury.

CONCLUSION: When compared to less frequent fallers, more frequent fallers had a lower risk for injury per fall. This appeared to be explained by differences in the circumstances of falls, and not by protective responses. Injury prevention strategies in long-term care should target both frequent and infrequent fallers, as the latter are more mobile and apt to sustain injury.

PDF Y Endnote Y

The Multifeature Gait Score: an accurate way to assess gait quality

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PLoS One 2017; 12(10): e0185741.

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(Copyright © 2017, Public Library of Science)

DOI 10.1371/journal.pone.0185741 **PMID** 29049403

Abstract

PURPOSE: This study introduces a novel way to accurately assess gait quality. This new method called Multifeature Gait Score (MGS) is based on the computation of multiple parameters characterizing six aspects of gait (temporal, amplitude, variability, regularity, symmetry and complexity) quantified with one inertial sensor. According to the aspects described, parameters were aggregated into partial scores to indicate the altered aspect in the case of abnormal patterns. In order to evaluate the overall gait quality, partial scores were averaged to a global score.

METHODS: The MGS was computed for 3 groups namely: healthy adult (10 subjects), sedentary elderly (11 subjects) and active elderly (20 subjects). Data were gathered from an inertial sensor located at the lumbar region during two sessions of 12m walking.

RESULTS: The results based on ANOVA and Tukey tests showed that the partial scores with the exception of those which describe the symmetry aspect were able to discriminate between groups ($p < 0.05$). This significant difference was also confirmed by the global score which shows a significantly lower value for the sedentary elderly group (3.58 ± 1.15) compared to the healthy adults (5.19 ± 0.84) and active elderly (4.82 ± 1.26). In addition, the intersession repeatability of the elaborated global score was excellent ($ICC = 0.93$, $\% SEM = 10.81$).

CONCLUSION: The results obtained support the reliability and the relevance of the MGS as a novel method to characterize gait quality.

PDF Y Endnote Y

The Strategies to Reduce Injuries and Develop Confidence in Elders Intervention: falls risk factor assessment and management, patient engagement, and nurse co-management

Reuben DB, Gazarian P, Alexander N, Araujo K, Baker D, Bean JF, Boulton C, Charpentier P, Duncan P, Latham N, Leipzig RM, Quintiliani LM, Storer T, McMahon S.

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Abstract

In response to the epidemic of falls and serious falls-related injuries in older persons, in 2014, the Patient Centered Outcomes Research Institute (PCORI) and the National Institute on Aging funded a pragmatic trial, Strategies to Reduce Injuries and Develop confidence in Elders (STRIDE) to compare the effects of a multifactorial intervention with those of an enhanced usual care intervention. The STRIDE multifactorial intervention consists of five major components that registered nurses deliver in the role of falls care managers, co-managing fall risk in partnership with patients and their primary care providers (PCPs). The components include a standardized assessment of eight modifiable risk factors (medications; postural hypotension; feet and footwear; vision; vitamin D; osteoporosis; home safety; strength, gait, and balance impairment) and the use of protocols and algorithms to generate recommended management of risk factors; explanation of assessment results to the patient (and caregiver when appropriate) using basic motivational interviewing techniques to elicit patient priorities, preferences, and readiness to participate in treatments; co-creation of individualized falls care plans that patients' PCPs review, modify, and approve; implementation of the falls care plan; and ongoing monitoring of response, regularly scheduled re-assessments of fall risk, and revisions of the falls care plan. Custom-designed falls care management software facilitates risk factor assessment, the identification of recommended interventions, clinic note generation, and longitudinal care management. The trial testing the effectiveness of the STRIDE intervention is in progress, with results expected in late 2019.

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Variation in older adult characteristics by residence type and use of home- and community-based services

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Int. J. Environ. Res. Public Health 2017; 14(3): e14030330.

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Abstract

BACKGROUND: The majority of older adults prefer to remain in their homes, or to "age-in-place." To accomplish this goal, many older adults will rely upon home- and community-based services (HCBS) for support. However, the availability and accessibility of HCBS may differ based on whether the older adult lives in the community or in a senior housing apartment facility.

METHODS: This paper reports findings from the Pathways to Life Quality study of residential change and stability among seniors in upstate New York. Data were analyzed from 663 older adults living in one of three housing types: service-rich facilities, service-poor facilities, and community-dwelling in single-family homes. A multinomial logistic regression model was used to examine factors associated with residence type. A linear regression model was fitted to examine factors associated with HCBS utilization.

RESULTS: When compared to community-dwelling older adults, those residing in service-rich and service-poor facilities were more likely to be older, report more activity limitations, and provide less instrumental assistance to others. Those in service-poor facilities were more likely to have poorer mental health and lower perceived purpose in life. The three leading HCBS utilized were senior centers (20%), homemaker services (19%), and transportation services (18%). More HCBS utilization was associated with participants who resided in service-poor housing, were older, were female, and had more activity limitations. More HCBS utilization was also associated with those who received instrumental support, had higher perceived purpose in life, and poorer mental health.

CONCLUSIONS: Findings suggest that older adults' residential environment is associated with their health status and HCBS utilization. Building upon the Person-Environment Fit theories, dedicated efforts are needed to introduce and expand upon existing HCBS available to facility residents to address physical and mental health needs as well as facilitate aging-in-place.

PDF Y Endnote Y

Visual and refractive associations with falls after first-eye cataract surgery

Palagyi A, Morlet N, McCluskey P, White A, Meuleners L, Ng JQ, Lamoureux E, Pesudovs K, Stapleton F, Ivers RQ, Rogers K, Keay L.

J. Cataract Refract. Surg. 2017; ePub(ePub): ePub.

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Abstract

PURPOSE: To clarify the effect of first-eye cataract surgery on the incidence of falls and identify components of visual function associated with fall risk. **SETTING:** Eight public hospital eye clinics in Sydney, Melbourne, and Perth, Australia.

DESIGN: Prospective cohort study.

METHODS: The study recruited patients who had bilateral cataract, were aged 65 years or older, and were on public hospital cataract surgery waiting lists. Comprehensive assessments of vision, physical function, and exercise activity were performed before and after first-eye cataract surgery. Falls were reported prospectively for up to 2 years and associations with falls were assessed using generalized linear mixed models.

RESULTS: Of the 329 patients recruited, 196 (66.6%) completed first-eye surgery within the study period. First-eye cataract surgery reduced incident falls by 33% (adjusted incidence rate ratio 0.67; 95% confidence interval [CI], 0.49-0.92; $P = .01$). Poorer dominant-eye visual acuity was associated with falls during the study timeline (incidence rate ratio, 2.20; 95% CI, 1.02-4.74; $P = .04$). Patients with larger than a spherical equivalent of ± 0.75 diopter change in the spectacle lens (operated eye) had a 2-fold greater incidence of falls in the period after first-eye cataract surgery than those with less or no change in lens power (incidence rate ratio, 2.17; 95% CI, 1.23-3.85; $P = .008$).

CONCLUSIONS: First-eye cataract surgery significantly reduced incident falls. Major changes in the dioptric power of spectacle correction of the operated eye after surgery increased the fall risk. Cautious postoperative refractive management is important to maximize the benefit of cataract surgery as a fall-prevention measure.

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Physical status and frailty index in nursing home residents: results from the INCUR study

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Abstract

AIM: The Short Physical Performance Battery (SPPB) is a widely used instrument for measuring physical performance, consisting of 3 sub-tests: a hierarchical test of balance, a gait speed test, and a chair stand test. Although equally considered in the computation of the SPPB score, each of the components may present a specific and different weight in clinical practice. The aim of this study was to estimate the relationship between SPPB and its component of an age-related deficit accumulation index (the so-called Frailty Index [FI] proposed by Rockwood).

METHOD: Data are from a longitudinal cohort study (ie, the Incidence of pneumonia and related Consequences in nursing home Residents [INCUR]) of 730 older persons (74.29% women) living in 13 French nursing homes. The FI was computed as the ratio between 30 actual and potential deficits the participant might have presented at the baseline visit (range between 0 [no deficit] and 1 [30 deficits]). Physical status was assessed using the SPPB score at baseline. Descriptive statistics and linear regression analyses were used to determine the relationship between the SPPB and FI and estimate which components of the SPPB were most strongly associated with the FI.

RESULTS: Mean age of participants was 86.5 (SD 7.5) years, with a mean FI of 0.37 (SD 0.11) and SPPB of 2.5 (range between 0 and 12). The SPPB and its components were all significantly associated with the FI, but the magnitude of the associations varied. Linear regression analyses adjusted for age, sex, showed that the balance test [$\beta = -0.045$ (95%CI -0.042; -0.028), $p < 0.0001$] and chair

stand test [$\beta = -0.040$ (95%CI -0.054; -0.027), $p < 0.0001$] was more strongly associated with the FI than the gait speed [$\beta = -0.015$ (95%CI -0.021; -0.008), $p < 0.0001$].

CONCLUSION: Of the 3 components of the SPPB, both balance and chair tests seem particularly relevant indicator of frailty among very old and complex elders living in nursing homes.

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Predicting falls among patients with multiple sclerosis: Comparison of patient-reported outcomes and performance-based measures of lower extremity functions

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Abstract

BACKGROUND: Accurate fall screening tools are needed to identify those multiple sclerosis (MS) patients at high risk of falling. The present study aimed at determining the validity of a series of performance-based measures (PBMs) of lower extremity functions and patient-reported outcomes (PROs) in predicting falls in a sample of MS patients ($n = 84$), who were ambulatory independent. **METHODS:** Patients were assessed using the following PBMs: timed up and go (TUG), timed 25-foot walk (T25FW), cognitive T25FW, 2-min walk (2MW), and cognitive 2MW. Moreover, a series of valid and reliable PROs were filled in by participants including the activities-specific balance confidence (ABC), 12-item multiple sclerosis walking scale (MSWS-12), fall efficacy scale international (FES-I), and modified fatigue impact scale (MFIS). The dual task cost (DTC) of 2MW and T25FW tests were calculated as a percentage of change in parameters from single to dual task conditions. Participants were classified as none-fallers and fallers (≥ 1) based on their prospective fall occurrence.

RESULTS: In the present study, 41(49%) participants recorded ≥ 1 fall and were classified as fallers. The results of logistic regression analysis revealed that each individual test, except DTC of 2MW and T25FW, significantly predicted future falls. However, considering the area under the curves (AUCs), PROs were more accurate compared to PBMs. In addition, the results of multiple logistic regression with the first two factors extracted from principal component analysis revealed that both factor 1 (PROs) and factor 2 (PBMs) significantly predicted falls with a greater odds ratio (OR) for factor 1 (factor 1: $P = < 0.0001$, OR = 63.41 (6.72-597.90)) than factor 2 ($P < 0.05$, OR = 5.03 (1.33-18.99)).

CONCLUSIONS: The results of this study can be used by clinicians to identify and monitor potential fallers in MS patients.

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Shoe-floor interactions in human walking with slips: modeling and experiments

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Abstract

Shoe-floor interactions play a crucial role in determining the possibility of potential slip and fall during human walking. Biomechanical and tribological parameters influence the friction characteristics between the shoe sole and the floor and the existing work mainly focus on experimental studies. In this paper, we present modeling, analysis, and experiments to understand slip and force distributions between the shoe sole and floor surface during human walking. We present results for both soft and hard sole material. The computational approaches for slip and friction force distributions are presented using a spring-beam networks model. The model predictions match the experimentally observed sole deformations with large soft sole deformation at the beginning and the end stages of the stance, which indicates the increased risk for slip. The experiments confirm that the required coefficient of friction and the deformation measurements can be used to predict slip occurrence. Moreover, the deformation and force distribution results provide further understanding and knowledge of slip initiation and termination under various biomechanical conditions.

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Socioeconomic inequalities in frailty among older adults: results from a 10-year longitudinal study in the Netherlands

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Abstract

BACKGROUND: Frailty is an important risk factor for adverse outcomes in older people. Substantial variation in frailty prevalence between socioeconomic groups exists, but longitudinal evidence for the association between socioeconomic position (SEP) and frailty is scarce.

OBJECTIVE: To investigate the course of socioeconomic inequalities in frailty among older adults during 10 years of follow-up.

METHODS: Data were used from the Longitudinal Aging Study Amsterdam ($n = 1,509$). Frailty was measured with the functional domains approach, based on deficiencies in four domains: physical, nutritive, cognitive, and sensory. Mixed-model analyses were performed to estimate the course of frailty and its association with SEP during a 10-year follow-up. We investigated whether similar patterns of associations held in different scenarios, comparing results of survivor analyses with those based on two imputation methods accounting for dropout due to death (substitution of first missing value and missing values imputed with a prediction model).

RESULTS: All scenarios showed a linear increase in frailty with aging (survivor analyses OR = 1.87, 95% CI = 1.66-2.11) and associations of low education and low income with frailty (adjusted OR for low education = 1.76, 95% CI = 1.05-2.97; adjusted OR for low income = 1.90, 95% CI = 1.20-3.01; both for survivor analyses). Sex-stratified analyses indicated that socioeconomic inequalities were mainly present in men, not in women. Similar patterns of associations of SEP with frailty were observed in all scenarios, but the increase in frailty prevalence over time differed substantially

between the scenarios. There were no statistically significant interactions between time and SEP on frailty (all scenarios), suggesting that inequalities in frailty did not increase or decrease during follow-up.

CONCLUSION: SEP inequalities in frailty among older adults were observed, mainly among men, and persisted during 10 years of follow-up.

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The effect of taichi practice on attenuating bone mineral density loss: a systematic review and meta-analysis of randomized controlled trials

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Abstract

OBJECTIVE: The purpose of this study was to determine the effects of practicing Taichi on attenuating bone mineral density (BMD) loss.

METHODS: Both electronic and manual searches were performed for randomized controlled trials (RCTs) examining Taichi for bone health. Two review authors independently performed study selection and data extraction according to inclusion criteria. A third party (Lin Luo) emerged to discuss with the two review authors and resolve a disagreement.

RESULTS: Twenty RCTs were found to meet the inclusion criteria and used for meta-analysis with a total effective sample of 1604. The aggregated results from this systematic review have shown significant benefits in favour of Taichi on BMD at lumbar spine (Standard Mean Difference, SMD) = 0.29; 95% CI 0.15 to 0.43; $p < 0.0001$), femur neck (SMD = 0.56; 95% CI 0.38 to 0.75; $p < 0.00001$), femur trochanter (SMD = 0.04; 95% CI 0.01 to 0.07; $p = 0.007$), total hip BMD (SMD = 0.46; 95% CI 0.16 to 0.76; $p = 0.003$).

CONCLUSIONS: The aggregated results from this systematic review suggests that Taichi is effective on attenuating BMD loss at the regions of lumbar spine and proximal femur neck in special populations (e.g., older adults, perimenopausal and postmenopausal women, people with osteoarthritis, and cancer survivors). Researchers should further examine the effect of Taichi on the proximal femur trochanter and total hip so that a more definitive claim can be made regarding the beneficial effects for attenuating BMD loss in these musculoskeletal regions.

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