Effect of a fall within three months of admission on delirium in critically Ill elderly patients: a population-based cohort study

Bu F, Cheng HT, Wang ZL, Hou YS, Zhuang Z, Li CY, Wang YQ, Zhang Y, Lyu J, Lyu QY.

Abstract

BACKGROUND: Delirium is common among elderly patients in the intensive care unit (ICU) and is associated with prolonged hospitalization, increased healthcare costs, and increased risk of death. Understanding the potential risk factors and early prevention of delirium is critical to facilitate timely intervention that may reverse or mitigate the harmful consequences of delirium.

AIM: To clarify the effects of pre-admission falls on ICU outcomes, primarily delirium, and secondarily pressure injuries and urinary tract infections.

METHODS: The study relied on data sourced from the Medical Information Mart for Intensive Care IV (MIMIC-IV) database. Statistical tests (Wilcoxon rank-sum or chi-squared) compared cohort characteristics. Logistic regression was employed to investigate the association between a history of falls and delirium, as well as secondary outcomes, while Kaplan-Meier survival curves were used to assess short-term survival in delirium and non-delirium patients.

RESULTS: Study encompassed 22,547 participants. Delirium incidence was 40%, significantly higher in patients with a history of falls (54.4% vs. 34.5%, p < 0.001). Logistic regression, controlling for confounders, not only confirmed that a history of falls elevates the odds of delirium (OR: 2.11; 95% CI: 1.97-2.26; p < 0.001) but also showed it increases the incidence of urinary tract infections (OR:1.50; 95% CI:1.40-1.62; p < 0.001) and pressure injuries (OR:1.36; 95% CI:1.26-1.47; p < 0.001). Elderly delirium patients exhibited lower 30-, 180-, and 360-day survival rates than non-delirium counterparts (all p < 0.001).

CONCLUSIONS: The study reveals that history of falls significantly heighten the risk of delirium and other adverse outcomes in elderly ICU patients, leading to decreased short-term survival rates. This emphasizes the critical need for early interventions and could inform future strategies to manage and prevent these conditions in ICU settings.

over; Cohort Studies; Delirium; Female; History of falls; Hospitalization; Humans; Incidence; Intensive care unit; Male; Mortality; Older adults; Pressure injury; Risk Factors; Urinary Tract Infections/epidemiology

"Biomechanical balance measures during timed up and go test improve prediction of prospective falls in older adults" - Author's Responses

Chen TB, Chou LS. Arch. Phys. Med. Rehabil. 2024; ePub(ePub): ePub.

Abstract

We appreciated the thoughtful comments on our paper titled "Biomechanical balance measures during timed up and go test improve prediction of prospective falls in older adults" and the opportunity to respond.

Language: en

Pharmacist intervention is associated with fewer serious falls over 3 months among older fallers at a day hospital: a quasi-experimental study

Corvaisier M, Chappe M, Gautier J, Lavergne A, Duval G, Spiesser-Robelet L, Annweiler C.
Maturitas 2024; ePub(ePub): ePub.

Abstract

OBJECTIVES: Some drugs increase the risk of falls, including serious falls. The objective of this quasi-experimental study was to determine whether the intervention of a clinical pharmacist among older outpatients receiving a multifactorial fall prevention program at a geriatric day hospital dedicated to older patients with a recent history of falls was effective in preventing serious falls over a 3-month follow-up, compared with usual care. STUDY DESIGN: Quasi-experimental study in 296 consecutive older outpatients, including 85 with pharmacist intervention (the intervention group) and 148 without (the control group). MAIN OUTCOME MEASURES: The main outcome was the occurrence of at least one serious fall within 3 months of follow-up. Covariates included age, sex, body mass index, grip strength, history of falls, Mini-Mental State Examination score, use of ≥3 drugs associated with risk of falls, frailty, and disability.

RESULTS: Fewer participants in the intervention group experienced at least one serious fall than in the control group (5 (5.9 %) versus 23 (15.5 %), P = 0.029), which persisted after adjustment for potential confounding factors (OR = 0.30 [95CI:0.11-0.84], P = 0.022). No significant effect was found on the indicence of all falls. Pharmacist intervention allowed more frequent therapeutic optimizations of antithrombotics (OR = 3.69 [95CI: 1.66-8.20]), proton pump inhibitors (OR = 3.34 [95CI: 1.31-8.50]), benzodiazepines (OR = 3.15 [95CI: 1.06-9.36]) and antidepressants (OR = 3.87 [95CI: 1.21-12.35]).

CONCLUSIONS: Among older fallers receiving a multifactorial fall prevention program at a day hospital, a clinical pharmacist intervention was associated with fewer incident serious falls over 3 months of follow-up.

Effectiveness of virtual reality in preventing falls in non-disabled older adults: a meta-analysis and systematic review

Abstract

OBJECTIVE: This study was conducted to evaluate the effectiveness of virtual reality interventions in preventing falls among non-disabled older adults.

METHODS: We conducted a librarian-designed database search. Two researchers independently screened eligible studies. The Cochrane Handbook for Systematic Reviews of Interventions was used to assess the risk of bias in the included studies.

RESULTS: Virtual reality interventions can effectively improve gait and dynamic and static balance function, enhance lower limb muscle strength, and reduce the risk of falls in the non-disabled elderly. However, the effect of virtual reality on reducing the fear of falling remains controversial.

CONCLUSION: Virtual reality interventions can effectively prevent falls in nondisabled elderly individuals. Higher quality, larger sample size, and long-term follow-up studies are needed to further verify the long-term effectiveness of virtual reality training in preventing falls in non-disabled elderly individuals.

Life space assessment and falls in older adults with multiple sclerosis

Holtzer R, Motl RW, Wagshul ME, Picone MA, Hernandez ME, Izzetoglu M, Lipton ML, Foley FW. Mult. Scler. Relat. Disord. 2024; 87: e105671.

Abstract

BACKGROUND/OBJECTIVE: Falls research in older adults with MS (OAMS) is scarce, and no studies have reported on the association between life-space mobility and falls in this group. Herein, we hypothesized that higher baseline life-space scores would be associated with reduced odds of reporting falls during follow-up, and explored whether the association differed by MS subtype (progressive vs. relapsing-remitting).

METHODS: OAMS (n = 91, mean age = 64.7 ± 4.3ys, %female = 66.9,%progressive MS = 30.7) completed the University of Alabama at Birmingham Life-Space-Assessment (UAB-LSA) scale and reported falls during a structured monthly telephone interview during follow-up (mean = 16.39 ± 11.44 months). General Estimated Equations (GEE) models were utilized to determine whether UAB-LSA scores predicted falls during follow-up.

RESULTS: GEE models revealed that higher UAB-LSA scores were associated with a significant reduction in the odds of falling during follow-up (OR = 0.69, p = 0.012, 95 %CI = 0.51 to 0.92). Stratified analyses revealed that this association was significant in progressive (OR = 0.57, p = 0.004, 95 %CI = 0.39 to 0.84), but not relapsing-remitting (OR = 0.93, p = 0.779, 95 %CI = 0.57 to 1.53) MS.

CONCLUSION: Higher life-space mobility was associated with lower odds of falling among OAMS with progressive subtype. The UAB-LSA may complement existing mobility measures for predicting fall risk.

Prevalence and risk factors for falls among the community dwelling older adults of Thrissur: a pilot study

Abstract

BACKGROUND: According to World Health Organization (WHO) statistics, every year 28-35% of people over 65 years and 32-42% of people over 70 years experience falls. Given that many falls are preventable, can occur in any population, and can result in significant morbidity and mortality, falls are receiving more attention as a major global issue.

OBJECTIVE: The objectives of this study were as follows: 1. To measure the prevalence of falls among the elderly living in the Thrissur Taluk Health Centre. 2. To identify the risk factors associated with falls in the elderly using the Centre for Disease Control and Prevention, Stopping Elderly Accidents, Deaths and Injuries (CDCs STEADI) 2019 scale and the Timed Up and Go (TUG) scale. 3. To find the association between the risk factors and the prevalence of fall among older people.

MATERIALS AND METHODS: A cross-sectional study was conducted to find the prevalence of fall among the elderly in Thrissur Taluk Health Centers. CDCs STEADI 2019 fall risk assessment tool was used to assess the risk factors associated with the elderly. TUG test was used to determine gait, balance, strength, and posture.

RESULTS: In our study, we discovered a prevalence of 41 percent of falls among the community-dwelling older adults of Thrissur. This study has shown that the risk of fall was higher among the female elderly population. 88% are found to be at high risk of fall, and 65% of the population were worried about fall.

CONCLUSION: This study found out a high prevalence of falls among community dwelling older adults.A future study with a larger sample size would be more helpful to confirm the impact of different variables in relation to the risk of fall among the elderly.

Accurate fall risk classification in elderly using one gait cycle data and machine learning

Nishiyama D, Arita S, Fukui D, Yamanaka M, Yamada H. Clin. Biomech. 2024; 115: e106262.

Abstract

BACKGROUND: Falls among the elderly are a major societal problem. While observations of medium-distance walking using inertial sensors identified potential fall predictors, classifying individuals at risk based on single gait cycles remains elusive. This challenge stems from individual variability and step-to-step fluctuations, making accurate classification difficult.

METHODS: We recruited 44 participants, equally divided into high and low fall-risk groups. A smartphone secured on their second sacral spinous process recorded data during indoor walking. Features were extracted at each gait cycle from a 6-dimensional time series (tri-axial angular velocity and tri-axial acceleration) and classified using the gradient boosting decision tree algorithm.

FINDINGS: Mean accuracy across five-fold cross-validation was 0.936. "Age" was the most influential individual feature, while features related to acceleration in the gait direction held the highest total relative importance when aggregated by axis (0.5365).

INTERPRETATION: Combining acceleration, angular velocity data, and the gradient boosting decision tree algorithm enabled accurate fall risk classification in the elderly, previously challenging due to lack of discernible features. We reveal the first-ever identification of three-dimensional pelvic motion characteristics during single gait cycles in the high-risk group. This novel method, requiring only one gait cycle, is valuable for individuals with physical limitations hindering repetitive or long-distance walking or for use in spaces with limited walking areas. Additionally, utilizing readily available smartphones instead of dedicated equipment has potential to improve gait analysis accessibility.

Factors associated with incident and recurrent falls among men enrolled in evidence-based fall prevention programs: an examination of race and ethnicity

Olokunlade T, Benden ME, Han G, Sherman LD, Smith ML. J. Appl. Gerontol. 2024; ePub(ePub): ePub.

Abstract

We examined factors associated with incident (one) and recurrent (2+) falls among 7207 non-Hispanic White (NHW) (89.7%), non-Hispanic Black (NHB) (5.0%), and Hispanic (5.3%) men ages ≥60 years with ≥1 chronic conditions, enrolled in an evidence-based fall program. Multinomial and binary regression analyses were used to assess factors associated with incident and recurrent falls. Relative to zero falls, NHB and Hispanic men were less likely to report incident (OR = 0.55, p <.001 and OR = 0.70, p =.015, respectively) and recurrent (OR = 0.41, p <.001 and OR = 0.58, p <.001, respectively) falls. Men who reported fear of falling and restricting activities were more likely to report incident (OR = 1.16, p <.001 and OR = 1.32, p <.001, respectively) recurrent and (OR = 1.46, p <.001 and OR = 1.71, p <.001, respectively) falls. Men with more comorbidities were more likely to report recurrent falls (OR = 1.10, p <.001). Compared to those who experienced one fall, men who reported fear of falling (OR = 1.28, p <.001) and restricting activities (OR = 1.31, p <.001) were more likely to report recurrent falls.

FINDINGS highlight the importance of multi-component interventions to prevent falls.

"Biomechanical balance measures during timed up and go test improve prediction of prospective falls in older adults". [Letter]

Abstract

I read with great interest the study by Chen and Chou entitled "Biomechanical balance measures during timed up and go test improve prediction of prospective falls in older adult"1. The authors demonstrated that frontal plane COM motion measures during the sit-to-walk element of the timed-up-and-go test is the most reliable predictor of future recurrent falls. I congratulate the authors for investigating an important topic. However, I would like to comment on some issues pertaining to detailed information of the older adults and methodological issues as below.

Language: en

Age-adjusted Charlson comorbidity index is associated with the risk of osteoporosis in older fall-prone men: a retrospective cohort study

Pan ZM, Zeng J, Li T, Hu F, Cai XY, Wang XJ, Liu GZ, Hu XH, Yang X, Lu YH, Liu MY, Gong YP, Liu M, Li N, Li CL. BMC Geriatr. 2024; 24(1): e413.

Abstract

BACKGROUND: There is growing evidence linking the age-adjusted Charlson comorbidity index (aCCI), an assessment tool for multimorbidity, to fragility fracture and fracture-related postoperative complications. However, the role of multimorbidity in osteoporosis has not yet been thoroughly evaluated. We aimed to investigate the association between aCCI and the risk of osteoporosis in older adults at moderate to high risk of falling.

METHODS: A total of 947 men were included from January 2015 to August 2022 in a hospital in Beijing, China. The aCCI was calculated by counting age and each comorbidity according to their weighted scores, and the participants were stratified into two groups by aCCI: low (aCCI < 5), and high (aCCI ≥5). The Kaplan Meier method was used to assess the cumulative incidence of osteoporosis by different levels of aCCI. The Cox proportional hazards regression model was used to estimate the association of aCCI with the risk of osteoporosis. Receiver operating characteristic (ROC) curve was adapted to assess the performance for aCCI in osteoporosis screening.

RESULTS: At baseline, the mean age of all patients was 75.7 years, the mean BMI was 24.8 kg/m(2), and 531 (56.1%) patients had high aCCI while 416 (43.9%) were having low aCCI. During a median follow-up of 6.6 years, 296 participants developed osteoporosis. Kaplan-Meier survival curves showed that participants with high aCCI had significantly higher cumulative incidence of osteoporosis compared with those had low aCCI (log-rank test: P < 0.001). When aCCI was examined as a continuous variable, the multivariable-adjusted model showed that the osteoporosis risk increased by 12.1% (HR = 1.121, 95% CI 1.041-1.206, P = 0.002) as aCCI increased by one unit. When aCCI was changed to a categorical variable, the multivariable-adjusted hazard ratios associated with different levels of aCCI [low (reference group) and high] were 1.00 and 1.557 (95% CI 1.223-1.983) for osteoporosis (P < 0.001), respectively. The aCCI (cutoff ≥5) revealed an area under ROC curve (AUC) of 0.566 (95%CI 0.527-0.605, P = 0.001) in identifying osteoporosis in older fall-prone men, with sensitivity of 64.9% and specificity of 47.9%.

CONCLUSIONS: The current study indicated an association of higher aCCI with an increased risk of osteoporosis among older fall-prone men, supporting the possibility of aCCI as a marker of long-term skeletal-related adverse clinical outcomes.

Language: en

Physical activity fragmentation and falls in older adults: findings from the National Health and Aging Trends Study

Popelsky BK, Gabriel KP, Dooley EE, Ylitalo KR. J. Gerontol. A Biol. Sci. Med. Sci. 2024; ePub(ePub): ePub.

Abstract

BACKGROUND: Physical activity (PA) may be an important fall prevention strategy. Current PA guidelines emphasize total PA dose, but daily patterning of PA is underappreciated. With aging, PA bouts become less frequent and shorter in duration (i.e.: more fragmented). PA fragmentation may be an indicator of fall risk, but the relationship is not well understood. This study examined daily PA accumulation and patterns with fall risk in older adults.

METHODS: Participants (n=685, 54.3% female, 61.5% aged 70-79 years) from the National Health and Aging Trends Study (NHATS) with wrist-worn accelerometry PA data from Round 11 (baseline) and sample person interviews with fall data from Round 12 (follow-up) were included. PA variables were categorized into tertiles and incident falls were defined as ≥1 self-reported fall in the year following the PA assessment between baseline and follow-up. A modified Poisson approach was used to estimate the relative risk of both PA accumulation and fragmentation with falls.

RESULTS: Overall, 40.0% reported an incident fall. After adjustment for sociodemographic and health characteristics, those in the highest tertile of total PA accumulation had lower fall risk (aRR=0.74, 95% CI: 0.57, 0.95) and those in the highest tertile of PA fragmentation had increased fall risk (aRR=1.33, 95% CI: 1.03, 1.73). Models were attenuated after adjustment for physical functioning.

CONCLUSIONS: PA fragmentation may identify fall risk in older adults. Longitudinal studies are needed to disentangle the temporal sequencing of the complex relationship between PA and physical functioning across the life-course.

Initiative to deprescribe high-risk drugs for older adults presenting to the emergency department after falls

Selman K, Roberts E, Niznik J, Anton G, Kelley C, Northam K, Teresi BB, Casey MF, Busby-Whitehead J, Davenport K. J. Am. Geriatr. Soc. 2024; ePub(ePub): ePub.

Abstract

BACKGROUND: Over 35 million falls occur in older adults annually and are associated with increased emergency department (ED) revisits and 1-year mortality. Despite associations between medications and falls, the prevalence of fall risk-increasing drugs remains high. Our objective was to implement an ED-based medication reconciliation for patients presenting after falls and determine whether an intervention targeting high-risk medications was related to decreased future falls.

METHODS: This was an observational prospective cohort study at a single site in the United States. Adults 65 years and older presenting to the ED after falls had a pharmacist review their medicines. Pharmacists made recommendations to taper, stop, or discuss medications with the primary clinician. At 3, 6, and 12 months, we recorded the number of fall-related return ED visits and determined if recommended medication changes had been implemented. We compared the rate of return visits of patients who had followed the medication change recommendations and those who received recommendations but had no change in their medications using chi-square tests.

RESULTS: A total of 577 patients (mean age 81 years, 63.6% female) were enrolled of 1509 potentially eligible patients. High-risk medications were identified in 310 patients (53.7%) who received medication recommendations. High-risk medications were associated with repeat fall-related visits at 12 months (risk difference 8.1% [95% confidence interval 0.97-15.0]). A total of 134 (43%) patients on high-risk medications had evidence of medication modification. At 12 months, there was no statistically significant difference in return fall visits between patients who had modifications to medications compared with those who had not implemented changes (p = 0.551).

CONCLUSIONS: Our findings identified opportunities for medication optimization in over half of emergency visits for falls and demonstrated that medication counseling in the ED is feasible. However, evaluation of the effect on future falls was limited.

Meta-analysis-based comparison of annual fall risk between older adults with Alzheimer's disease and mild cognitive impairment

Abstract

BACKGROUND: Falls are a primary cause of injuries and hospitalization in older adults. It has been reported that cognitive impairments and dementia can increase fall risk in the older population; however, it remains unknown if fall risk differs among subgroups of dementia. This meta-analysis summarized previous studies reporting the annual fall risk of people with Alzheimer's disease (AD) or mild cognitive impairment (MCI) and compared the fall risk between these two groups of people with dementia.

METHODS: Thirty-five studies enrolling 7844 older adults with AD or MCI were included. The annual fall prevalence and average number of falls of the included studies were meta-analyzed and compared by random-effects models with inverse variance weights.

RESULTS: The annual fall prevalence in people with AD (43.55%) was significantly higher than MCI (35.26%, p < 0.001). A χ(2) test indicated that the pooled fall prevalence is significantly higher in people with AD than MCI χ(2) = 158.403, p < 0.001). Additionally, the yearly average number of falls in AD was higher than in MCI (1.30 vs 0.77 falls/person).

CONCLUSIONS: The results showed that older people with AD experience a higher annual fall prevalence with a larger number of falls than older adults with MCI. The results suggested that the fall risk measurements should be reported separately between people with AD and MCI. The findings could provide preliminary guidance for the identification of individuals with dementia who experience a high fall risk.

Trends in falls among older adults before and during the COVID-19 pandemic in Ontario, Canada: a retrospective observational study

Weerasinghe A, Thielman J, Li Y, Doguparty VB, Medeiros A, Keller-Olaman S, Carsley S, Richmond SA. BMC Geriatr. 2024; 24(1): e418.

Abstract

BACKGROUND: The public health measures associated with the COVID-19 pandemic may have indirectly impacted other health outcomes, such as falls among older adults. The purpose of this study was to examine trends in fall-related hospitalizations and emergency department visits among older adults before and during the COVID-19 pandemic in Ontario, Canada.

METHODS: We obtained fall-related hospitalizations (N = 301,945) and emergency department visit (N = 1,150,829) data from the Canadian Institute for Health Information databases from 2015 to 2022 for adults ages 65 and older in Ontario. Fall-related injuries were obtained using International Classification of Diseases, 10th edition, Canada codes. An interrupted time series analysis was used to model the change in weekly fall-related hospitalizations and emergency department visits before (January 6, 2015-March 16, 2020) and during (March 17, 2020-December 26, 2022) the pandemic.

RESULTS: After adjusting for seasonality and population changes, an 8% decrease in fall-related hospitalizations [Relative Rate (RR) = 0.92, 95% Confidence Interval (CI): 0.85, 1.00] and a 23% decrease in fall-related emergency department visits (RR = 0.77, 95%CI: 0.59, 1.00) were observed immediately following the onset of the pandemic, followed by increasing trends during the pandemic for both outcomes.

CONCLUSIONS: Following an abrupt decrease in hospitalizations and emergency department visits immediately following the onset of the pandemic, fall-related hospitalizations and emergency department visits have been increasing steadily and are approaching pre-pandemic levels. Further research exploring the factors contributing to these trends may inform future policies for public health emergencies that balance limiting the spread of disease among this population while supporting the physical, psychological, and social needs of this vulnerable group.

Artificial intelligence based on falling in older people: a bibliometric analysis

Abstract

OBJECTIVES: This study aimed to analyze publications on artificial intelligence (AI) for falls in older people from a bibliometric perspective.

METHODS: The Web of Science database was searched for titles of English-language articles containing the words "artificial intelligence," "deep learning," "machine learning," "natural language processing,", "neural artificial network," "fall," "geriatric," "elderly," "aging," "older," and "old age." An R-based application (Biblioshiny for bibliometrics) and VOSviewer software were used for analysis.

RESULTS: Thirty-seven English articles published between 2018 and 2024 were included. The year 2023 is the year with the most publications with 16 articles. The most productive research field was "Engineering Electrical Electronic" with seven articles. The most productive country was the United States, followed by China. The most common words were "injuries," "people," and "risk factors."

CONCLUSION: Publications on AI and falls in the elderly are both few in number and the number of publications has increased in recent years. Future research should include relevant analyses in scientific databases, such as Scopus and PubMed.

Comparison of falls and risk factors among older adults in urban villages, urban and rural areas of Shantou, China

Abstract

OBJECTIVE: To investigate and compare the differences between the incidence of falls, balance and living environment among older persons in urban villages and other types of residential areas.

METHODS: We surveyed 580 older adults living in different types of residential areas in Shantou, China, surveying basic information, fall incidence, balance ability testing of older persons, home environment safety assessment.

RESULTS: The incidence of falls among older people in urban villages (19.54 %) was between urban areas(26.63 %) and rural areas(16.91 %). The influencing factors of falls in different residential types were different. Near-fall, abnormal bowel movement, and impaired balance ability were the risk factors of falls among older persons in urban villages. Divorce/single, fair and poor hearing loss and near-fall were the risk factors of falls in urban older adults. Frailty and impaired balance ability were the risk factors of falls in rural older people.

CONCLUSIONS: Risk factors for falls in older people vary according to the characteristics of their living areas and relevant interventions should be targeted according to the characteristics of falls occurring in different residential areas.