

Safety Literature 25th June 2023

Association of medication use with falls and mortality among long-term care residents: a longitudinal cohort study

Roitto HM, Aalto UL, Öhman H, Saarela RKT, Kautiainen H, Salminen K, Pitkälä KH. BMC Geriatr. 2023; 23(1): e375.

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DOI 10.1186/s12877-023-04096-6 PMID 37331981 Association of medication use with falls and mortality among long-term care residents: a longitudinal cohort study

Abstract

BACKGROUND: Falls in long-term care are common. The aim of our study was to explore how medication use is associated with incidence of falls, related consequences, and all-cause mortality among long-term care residents.

METHODS: Five hundred thirty two long-term care residents aged 65 years or older participated in this longitudinal cohort study in 2018-2021. Data on medication use were retrieved from medical records. Polypharmacy was defined as use of 5-10 medications and excessive polypharmacy as use of > 10 medications. The numbers of falls, injuries, fractures, and hospitalizations were collected from medical records over 12 months following baseline assessment. Participants were followed for three years for mortality. All analysis were adjusted for age, sex, Charlson Comorbidity Index, Clinical dementia rating, and mobility.

RESULTS: A total of 606 falls occurred during the follow-up. Falls increased significantly with the number of medications used. Fall rate was 0.84/person-years (pyrs) (95% CI 0.56 to 1.13) for the non-polypharmacy group, 1.13/pyrs (95% CI 1.01 to 1.26) for the polypharmacy group, and 1.84/pyrs (95% CI 1.60 to 2.09) for the excessive polypharmacy group. Incidence rate ratio for falls was 1.73 (95% CI 1.44 to 2.10) for opioids, 1.48 (95% CI 1.23 to 1.78) for anticholinergic medication, 0.93 (95% CI 0.70 to 1.25) for psychotropics, and 0.91 (95% CI 0.77 to 1.08) for Alzheimer medication. The three-year follow-up showed significant differences in mortality between the groups, the lowest survival rate (25%) being in the excessive polypharmacy group.

CONCLUSION: Polypharmacy, opioid and anticholinergic medication use predicted incidence of falls in long-term care. The use of more than 10 medications predicted all-cause mortality. Special attention should be paid to both number and type of medications when prescribing in long-term care.

Language: en

Keywords

Mortality; Falls; Long-term care; Polypharmacy

Home care worker-supported exercise program to address falls: a feasibility study

Walsh W, Meyer C, Cyarto EV. Aust. J. Prim. Health 2023; ePub(ePub): ePub.

(Copyright © 2023, Australian Institute for Primary Care and School of Public Health, La Trobe University, Publisher CSIRO Publishing)

DOI 10.1071/PY22248 **PMID** 37323031

Abstract

BACKGROUND: Falls are a major concern for community-dwelling older adults. The Otago Exercise Program (OEP) is an evidence-based home program that reduces risk of falls. Exercise participation and program adherence can be challenging. Home care workers (HCWs) are well positioned to provide support for older adults.

METHODS: This feasibility study included: HCW training; HCW in-home support of a physiotherapist-tailored OEP; online physiotherapy consultations; older participant questionnaires and functional outcome measures; and HCW and older participant interviews.

RESULTS: Twelve older adults, eight HCWs and one physiotherapist participated. A small falls risk reduction, and improvement in falls efficacy, quality of life and functional improvement were noted. Thematic analysis showed formal and informal support was valued by older adults and HCWs. A role-ordered matrix synthesis highlighted variable ongoing independent program participation.

CONCLUSIONS: By Your Side, a physiotherapist-led and home care worker-supported modified OEP provides a feasible and acceptable option for falls prevention in home care services. Collaborative teamwork, and both formal and informal support, are key aspects to optimising engagement and benefits.

Language: en

Acute effects of different proprioceptive neuromuscular facilitation stabilization techniques on the balance of elderly women

Lamp JS, Beraldo LM, Vieira Dos Santos W, Giacometti da Silva L, Cadore EL, Pietta-Dias C. J. Bodyw. Mov. Ther. 2023; 35: 342-347.

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DOI 10.1016/j.jbmt.2023.04.054 PMID 37330792

Abstract

AIM: To compare the acute effects of rhythmic stabilization (RS) and stabilizer reversal (SR) techniques of PNF on the balance of sedentary elderly women.

METHODS: Women aged (≥ 70) were allocated into three groups: RS, SR and control (CR). The experimental groups (RS and SR) performed balance exercises with the addition of rhythmic stabilization techniques (RS group) or with stabilizers reversal (SR group) for 15 min. The CR group performed the exercises without adding the PNF stabilization techniques. Participants performed the Time Up and Go (TUG) test, the Functional Reach Test (FRT) and static and dynamic stabilometry pre and post intervention. Kruskal-Wallis and Mann-Whitney tests were used for comparison between groups and post hoc analysis, respectively, with $p \leq 0.05$. For the effect size measurements, the r for Wilcoxon and Mann-Whitney signal were used.

RESULTS: For functional tests intra-group analysis, a reduction in TUG time and an increase in FRT range ($p \leq 0.05$) were observed in RS e SR groups. Stabilometry analysis showed a significant difference only for the RS group, with reduced average velocity of the centre of pressure (COP), and an increased in the left foot pressure.

CONCLUSIONS: A single RS or SR session reduced the TUG time and the range distance in the FRT in elderly women. A single session of the RS technique was also able to reduce the mean velocity of the COP and the maximum pressure on the left foot. **IMPACT:** This study shows an easy-to-apply methods without additional materials that can help prevent falls in the elderly.

Language: en

Keywords

Aged; Humans; Female; Aging; Postural Balance; *Muscle Stretching Exercises; *Occupational Therapy; Foot; Physical Therapy Modalities; Stabilization techniques; Stabilometry

Associations between intrinsic capacity, functional difficulty, and fall outcomes among older adults in India

Muneera K, Muhammad T, Pai M, Ahmed W, Althaf S. Sci. Rep. 2023; 13(1): e9829.

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Abstract

The construct of intrinsic capacity (IC) in the context of integrated care for older adults emphasizes functional assessment from a holistic perspective. It provides reliable and comparable insights on subsequent functioning and disability. Given the paucity of research on IC and health outcomes in low- and middle-income countries (LMICs), the present study examined the association of IC with geriatric conditions of functional limitations and multiple fall outcomes among older adults in India. The data used for analysis come from the first wave of the Longitudinal Aging Study in India (LASI), 2017-2018. The final sample size contains 24,136 older adults (11,871 males and 12,265 females) age 60 years or above. Multivariable binary logistic regression is employed to examine the association of IC and other explanatory factors with outcome variables of difficulty in activities of daily living (ADL) and instrumental activities of daily living (IADL), falls, fall injury, and multiple falls. Of the total sample, 24.56% of older adults were observed to be in the high IC category. The prevalence of ADL difficulty, IADL difficulty, falls, multiple falls and fall-related injury is estimated to be 19.89%, 45.00%, 12.36%, 5.49% and 5.57%, respectively. Older adults who reported high IC had a significantly lower prevalence of ADL difficulty (12.26% vs 22.38%) and IADL difficulty (31.13% vs 49.52%) than those who reported low IC. Similarly, a lower prevalence of falls (9.42% vs 13.34%), fall-related injury (4.10% vs 6.06%) and multiple falls (3.46% vs 6.16%) were reported among those who had high IC. After adjusting for a large number of confounders such as age, sex, health-related attributes and lifestyle behaviors, older adults with high IC had significantly lower odds of ADL difficulty [aOR: 0.63, CI: 0.52-0.76], IADL difficulty [aOR: 0.71, CI: 0.60-0.83], falls [aOR: 0.80, CI: 0.67-0.96], multiple falls [aOR: 0.73, CI: 0.58-0.96] and fall-related injury [aOR: 0.78, CI: 0.61-0.99]. That a high IC was independently associated with a lower risk of functional difficulty and fall outcomes in later life is of enormous value in predicting subsequent functional care needs. More specifically, the findings here imply that because regular IC monitoring can predict poor health outcomes in older adults, improvements in IC should be prioritized while formulating disability and fall prevention strategies.

Language: en

Consistent hearing aid use is associated with lower fall prevalence and risk in older adults with hearing loss

Campos L, Prochazka A, Anderson M, Kaizer A, Foster C, Hullar T. J. Am. Geriatr. Soc. 2023; ePub(ePub): ePub.

(Copyright © 2023, John Wiley and Sons)

DOI 10.1111/jgs.18461 **PMID** 37314100

Abstract

BACKGROUND: Falls and their sequelae cost more than \$50 billion every year. Older adults with hearing loss are at 2.4 times greater risk of falls than their normal hearing peers. Current research is inconclusive about whether hearing aids can offset this increased fall risk, and no previous studies considered if outcomes differed based on the consistency of hearing aid use.

METHODS: Individuals 60 years and older with bilateral hearing loss completed a survey consisting of the Fall Risk Questionnaire (FRQ) and questions about hearing loss history, hearing aid use, and other common fall risk factors. In this cross-sectional study, fall prevalence, as well as fall risk (based on FRQ score), was compared between hearing aid users and non-users. A separate group of consistent hearing-aid users (at least 4 h daily use for more than 1 year) was also compared with inconsistent/non-users.

RESULTS: Responses from 299 surveys were analyzed. Bivariate analysis found 50% reduced odds of experiencing a fall for hearing aid users compared with non-users (OR = 0.50 [95% CI: 0.29-0.85], $p = 0.01$). After adjusting for age, sex, hearing loss severity, and medication usage, those who reported any hearing aid use still had lower odds of falls (OR = 0.48 [95% CI: 0.26-0.90], $p = 0.02$) and lower odds of being at risk for falls (OR = 0.36 [95% CI: 0.19-0.66] $p < 0.001$) than non-users.

RESULTS for consistent hearing aid users demonstrate an even stronger association of lowered odds of falling (OR = 0.35 [95% CI: 0.19-0.67], $p < 0.001$) and lower odds of being at risk for falls (OR = 0.32 [95% CI: 0.12-0.59], $p < 0.001$), suggesting a potential dose-response relationship.

CONCLUSIONS: These findings suggest that use of hearing aids-especially consistent hearing aid use-is associated with lower odds of experiencing a fall or being classified as at risk for falls in older individuals with hearing loss.

Language: en

Keywords

older adults; falls; hearing aids; hearing impairment; hearing loss

Development of a smart home interface with older adults: multi-method co-design study

Ghorayeb A, Comber R, Gooberman-Hill R. JMIR Aging 2023; 6: e44439.

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Abstract

BACKGROUND: Smart home technologies have the potential to support aging in place; however, older people's perceptions of the value of smart homes may be influenced by their access to the information gathered by the technology. This information is needed to support their informed decision-making. Limited research has been conducted on how best to design visualizations of smart home data in keeping with the needs and wishes of older people.

OBJECTIVE: We aimed to investigate the design options that impact the usefulness of smart home systems, older people's information needs, their perceptions of data visualization, and the ways they would like information displayed to them.

METHODS: We used a qualitative approach to empower the participants as co-designers. Data collection comprised a sequence of methods such as interviews, observation, focus groups, scenario design, probes, and design workshops. Each phase informed the next. Overall, 13 older adults (n=8, 62% female and n=5, 38% male; aged 65-89 years) consented to participate. A thematic approach was used to analyze the data set, and participants were actively involved in designing the in-home interface, which enabled them to better conceptualize their needs.

RESULTS: The information collected was clustered into 5 themes: enabling home, health, and self-monitoring; enabling opportunities for social inclusion and engagement; enhancing cognitive abilities; customizability of the display; and promoting inclusion in recreation and leisure activities. These themes informed 5 design sessions in which participants co-designed visual metaphors for the themes based on their own experiences in an age-inclusive manner. Together, the participants produced a user-friendly prototype, which they chose to call My Buddy. They found it useful to receive social and cognitive triggers, as well as recommendations for special diets or activities based on their mood, health, and social status.

CONCLUSIONS: Smart home data visualization is much more than a nice-to-have option. Visualization is a must-have feature because it deepens the understanding of the information collected and means that technology provides information of value and relevance to older people. This may improve the acceptability and perceived utility of in-home technology. By understanding what older people want to know from smart home technology and considering how to visualize data in ways that work for them, we can provide an appropriate in-home interface. Such an interface would

suggest ways or opportunities to connect and socialize; stimulate contact with close friends or family members; maintain awareness of health and well-being; provide support in decision-making, cognitive tasks, and daily life activities; and monitor health status. Older adults are the best co-designers for the development of visual metaphors that resonate with their own experiences. Our findings promote the development of technologies that foreground and reflect the information needs of older people and engage them as designers of the display.

Language: en

Keywords

qualitative research; older people; digital health; mobile phone; data visualization; smart homes; technology acceptance

Factors associated with fall risk of community-dwelling older people: a decision tree analysis

Fong KNK, Chung RCK, Sze PPC, Ng CKM. Digit. Health 2023; 9: e20552076231181202.

(Copyright © 2023, SAGE Publishing)

DOI 10.1177/20552076231181202 **PMID** 37325076

Abstract

OBJECTIVE: To examine the predictive attributes for accidental falls in community-dwelling older people in Hong Kong using decision tree analysis.

METHODS: We recruited 1151 participants with an average age of 74.8 years by convenience sampling from a primary healthcare setting to carry out the cross-sectional study over 6 months. The whole dataset was divided into two sets, namely training set and test set, which respectively occupied 70% and 30% of the whole dataset. The training dataset was used first; decision tree analysis was used to identify possible stratifying variables that could help to generate separate decision models.

RESULTS: The number of fallers was 230 with 20% 1-year prevalence. There were significant differences in gender, use of walking aids, presence of chronic diseases, and co-morbidities including osteoporosis, depression, and previous upper limb fractures, and performance in the Timed Up and Go test and the Functional Reach test among the baselines between the faller and non-faller groups. Three decision tree models for the dependent dichotomous variables (fallers, indoor fallers, and outdoor fallers) were generated, with overall accuracy rates of the models of 77.40%, 89.44% and 85.76%, respectively. Timed Up and Go, Functional Reach, body mass index, high blood pressure, osteoporosis, and number of drugs taken were identified as stratifying variables in the decision tree models for fall screening.

CONCLUSION: The use of decision tree analysis for clinical algorithms for accidental falls in community-dwelling older people creates patterns for decision-making in fall screening, which also paves the way for utility-based decision-making using supervised machine learning in fall risk detection.

Language: en

Keywords

Accidental falls; machine learning; older people; community-dwelling; decision tree analysis

Fall detection based on dynamic key points incorporating preposed attention

Zheng K, Li B, Li Y, Chang P, Sun G, Li H, Zhang J. Math. Biosci. Eng. 2023; 20(6): 11238-11259.

(Copyright © 2023, American Institute of Mathematical Sciences)

DOI 10.3934/mbe.2023498 **PMID** 37322980

Abstract

Accidental falls pose a significant threat to the elderly population, and accurate fall detection from surveillance videos can significantly reduce the negative impact of falls. Although most fall detection algorithms based on video deep learning focus on training and detecting human posture or key points in pictures or videos, we have found that the human pose-based model and key points-based model can complement each other to improve fall detection accuracy. In this paper, we propose a preposed attention capture mechanism for images that will be fed into the training network, and a fall detection model based on this mechanism. We accomplish this by fusing the human dynamic key point information with the original human posture image. We first propose the concept of dynamic key points to account for incomplete pose key point information in the fall state. We then introduce an attention expectation that predicates the original attention mechanism of the depth model by automatically labeling dynamic key points. Finally, the depth model trained with human dynamic key points is used to correct the detection errors of the depth model with raw human pose images. Our experiments on the Fall Detection Dataset and the UP-Fall Detection Dataset demonstrate that our proposed fall detection algorithm can effectively improve the accuracy of fall detection and provide better support for elderly care.

Language: en

Keywords

fall detection; complementary correction; decision fusion; dynamic key points; preposed attention

Falls increase the risk for incident anxiety and depressive symptoms among adults aged ≥ 50 years: an analysis of the Irish longitudinal study on ageing

Jacob L, Kostev K, Shin JI, Smith L, Oh H, Abduljabbar AS, Haro JM, Koyanagi A. Arch. Gerontol. Geriatr. 2023; 114: e105098.

(Copyright © 2023, Elsevier Publishing)

DOI 10.1016/j.archger.2023.105098 **PMID** 37315378

Abstract

BACKGROUND: Little is known about the potential impact of falls on the onset of common mental disorders in older adults. Thus, we aimed to investigate the longitudinal association between falls and incident anxiety and depressive symptoms in adults aged ≥ 50 years living in Ireland.

METHODS: Data from the Irish Longitudinal Study on Ageing were analyzed (Wave 1: 2009-2011; and Wave 2: 2012-2013). The presence of falls and injurious falls in the past 12 months was assessed at Wave 1. Anxiety and depressive symptoms were assessed at Wave 1 and Wave 2 using the anxiety subscale of the Hospital Anxiety and Depression Scale (HADS-A) and the 20-item Center for Epidemiologic Studies Depression (CES-D), respectively. Covariates included sex, age, education, marital status, disability, and the number of chronic physical conditions. The association of falls at baseline with incident anxiety and depressive symptoms at follow-up was estimated by multivariable logistic regression.

RESULTS: This study included 6,862 individuals (51.5% women; mean [SD] age 63.1 [8.9] years). After adjusting for covariates, falls were significantly associated with anxiety (OR = 1.58, 95%CI = 1.06-2.35) and depressive symptoms (OR = 1.43, 95%CI = 1.06-1.92). These associations were no longer significant after including fear of falling in the models. Similar findings were obtained for injurious falls, although the relationship with anxiety symptoms was not statistically significant.

CONCLUSIONS: This prospective study of older adults from Ireland found significant associations between falls and incident anxiety and depressive symptoms. Future research may focus on whether interventions to reduce fear of falling could also alleviate anxiety and depressive symptoms.

Language: en

Keywords

Falls; Ireland; Depressive symptoms; Older adults; Anxiety symptoms; Prospective study

Increasing incidence of ED-visits and admissions due to traumatic brain injury among elderly patients in the Netherlands, 2011-2020

Santing JAL, Brand CLVD, Panneman MJM, Asscheman JS, van der Naalt J, Jellema K. Injury 2023; ePub(ePub): ePub.

(Copyright © 2023, Elsevier Publishing)

DOI 10.1016/j.injury.2023.110902 **PMID** 37339918

Abstract

BACKGROUND AND IMPORTANCE: Traumatic brain injury (TBI) is a leading cause of disability and mortality worldwide. Nowadays the highest combined incidence of TBI-related emergency department (ED) visits, hospitalizations and deaths occurs in older adults. Knowledge of the changing patterns of epidemiology is essential to identify targets to enhance prevention and management of TBI.

OBJECTIVE: To examine time trends of ED visits, admissions, and mortality for TBI comparing non-elderly and elderly people (aged ≥ 65 years) in the Netherlands from 2011 to 2020.

DESIGN: We conducted a retrospective observational, longitudinal study of TBI using data from the Dutch Injury Surveillance System (DISS) and Statistics Netherlands from 2011 to 2020. **OUTCOME MEASURE AND ANALYSIS:** The main outcome measures were TBI-related ED visits, hospitalizations, and mortality. Temporal trends in population-based incidence rates were evaluated using Poisson regression. We compared patients under 65 years and patients aged 65 years or older. **MAIN RESULTS:** From 2011 to 2020, absolute numbers of TBI related ED visits increased by 244%, and hospital admissions and mortality showed an almost twofold increase in patients aged 65 years and older. The incidence of TBI-related ED visits and hospital admission increased also in elderly adults, with 156% and 51% respectively, whereas the mortality remained stable. In contrast, overall rates of ED visits, admissions, and mortality, and causes for TBI did not change in patients younger than 65 years during the study period.

CONCLUSION: This trend analysis shows a significant increase of ED-visits and hospital admission for TBI in elderly adults from 2011 to 2020, whereas the mortality remained stable. This increase cannot be explained by the aging of the Dutch population alone, but might be related to comorbidities, causes of injury, and referral policy. These findings strengthen the development of strategies to prevent TBI and improve the organization of acute care necessary to reduce the impact and burden of TBI in elderly adults and on healthcare and society.

Language: en

Keywords

Mortality; Traumatic brain injury; Admission; ED visit; Elderly adults; Trend analysis

Nutritional status predicts injurious falls among community-dwelling older adults: does sex matter?

Chen TY, Rajan SI, Saito Y. J. Appl. Gerontol. 2023; ePub(ePub): ePub.

(Copyright © 2023, SAGE Publishing)

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Abstract

The association of poor nutritional status with falls-related injuries other than fractures is unclear. Although there are sex differences in poor nutritional status and the rate of falls-related injuries, whether the impacts of poor nutritional status on falls-related injuries differ by sex is unclear. We investigated whether baseline poor nutritional status predicted injurious falls, fall-related minor injuries, and fractures at 3-year follow-up and whether these relationships differed by sex among community-dwelling older adults (N = 3257). We found that being at risk of malnutrition at baseline significantly predicted injurious falls but not minor injuries and fractures at follow-up. Compared to older males at risk of malnutrition at baseline, females at risk of malnutrition were significantly more likely to have injurious falls and minor injuries later. Being at risk of malnutrition predicted injurious falls, especially among older females. Regular nutritional screenings among older females should be implemented to provide prompt interventions against falls.

Language: en

Keywords

injury; falls; sex; mini nutritional assessment

Overlapping status of frailty and fear of falling: an elevated risk of incident disability in community-dwelling older adults

Sawa R, Doi T, Tsutsumimoto K, Nakakubo S, Kurita S, Kiuchi Y, Nishimoto K, Shimada H. Aging Clin. Exp. Res. 2023; ePub(ePub): ePub.

(Copyright © 2023, Holtzbrinck Springer Nature Publishing Group)

DOI 10.1007/s40520-023-02474-z **PMID** 37337077

Abstract

BACKGROUND: Although overlapping frailty and fear of falling (FoF) are likely to increase with population aging, the combined effect of frailty and FoF on incident disability is not yet well understood. **AIMS:** The purpose of this study is to examine whether frailty combined with FoF increased the risk of incident disability in older adults. Our secondary purpose was to clarify the synergistic effect of frailty and FoF on incident disability.

METHODS: This is a prospective study. Participants were 9372 older adults (mean age 73.5 years). Frailty status was assessed using the Japanese Cardiovascular Health Study index, and FoF was measured using two closed questions. Incident disability was prospectively monitored by their long-term care insurance records.

RESULTS: During the follow-up period (mean duration 23.4 months), 487 (5.2%) participants developed disability. The proportion of incident disability linearly increased according to FoF level regardless of baseline frailty status. Frail participants with FoF had a higher risk of incident disability than those with frailty only or neither (adjusted hazard ratio [HR] 2.63, 95% confidence interval [CI] 1.95-3.54). Frailty in combination with excessive FoF further increased the risk of incident disability (adjusted HR 4.30, 95% CI 2.56-7.23) although no synergistic effect was observed (relative excessive risk due to interaction 1.69, 95% CI - 0.55, 3.93).

CONCLUSION: The overlapping status of frailty and FoF, especially excessive FoF, increases the risk of incident disability in older adults.

Language: en

Keywords

Disability; Frailty; Excessive fear; Fear of falling; Psychological factor

The smart-home study: a feasibility study to pilot the use of smartphone technology to identify environmental falls risk factors in the home

Leung KHM, Brandis S. Hong Kong J. Occup. Ther. 2023; 36(1): 3-12.

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DOI 10.1177/15691861231155994 **PMID** 37332299

Abstract

INTRODUCTION: While occupational therapy home assessments are effective to identify environmental falls risk factors, patients may not receive these services due to workforce distribution and geographical distances. Technology may offer a new way for occupational therapists to conduct home assessments to identify environmental fall risks.

OBJECTIVES: To (i) explore the feasibility of identifying environmental risk factors using smartphone technology, (ii) develop and pilot a suite of procedures for taking smartphone images and (iii) examine the inter-rater reliability and content validity between occupational therapists when assessing smartphone images using a standardised assessment tool.

METHOD: Following ethical approval a procedure was developed and participants recruited to submit smartphone images of their bedroom, bathroom and toilet. Two independent occupational therapists then assessed these images using a home safety checklist.

FINDINGS were analysed using inferential and descriptive statistics.

RESULTS: Of 100 volunteers screened, 20 individuals participated. A guideline for instructing patients to take home images was developed and tested. Participants averaged 9.00 minutes (SD 4.401) to complete the task, whilst occupational therapists took approximately 8 minutes to review the images. The inter-rater reliability between the two therapists was 0.740 (95% CI: 0.452-0.888).

CONCLUSION: The study found that use of smartphones was to a large extent feasible and conclude that the use of smartphone technologies is a potential complimentary service to traditional home visits. The effective prescription of equipment in this trial was identified as a challenge. The impact on costs and potential falls incidents remains uncertain and more research is warranted in representative populations.

Language: en

Keywords

technology; feasibility; falls risk; Home assessment; smartphone

Unintentional domestic injuries among elderly in rural areas of Mandya: a community-based cross-sectional study in Southern Karnataka

Shashikantha SK, Huchchannavar R, Jindal HA. J. Family Med. Prim. Care 2023; 12(4): 727-733.

(Copyright © 2023, Medknow Publications)

DOI 10.4103/jfmpe.jfmpe_1745_22 **PMID** 37312780

Abstract

BACKGROUND: As the proportion of elderly in the population increases, they also become vulnerable to various types of intentional or unintentional injuries. Domestic accidents including falls among the elderly have been identified as a leading cause of injury-related morbidity and mortality in India and elsewhere.

AIM: This study aims to assess the burden and pattern of domestic accidents in a rural part of Southern India.

METHODS AND SETTING: A community-based cross-sectional study among the elderly (≥ 60 years) was carried out in rural areas of Southern Karnataka. A semi-structured interview schedule was used to get the information on domestic accidents. Inferential statistical tests like the Chi-square test and logistic regression analysis were used.

RESULTS: A total of 500 persons aged ≥ 60 years with a mean age of 69.09 ± 7.42 years (Range 60-92 years) were included. One-third of the subjects have had an incidence of domestic accidents in the past 1 year contributing to a 35% prevalence of domestic accidents. A higher prevalence of domestic accidents was seen in those subjects who were ill (47.9%). Overall prevalence of falls was 21.4% ($P = 0.007$). One-fifth of the subjects with domestic accidents had a residual illness.

CONCLUSION AND CONTRIBUTION: One-third of our subjects gave a history of one or the other form of domestic accidents in the previous 1 year. Our study highlights the problem of unintentional domestic injuries among the most vulnerable group of the elderly and calls for a continuous assessment of the burden and nature of injuries.

Language: en

Keywords

Domestic injuries; falls among elderly; unintentional injuries

"Participation is fun and empowering": a participatory approach to co-design a cultural art program for older chinese at risk of depression in Hong Kong

Liu T, Chan R, Yeung C, Lee LCB, Chan TNC, Welton K, Lum TYS, Wong GHY. *Innov. Aging* 2023; 7(5): igad041.

(Copyright © 2023, Oxford University Press)

DOI 10.1093/geroni/igad041 **PMID** 37342491

Abstract

BACKGROUND AND OBJECTIVES: Internalized ageism and stigma of mental illness may disempower older people and impede help-seeking among those at risk of depression. Arts are deemed enjoyable, stigma-free, and conducive to mental health, and a participatory approach can engage and empower potential service users. This study aimed to co-design a cultural art program and test its feasibility in empowering older Chinese people in Hong Kong and preventing depression. **RESEARCH DESIGN AND METHODS:** Adopting a participatory approach and guided by the Knowledge-to-Action framework, we co-designed a 9-session group art program using Chinese calligraphy as the channel for gaining emotional awareness and facilitating expression. The iterative participatory co-design process engaged 10 older people, 3 researchers, 3 art therapists, and 2 social workers through multiple workshops and interviews. We tested the program's acceptability and feasibility in 15 community-dwelling older people at risk of depression (mean age = 71.6). Mixed methods were used, including pre- and postintervention questionnaires, observation, and focus groups.

RESULTS: Qualitative findings suggest the feasibility of the program, and quantitative findings indicated its effects in increasing empowerment ($t(14) = 2.82, p < .05$), but not in other mental health-related measurements. Participants reflected that active participation and learning new art skills were fun and empowering, arts enabled them to gain insight into and express deeper feelings, and groups with peers made them feel relatable and accepted.

DISCUSSION AND IMPLICATIONS: Culturally appropriate participatory arts groups can effectively promote empowerment in older people, and future research should balance eliciting meaningful personal experiences and measurable changes.

Language: en

Keywords

Mental health; Arts-based intervention; Creativity; Self-stigma; Visual arts

Clinical and epidemiological characteristics of 369 patients with pelvic fractures in Eastern Zhejiang Province of China: a retrospective study

Dai J, He J, Ying Y, Huang D, Feng L. BMC Musculoskelet. Disord. 2023; 24(1): e495.

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DOI 10.1186/s12891-023-06632-2 **PMID** 37328894

Abstract

BACKGROUND: Data on the epidemiological characteristics and prognostic factors of patients with pelvic fractures are lacking, particularly in China. This study aimed to summarise the clinical and epidemiological characteristics of patients with pelvic fractures in eastern Zhejiang Province, China, and to identify risk factors for poor prognosis.

METHODS: The clinical data of 369 patients with pelvic fractures admitted to the Ningbo No. 6 Hospital between September 2020 and September 2021 were retrospectively analysed. Data on the demographic characteristics; fracture classification; injury time, cause, and site; treatment plan; and prognosis were collected using the Picture Archiving and Communication System and the Hospital Information System. Differences in constituent proportions were analysed using the chi-square test. Logistic regression analysis was used to identify factors affecting patient prognosis. Statistical significance was set at $p \leq 0.05$.

RESULTS: Among the 369 patients, there were 206 men and 163 women, at a ratio of 1.26:1, and the average age was 53.64 ± 0.78 years. More than 50% of patients were aged 41–65 years. The average length of hospital stay was 18.88 ± 1.78 days. The three most common causes of pelvic fractures were traffic accidents (51.2%), falls from height (31.44%), and flat-ground falls (14.09%). There were significant differences in the distribution of the three causes of injury depending on age ($p < 0.001$), sex ($p < 0.001$), and occupation ($p < 0.0001$). Most patients were manual workers (48.8%). Furthermore, most patients ($n = 262$, 71.0%) underwent surgical treatment for pelvic fractures. Postoperative complications occurred in 26 patients (7.05%), and infection was the main complication (73.08%). Age ($p = 0.013$), occupation ($p = 0.034$), cause of injury ($p = 0.022$), treatment options ($p = 0.001$), and complications ($p < 0.0001$) were independent factors affecting the prognosis of patients with pelvic fractures. One death (0.027%) occurred, which was due to severe blood loss.

CONCLUSIONS: Age, occupation, cause of injury, treatment options and complications were factors affecting patient prognosis. In addition, changes in blood flow and prevention of infection warrant attention.

Language: en

Keywords

Injury; Pelvis; Epidemiological characteristics; Fracture, falls

Cognitive impairment is associated with gait variability and fall risk in amyotrophic lateral sclerosis

Dubbioso R, Spisto M, Hausdorff JM, Aceto G, Iuzzolino VV, Senerchia G, De Marco S, Marcuccio L, Femiano C, Iodice R, Salvatore E, Santangelo G, Trojano L, Moretta P. Eur. J. Neurol. 2023; ePub(ePub): ePub.

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Abstract

BACKGROUND: In amyotrophic lateral sclerosis (ALS), gait abnormalities contribute to poor mobility and represent a relevant risk for falls. To date, gait studies in ALS patients focused on the motor dimension of the disease, underestimating the cognitive aspects.

METHODS: Using a wearable gait analysis device, we compared gait patterns in ambulatory ALS patients with Mild Cognitive Impairment (ALS MCI+; n=18), and without MCI (ALS MCI-; n=24), and healthy individuals (HS; n=16) under two conditions: (1) normal gait (single task), (2) walking while counting backward (dual task). Finally, we examined if the occurrence and number of falls in the three months following the baseline test were related to cognition.

RESULTS: In the single task condition, ALS patients, regardless of cognition, displayed higher gait variability than HS, especially for stance and swing time ($p < 0.001$). The dual task condition revealed additional differences in gait variability parameters between ALS MCI+ and ALS MCI- for cadence ($p=0.005$), stance time ($p=0.04$), swing time ($p=0.04$) and stability index ($p=0.02$). Moreover, ALS MCI+ showed a higher occurrence ($p=0.001$) and number of falls ($p < 0.001$) at the follow-up. Regression analyses demonstrated that MCI condition predicted the occurrence of future falls ($\beta = 3.649$ $p = 0.01$) and, together with executive dysfunction, was associated with the number of falls (cognitive impairment: $\beta = 0.63$; $p < 0.001$; executive dysfunction: $\beta = 0.39$; $p = 0.03$), regardless of motor impairment at clinical examination.

CONCLUSION: In ALS, MCI is associated with exaggerated gait variability and predicts the occurrence and number of short-term falls. This article is protected by copyright. All rights reserved.

Language: en

Keywords

falls; cognition; amyotrophic lateral sclerosis; gait analysis; wearable sensors

Consistent hearing aid use is associated with lower fall prevalence and risk in older adults with hearing loss

Campos L, Prochazka A, Anderson M, Kaizer A, Foster C, Hullar T. J. Am. Geriatr. Soc. 2023; ePub(ePub): ePub.

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Abstract

BACKGROUND: Falls and their sequelae cost more than \$50 billion every year. Older adults with hearing loss are at 2.4 times greater risk of falls than their normal hearing peers. Current research is inconclusive about whether hearing aids can offset this increased fall risk, and no previous studies considered if outcomes differed based on the consistency of hearing aid use.

METHODS: Individuals 60 years and older with bilateral hearing loss completed a survey consisting of the Fall Risk Questionnaire (FRQ) and questions about hearing loss history, hearing aid use, and other common fall risk factors. In this cross-sectional study, fall prevalence, as well as fall risk (based on FRQ score), was compared between hearing aid users and non-users. A separate group of consistent hearing-aid users (at least 4 h daily use for more than 1 year) was also compared with inconsistent/non-users.

RESULTS: Responses from 299 surveys were analyzed. Bivariate analysis found 50% reduced odds of experiencing a fall for hearing aid users compared with non-users (OR = 0.50 [95% CI: 0.29-0.85], $p = 0.01$). After adjusting for age, sex, hearing loss severity, and medication usage, those who reported any hearing aid use still had lower odds of falls (OR = 0.48 [95% CI: 0.26-0.90], $p = 0.02$) and lower odds of being at risk for falls (OR = 0.36 [95% CI: 0.19-0.66] $p < 0.001$) than non-users.

RESULTS for consistent hearing aid users demonstrate an even stronger association of lowered odds of falling (OR = 0.35 [95% CI: 0.19-0.67], $p < 0.001$) and lower odds of being at risk for falls (OR = 0.32 [95% CI: 0.12-0.59], $p < 0.001$), suggesting a potential dose-response relationship.

CONCLUSIONS: These findings suggest that use of hearing aids-especially consistent hearing aid use-is associated with lower odds of experiencing a fall or being classified as at risk for falls in older individuals with hearing loss.

Language: en

Keywords

older adults; falls; hearing aids; hearing impairment; hearing loss

Developing and testing implementation strategies to support the Centers for Disease Control and Prevention's Initiative for Falls Risk Management in Outpatient Physical Therapy: a protocol

Vincenzo JL, Brach JS, Bean J, Curran GM. Arch. Rehabil. Res. Clin. Transl. 2023; 5(2): e100268.

(Copyright © 2023, Elsevier Publishing)

DOI 10.1016/j.arrct.2023.100268 **PMID** 37312984

Abstract

OBJECTIVES: To develop and test implementation strategies to support implementing the Centers for Disease Control and Preventions' Stopping Elderly Accidents, Deaths, and Injuries (STEADI) initiative for falls prevention and falls risk management in a novel setting, outpatient physical therapy.

DESIGN: A feasibility implementation study engaging key partners involved in or affected by the implementation throughout the study. **SETTING:** Five outpatient physical therapy clinics embedded in a health system. **PARTICIPANTS:** Key partners (physical therapists, physical therapist assistants, referring physicians, administrative clinic staff, older adults, and caregivers) involved in or affected by the implementation (N=48) will participate in surveys and interviews to identify barriers and facilitators prior to implementation and post implementation. Twelve key partners representing at least 1 of each group will participate in evidence-based quality improvement panels to identify which barriers and facilitators are most important and feasible to address and to assist in choosing and designing implementation strategies to support the uptake of STEADI in outpatient rehabilitation. STEADI will be implemented in 5 outpatient physical therapy clinics as a standard of care for the ~1200 older adults attending those clinics annually. **OUTCOMES:** Primary outcomes include clinic- and provider-level (physical therapists and physical therapist assistant) adoption and fidelity to STEADI screening, multifactorial assessment, and falls risk interventions for older adults (65 years or older) attending outpatient physical therapy. Key partners' perceived feasibility, acceptability, and appropriateness of STEADI in outpatient physical therapy will also be measured using validated implementation science questionnaires. Exploratory clinical outcomes of older adults' falls risk pre- and post rehabilitation will be investigated.

Language: en

Keywords

Rehabilitation; Implementation science; Postural control and aged

Discrepancies in perception of fall risk between patients with subacute stroke and physical therapists in a rehabilitation hospital: a retrospective cohort study

Inoue S, Otaka Y, Horimoto Y, Shirooka H, Sugasawa M, Kondo K. *Front. Aging* 2023; 4: e1204488.

(Copyright © 2023, Frontiers Research Foundation)

DOI 10.3389/fragi.2023.1204488 **PMID** 37342863

Abstract

OBJECTIVE: Falls are one of the most common complications of a stroke. This study aimed to clarify the discrepancy between the perceived fall risk of hospitalized patients with stroke and the clinical judgment of physical therapists and to examine the changes in discrepancy during hospitalization.

DESIGN: Retrospective cohort study. **Patients:** This study included 426 patients with stroke admitted to a Japanese convalescent rehabilitation hospital between January 2019 and December 2020.

METHODS: The Falls Efficacy Scale-International was used to assess both patients' and physical therapists' perception of fall risk. The difference in Falls Efficacy Scale-International scores assessed by patients and physical therapists was defined as the discrepancy in fall risk, and its association with the incidence of falls during hospitalization was investigated.

RESULTS: Patients had a lower perception of fall risk than physical therapists at admission ($p < 0.001$), and this trend continued at discharge ($p < 0.001$). The discrepancy in fall risk perception was reduced at discharge for non-fallers and single fallers ($p < 0.001$), whereas the difference remained in multiple fallers.

CONCLUSION: Unlike physical therapists, patients underestimated their fall risk, especially patients who experienced multiple falls. These results may be useful for planning measures to prevent falls during hospitalization.

Language: en

Keywords

risk assessment; accidental falls; rehabilitation; cerebrovascular disorder; judgment; patient safety

Exploring variation in implementation of multifactorial falls risk assessment and tailored interventions: a realist review

Alvarado N, McVey L, Wright J, Healey F, Dowding D, Cheong VL, Gardner P, Hardiker N, Lynch A, Zaman H, Smith H, Randell R. BMC Geriatr. 2023; 23(1): e381.

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DOI 10.1186/s12877-023-04045-3 PMID 37344760

Abstract

BACKGROUND: Falls are the most common safety incident reported by acute hospitals. In England national guidance recommends delivery of a multifactorial falls risk assessment (MFRA) and interventions tailored to address individual falls risk factors. However, there is variation in how these practices are implemented. This study aimed to explore the variation by examining what supports or constrains delivery of MFRAs and tailored interventions in acute hospitals.

METHODS: A realist review of literature was conducted with searches completed in three stages: (1) to construct hypotheses in the form of Context, Mechanism, Outcome configurations (CMOc) about how MFRAs and interventions are delivered, (2) to scope the breadth and depth of evidence available in Embase to test the CMOcs, and (3) following prioritisation of CMOcs, to refine search strategies for use in multiple databases. Citations were managed in EndNote; titles, abstracts, and full texts were screened, with 10% independently screened by two reviewers.

RESULTS: Two CMOcs were prioritised for testing labelled: Facilitation via MFRA tools, and Patient Participation in interventions. Analysis indicated that MFRA tools can prompt action, but the number and type of falls risk factors included in tools differ across organisations leading to variation in practice. Furthermore, the extent to which tools work as prompts is influenced by complex ward conditions such as changes in patient condition, bed swaps, and availability of falls prevention interventions. Patient participation in falls prevention interventions is more likely where patient directed messaging takes individual circumstances into account, e.g., not wanting to disturb nurses by using the call bell. However, interactions that elicit individual circumstances can be resource intensive and patients with cognitive impairment may not be able to participate despite appropriately directed messaging.

CONCLUSIONS: Organisations should consider how tools can be developed in ways that better support consistent and comprehensive identification of patients' individual falls risk factors and the complex ward conditions that can disrupt how tools work as facilitators. Ward staff should be supported to deliver patient directed messaging that is informed by their individual circumstances to encourage participation in falls prevention interventions, where appropriate. **TRIAL REGISTRATION: PROSPERO: CRD42020184458.**

Language: en

Keywords

Risk assessment; Falls; Falls prevention; Patient participation; Realist review

Failure mode and Effect Analysis of personal fall arrest system under the intuitionistic fuzzy environment

Ghasemi F, Rahimi J. Heliyon 2023; 9(6): e16606.

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DOI 10.1016/j.heliyon.2023.e16606 **PMID** 37313142

Abstract

BACKGROUND AND AIMS: Intuitionistic fuzzy sets (IFS) theory is more powerful than classic fuzzy sets theory in handling uncertainty. A new approach for Failure Mode and Effect Analysis (FMEA) was developed based on IFS and group decision-making (known as IF-FMEA) for investigating Personal Fall Arrest System (PFAS).

METHOD: FMEA parameters, including occurrence, consequence, and detection, were re-defined based on a seven-point linguistic scale. Each linguistic term was associated with an intuitionistic triangular fuzzy set. Opinions on the parameters were gathered from a panel of experts, integrated using the similarity aggregation method, and defuzzified utilizing the center of gravity approach.

RESULTS: Nine failure modes were identified and analyzed using both FMEA and IF-FMEA. The risk priority numbers (RPNs) and prioritization obtained from the two approaches were different, highlighting the importance of using IFS. The highest RPN was associated with the lanyard web failure, while the failure of the anchor D-ring had the least RPN. Detection score was higher for metal parts of the PFAS, suggesting that failures in these parts are harder to detect.

CONCLUSION: In addition to being economical in terms of calculations, the proposed method was efficient in handling uncertainty. Different parts of a PFAS create different levels of risk.

Language: en

Keywords

Accident prevention; Risk assessment; Fuzzy sets; Safety analysis

Fall detection based on dynamic key points incorporating preposed attention

Zheng K, Li B, Li Y, Chang P, Sun G, Li H, Zhang J. Math. Biosci. Eng. 2023; 20(6): 11238-11259.

(Copyright © 2023, American Institute of Mathematical Sciences)

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Abstract

Accidental falls pose a significant threat to the elderly population, and accurate fall detection from surveillance videos can significantly reduce the negative impact of falls. Although most fall detection algorithms based on video deep learning focus on training and detecting human posture or key points in pictures or videos, we have found that the human pose-based model and key points-based model can complement each other to improve fall detection accuracy. In this paper, we propose a preposed attention capture mechanism for images that will be fed into the training network, and a fall detection model based on this mechanism. We accomplish this by fusing the human dynamic key point information with the original human posture image. We first propose the concept of dynamic key points to account for incomplete pose key point information in the fall state. We then introduce an attention expectation that predicates the original attention mechanism of the depth model by automatically labeling dynamic key points. Finally, the depth model trained with human dynamic key points is used to correct the detection errors of the depth model with raw human pose images. Our experiments on the Fall Detection Dataset and the UP-Fall Detection Dataset demonstrate that our proposed fall detection algorithm can effectively improve the accuracy of fall detection and provide better support for elderly care.

Language: en

Keywords

fall detection; complementary correction; decision fusion; dynamic key points; preposed attention

Human locomotion over obstacles reveals real-time prediction of energy expenditure for optimized decision-making

Daniels KAJ, Burn JF. *Proc. Biol. Sci.* 2023; 290(2000): e20230200.

(Copyright © 2023, Royal Society of London)

DOI 10.1098/rspb.2023.0200 **PMID** 37312546

Abstract

Despite decades of evidence revealing a multitude of ways in which animals are adapted to minimize the energy cost of locomotion, little is known about how energy expenditure shapes adaptive gait over complex terrain. Here, we show that the principle of energy optimality in human locomotion can be generalized to complex task-level locomotor behaviours requiring advance decision-making and anticipatory control. Participants completed a forced-choice locomotor task requiring them to choose between discrete multi-step obstacle negotiation strategies to cross a 'hole' in the ground. By modelling and analysing mechanical energy cost of transport for preferred and non-preferred manoeuvres over a wide range of obstacle dimensions, we showed that strategy selection was predicted by relative energy cost integrated across the complete multi-step task. Vision-based remote sensing was sufficient to select the strategy associated with the lowest prospective energy cost in advance of obstacle encounter, demonstrating the capacity for energetic optimization of locomotor behaviour in the absence of online proprioceptive or chemosensory feedback mechanisms. We highlight the integrative hierarchic optimizations that are required to facilitate energetically efficient locomotion over complex terrain and propose a new behavioural level linking mechanics, remote sensing and cognition that can be leveraged to explore locomotor control and decision-making.

Language: en

Keywords

Humans; Prospective Studies; Animals; biomechanics; *Cognition; *Energy Metabolism; energetics; human movement; locomotion; Locomotion; manoeuvres; optimization; Telemetry

Quantitative methods used to evaluate balance, postural control, and the fear of falling in lower limb prosthesis users: a systematic review

Johansson R, Jensen L, Barnett CT, Rusaw DF. *Prosthet. Orthot. Int.* 2023; ePub(ePub): ePub.

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Abstract

Problems with balance, postural control, and fear of falling are highly prevalent in lower limb prosthesis users, with much research conducted to understand these issues. The variety of tools used to assess these concepts presents a challenge when interpreting research outcomes. This systematic review aimed to provide a synthesis of quantifiable methods used in the evaluation of balance, postural control, and fear of falling in lower limb prosthesis users with an amputation level at or proximal to the ankle joint. A systematic search was conducted in CINAHL, Medline, AMED, Cochrane, AgeLine, Scopus, Web of Science, Proquest, PsycINFO, PsycArticles, and PubPsych databases followed by additional manual searching via reference lists in the reviewed articles databases. Included articles used quantitative measure of balance or postural control as one of the dependent variables, lower limb prosthesis users as a sample group, and were published in a peer-reviewed journal in English. Relevant assessment questions were created by the investigators to rate the assessment methods used in the individual studies. Descriptive and summary statistics are used to synthesize the results. The search yielded ($n = 187$) articles assessing balance or postural control ($n = 5487$ persons in total) and ($n = 66$) articles assessing fear of falling or balance confidence ($n = 7325$ persons in total). The most used test to measure balance was the Berg Balance Scale and the most used test to measure fear of falling was the Activities-specific Balance Confidence scale. A large number of studies did not present if the chosen methods were valid and reliable for the lower limb prosthesis users. Among study limitations, small sample size was common.

Language: en