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Analysis of dual-task elderly gait in fallers and non-fallers using wearable sensors

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(Copyright © 2016, Elsevier Publishing)

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Abstract

Dual-task (DT) gait involves walking while simultaneously performing an attention-demanding task and can be used to identify impaired gait or executive function in older adults. Advancement is needed in techniques that quantify the influence of dual tasking to improve predictive and diagnostic potential. This study investigated the viability of wearable sensor measures to identify DT gait changes in older adults and distinguish between elderly fallers and non-fallers. A convenience sample of 100 older individuals (75.5±6.7 years; 76 non-fallers, 24 fallers based on 6 month retrospective fall occurrence) walked 7.62m under single-task (ST) and DT conditions while wearing pressure-sensing insoles and tri-axial accelerometers at the head, pelvis, and left and right shanks. Differences between ST and DT gait were identified for temporal measures, acceleration descriptive statistics, Fast Fourier Transform (FFT) quartiles, ratio of even to odd harmonics, center of pressure (CoP) stance path coefficient of variation, and deviations to expected CoP stance path. Increased posterior CoP stance path deviations, increased coefficient of variation, decreased FFT quartiles, and decreased ratio of even to odd harmonics suggested increased DT gait variability. Decreased gait velocity and decreased acceleration standard deviations (SD) at the pelvis and shanks could represent compensatory gait strategies that maintain stability. Differences in acceleration between fallers and non-fallers in head posterior SD and pelvis AP ratio of even to odd harmonics during ST, and pelvis vertical maximum Lyapunov exponent during DT gait were identified. Wearable-sensor-based DT gait assessments could be used in point-of-care environments to identify gait deficits.

PDF Y Endnote Y

Barriers to and promoters of screening for falls in elderly community-dwelling patients by general practitioners: a large cross-sectional survey in two areas of France

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Arch. Gerontol. Geriatr. 2016; 65: 85-91.

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Abstract

The objective was to determine the factors affecting French GPs' implementation of annual screening for falls among patients of 75 years old and over. We conduct a cross-sectional study in two areas in the South-east of France (Savoie and Isère). An anonymized survey was sent by e-mail and/or post in May 2008 to all GPs with a large practice. Reminder letters were sent to GPs who hadn't answered between June and July 2008. Potentials barriers were measured by dichotomous scale. On GPs characteristics (socio-demographic, knowledge, attitude and practice), a multiple logistic regression was performed to identify others factors affecting falls screening. 493

questionnaires were analyzed (26.8%). 65.3% of respondents considered annual screening for falls to be useful, though only 28.8% of them implemented it each year and 9.3% every two to five years. Barriers to achieving annual screening included patient selecting (56.3%), forgetting to screen (26.6%), unsuitable working conditions (18.5%), lack of time (13.3%), of knowledge (13.3%), or of financial compensation (11.1%). Perception of the usefulness of annual screening for falls (OR=5.38 (2.07-14.08); $p=0.001$), satisfaction with medical care for falls (OR=1.34 (1.09-1.65); $p=0.006$) and increased consultation time (OR=2.65 (1.37-5.13); $p=0.004$), were found to have a significant impact on the implementation of annual screening for falls. Asking your patient each year if s/he has had any falls, inquiring about gait and balance disturbance is not time consuming. Finally, to improve a health-related quality of life, GPs should consider fall assessment as a fundamental feature of medical care.

PDF Y Endnote Y

Can the provision of a home help service for the elderly population reduce the incidence of fall-related injuries? A quasi-experimental study of the community-level effects on hospital admissions in Swedish municipalities

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Inj. Prev. 2016; ePub(ePub): ePub.

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Abstract

BACKGROUND: Fall-related injuries are a global public health problem, especially in elderly populations. The effect of an intervention aimed at reducing the risk of falls in the homes of community-dwelling elderly persons was evaluated. The intervention mainly involves the performance of complicated tasks and hazards assessment by a trained assessor, and has been adopted gradually over the last decade by 191 of 290 Swedish municipalities.

METHODS: A quasi-experimental design was used where intention-to-treat effect estimates were derived using panel regression analysis and a regression discontinuity (RD) design. The outcome measure was the incidence of fall-related hospitalisations in the treatment population, the age of which varied by municipality (≥ 65 years, ≥ 67 years, ≥ 70 years or ≥ 75 years).

RESULTS: We found no statistically significant reductions in injury incidence in the panel regression (IRR 1.01 (95% CI 0.98 to 1.05)) or RD (IRR 1.00 (95% CI 0.97 to 1.03)) analyses. The results are robust to several different model specifications, including segmented panel regression analysis with linear trend change and community fixed effects parameters.

CONCLUSIONS: It is unclear whether the absence of an effect is due to a low efficacy of the services provided, or a result of low adherence. Additional studies of the effects on other quality-of-life measures are recommended before conclusions are drawn regarding the cost-effectiveness of the provision of home help service programmes.

PDF Y Endnote Y

Care-delivery interventions to manage agitation and aggression in dementia nursing home and assisted living residents: a systematic review and meta-analysis

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DOI 10.1111/jgs.13936 **PMID** 27000321

Abstract

OBJECTIVES: To evaluate the efficacy of nonpharmacological care-delivery interventions (staff training, care-delivery models, changes to the environment) to reduce and manage agitation and aggression in nursing home and assisted living residents.

DESIGN: Three bibliographic databases, references of systematic reviews, ClinicalTrials.gov, and the International Controlled Trials Registry Platform were systematically searched for randomized controlled trials reporting behavioral outcomes for nonpharmacological care-delivery interventions in nursing homes and assisted living facilities. Five investigators independently assessed study eligibility, extracted data, rated risk of bias, and graded strength of evidence. Inclusion was limited to studies with low to moderate risk of bias.

SETTING: Nursing homes and assisted living facilities.

PARTICIPANTS: Facility caregiving staff.

MEASUREMENTS: Agitation, aggression, antipsychotic and other psychotropic use, general behavior.

RESULTS: Nineteen unique studies met entry criteria, addressing several categories of facility caregiver training interventions: dementia care mapping (DCM; n = 3), person-centered care (PCC; n = 3), clinical protocols to reduce the use of antipsychotic and other psychotropic drugs (n = 3), and emotion-oriented care (n = 2). Eleven additional studies evaluated other unique interventions.

RESULTS were pooled for the effect of each type of intervention on agitation and aggression: DCM (standardized mean difference -0.12, 95% confidence interval (CI) = -0.66 to 0.42), PCC (standardized mean difference -0.15, 95% CI = -0.67 to 0.38), and protocols to reduce antipsychotic and other psychotropic use (Cohen-Mansfield Agitation Inventory mean difference -4.5, 95% C = -38.84 to 29.93). Strength of evidence was generally insufficient to draw conclusions regarding efficacy or comparative effectiveness.

CONCLUSION: Evidence was insufficient regarding the efficacy of nonpharmacological care-delivery interventions to reduce agitation or aggression in nursing home and assisted living facility residents with dementia.

PDF Y Endnote Y

Clinical application of the "Stop walking while talking test". Relationship with geriatric assessment parameters and other tests of balance and gait

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DOI 10.1016/j.regg.2016.01.008 **PMID** 27016822

Abstract

OBJECTIVE: To assess the relationship between the Stop Walking While Talking (SWWT) test and some parameters of the geriatric assessment, as well as other tests of balance and gait.

PATIENTS AND METHODS: A prospective, observational and cross-sectional study conducted on 108 patients (62% women), with a mean age of 80.5 ± 8.4 years. Twenty-three of them were living at home, 24 in a nursing home, and 61 in an intermediate care unit. A record was made of the Barthel index, Mini-Mental State Examination of Folstein (MMSE), comorbidity (Charlson index), the presence of previous falls, and fear of falling. Timed Up and Go (TUG), Tinetti test, and Stop Walking While Talking (SWWT) test, were performed on all the patients. Based on the results of the SWWT test patients were divided in two groups: "stoppers" and "non-stoppers". All patients were able to walk (with or without walking aids).

RESULTS: The stoppers group of patients had a mean age 82.2 ± 8.7 ; Barthel index 64.6 ± 20.7 ; MMSE 21.6 ± 5.1 ; Charlson index 1.8 ± 1.7 , and the non-stoppers 78.5 ± 7.6 ($P=.024$), 86.0 ± 18.1 ($P<.001$), 24.3 ± 4.0 ($P=.004$), and 1.3 ± 1.6 ($P=.130$), respectively. Of the 58 stoppers patients, 39 (67.2%) had a previous fall, and 19 (32.8%) had not ($P=.002$); 43 (74.1%) had fear of falling, and 15 (25.9%) had not ($P<0.009$). Of the 63 patients with $TUG>20$ seconds, 52 (82.5%) were stoppers and 11 (17.5%) non-stoppers. Of the 31 with TUG between 10-20seconds, 5 (16.1%) were stoppers and 26 (83.9%) non-stoppers. Of the 14 with $TUG<10$ seconds, 1 (7.1%) were stoppers, and 13 (92.9%) non-stoppers ($P<0.0001$). The score of Tinetti test in the stoppers group was 15.4 ± 5.2 , and in non-stoppers 23.9 ± 4.6 ($P<0.001$).

CONCLUSIONS: Those in the stopper group were significantly older, were more dependent in activities of daily living, had greater cognitive impairment, more previous falls, had greater fear of falling, lower scores on the Tinetti test, and longer times in the TUG.

PDF N Endnote Y

Deficits in selective attention alter gait in frail older adults

Cornu V, Steinmetz JP, Federspiel C.

GeroPsych (Bern) 2016; 29(1): 29-36.

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DOI 10.1024/1662-9647/a000137 **PMID** unavailable

Abstract

A growing body of research demonstrates an association between gait disorders, falls, and attentional capacities in older adults. The present work empirically analyzes differences in gait parameters in frail institutionalized older adults as a function of selective attention. Gait analysis under single- and dual-task conditions as well as selective attention measures were collected from a total of 33 nursing-home residents. We found that differences in selective attention performances were related to the investigated gait parameters. Poorer selective attention performances were associated with higher stride-to-stride variabilities and a slowing of gait speed under dual-task conditions. The present findings suggest a contribution of selective attention to a safe gait. Implications for gait rehabilitation programs are discussed.

PDF N Endnote Y

Exergames for unsupervised balance training at home: a pilot study in healthy older adults

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Gait Posture 2016; 44: 161-167.

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Abstract

Exercise videogames (exergames) are gaining popularity as tools for improving balance ability in older adults, yet few exergames are suitable for home-based use. The purpose of the current pilot study was to examine the effects of a 6-week unsupervised home-based exergaming training program on balance performance. Ten community dwelling healthy older adults (age: 75.9±7.2 years) played a newly developed ice skating exergame for six weeks at home. In the game, the speed and direction of a virtual ice skater on a frozen canal were controlled using lateral weight shifts, which were captured using Kinect. Sway characteristics during quiet standing in eyes open (EO), eyes closed (EC) and dual task (DT) conditions were assessed in time and frequency domain before, and after two, four and six weeks of training. Balance was also evaluated using the narrow ridge balance test (NRBT). Multilevel modeling was applied to examine changes in balance ability. Participants played 631 (±124)min over the intervention period and no subjects dropped out. Balance in terms of sway characteristics improved on average by 17.4% (EO) and 23.3% (EC) after six weeks of training ($p<0.05$). Differences in rate of improvement ($p<0.05$) were observed between participants. No intervention effects were found for quiet standing in DT conditions and on the NRBT. In conclusion, the pilot study showed that unsupervised home-based exergaming is feasible in community dwelling older adults, but also that participants do not benefit equally from the program, thereby emphasizing the need for more personalized exergame training programs.

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Expectations towards home care re-ablement in Danish municipalities

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Int. J. Sociol. Soc. Policy 2015; 35(3/4): 126-140.

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DOI 10.1108/IJSSP-06-2014-0045 **PMID** unavailable

Abstract

PURPOSE: Re-abling care of frail older people is highly on the agenda in several countries. The purpose of this paper is to have a closer look at the argumentation used for its establishment by local policy actors in the field and the kind of expectations towards the behaviour of frail older people it entails.

DESIGN/METHODOLOGY/APPROACH: The empirical material consists of qualitative interviews with 17 local policy actors in two Danish municipalities. The interviews have been analysed with the help of argumentative discourse analysis.

FINDINGS: The most important argument for re-abling care appears to be grounded in economic reasons. However, a second, moral argument was found revolving around the older peoples' activity, which contributes to the establishment of moral expectations towards frail older people to be active.

RESEARCH LIMITATIONS/IMPLICATIONS: As the goal of the study was to analyse understandings and

values of key local actors, the implementation of re-ablement programmes and the users' perspective were not studied.

ORIGINALITY/VALUE: The paper contributes to the investigation of the shift from universal entitlement as a right to towards market rationalities in Danish elder care.

PDF Y Endnote Y

Factors affecting mortality in older trauma patients-a systematic review and meta-analysis

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Injury 2016; ePub(ePub): ePub.

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DOI 10.1016/j.injury.2016.02.027 **PMID** 27015751

Abstract

INTRODUCTION: Major trauma in older people is a significant health burden in the developed world. The aging of the population has resulted in larger numbers of older patients suffering serious injury. Older trauma patients are at greater risk of death from major trauma, but the reasons for this are less well understood. The aim of this review was to identify the factors affecting mortality in older patients suffering major injury.

MATERIALS AND METHODS: A systematic review of Medline, Cinhal and the Cochrane database, supplemented by a manual search of relevant papers was undertaken, with meta-analysis. Multi-centre cohort studies of existing trauma registries that reported risk-adjusted mortality (adjusted odds ratios, AOR) in their outcomes and which analysed patients aged 65 and older as a separate cohort were included in the review.

RESULTS: 3609 papers were identified from the electronic databases, and 28 from manual searches. Of these, 15 papers fulfilled the inclusion criteria. Demographic variables (age and gender), pre-existing conditions (comorbidities and medication), and injury-related factors (injury severity, pattern and mechanism) were found to affect mortality. The 'oldest old', aged 75 and older, had higher mortality rates than younger patients, aged 65-74 years. Older men had a significantly higher mortality rate than women (cumulative odds ratio 1.51, 95% CI 1.37-1.66). Three papers reported a higher risk of death in patients with pre-existing conditions. Two studies reported increased mortality in patients on warfarin (cumulative odds ratio 1.32, 95% CI 1.05-1.66). Higher mortality was seen in patients with lower Glasgow coma scores and systolic blood pressures. Mortality increased with increased injury severity and number of injuries sustained. Low level falls were associated with higher mortality than motor vehicle collisions (cumulative odds ratio 2.88, 95% CI 1.26-6.60).

CONCLUSIONS: Multiple factors contribute to mortality risk in older trauma patients. The relation between these factors and mortality is complex, and a fuller understanding of the contribution of each factor is needed to develop a better predictive model for trauma outcomes in older people. More research is required to identify patient and process factors affecting mortality in older patients.

PDF Y Endnote Y

Hearing loss and falls: a systematic review and meta-analysis

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Laryngoscope 2016; ePub(ePub): ePub.

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DOI 10.1002/lary.25927 **PMID** 27010669

Abstract

BACKGROUND: Falls are a devastating condition in older individuals. Identifying potentially modifiable risk factors such as hearing loss would provide a substantial public health benefit.

OBJECTIVE: To evaluate the current evidence for an association between hearing loss and falls risk.

DATA SOURCES: A systematic search of PubMed, Cumulative Index to Nursing and Allied Health Literature, Embase, Scopus, Web of Science, and Cochrane databases was performed in July 2014.

STUDY ELIGIBILITY: Studies were eligible for inclusion if they were published in the peer-reviewed literature. All studies used a predetermined definition of hearing loss. Main outcomes and measurements were fall hospitalization records or self-reports of falls by structured interview or validated questionnaires.

STUDY APPRAISAL AND SYNTHESIS: Two investigators independently reviewed the literature related to hearing loss, falls, and older adults. We pooled effect sizes from across the studies and performed a meta-analysis to compute an overall effect size.

RESULTS AND LIMITATIONS: Twelve eligible studies were identified. The odds of falling were 2.39 times greater among older adults with hearing loss than older adults with normal hearing (pooled odds ratio 2.39, 95% confidence interval [CI]: 2.11-2.68). In sensitivity analyses, we restricted the meta-analysis to studies where hearing loss was audiometrically defined (N = 6) and observed hearing loss to be associated with a 69% increase in the odds of falling (pooled odds ratio 1.69, 95% CI: 1.18-2.19). When we further limited to studies that also performed multivariate regression analyses (N = 4), the overall effect size did not appreciably change (pooled odds ratio 1.72, 95% CI: 1.07-2.37). We observed a potential positive publication bias in the literature. Limitations of the systematic review and meta-analysis are the cross-sectional designs of most studies and the heterogeneity across studies (Q = 631, P <.05, I(2) = 98.1%).

CONCLUSIONS AND RELEVANCE: In the published literature, hearing loss is associated with a significantly increased odds of falling in older adults. These findings need to be interpreted in light of the potential for positive publication bias in the literature on this topic. **LEVEL OF EVIDENCE:** NA

PDF Y Endnote Y

High serum adiponectin levels predict incident falls among middle-aged and older adults: a prospective cohort study

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Age Ageing 2016; ePub(ePub): ePub.

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(Copyright © 2016, Oxford University Press)

DOI 10.1093/ageing/afw043 **PMID** 27013505

Abstract

BACKGROUND AND OBJECTIVE: adiponectin is an adipocyte-derived hormone with anti-obesity and anti-diabetic properties. However, higher circulating adiponectin levels are related to poor muscle function and physical disability, which suggests a potential link between adiponectin and risk of falls. Nevertheless, no direct association between circulating adiponectin levels and incident fall risk has been reported. Therefore, this study aimed to investigate the relationship between serum adiponectin levels and incident falls in a population of middle-aged and older adults.

DESIGN: a prospective cohort study.

SETTING: Oroshisho Center in Sendai City, Japan.

SUBJECTS: Japanese adults who were ≥ 45 years old ($n = 430$).

MEASUREMENTS: serum adiponectin levels were measured at baseline, and the subjects were divided into sex-specific tertiles. Data regarding a history of falls were collected via participant recall using a self-reported questionnaire. Incident falls were defined as falls that were experienced by people without a history of falls at baseline.

RESULTS: during the 2-year follow-up, 15.6% (67/430) of the subjects experienced an incident fall. In the univariate logistic regression analysis, incident falls were significantly more frequent across the increasing sex-specific serum adiponectin tertiles (P for trend = 0.008). Adjusted odds ratios (95% confidence interval) for incident falls were 2.31 (1.07-4.98) in the middle tertile and 3.61 (1.63-7.99) in the highest tertile; this risk was significantly higher than that for the lowest adiponectin tertile (P for trend = 0.002).

CONCLUSIONS: the findings of this prospective cohort study indicate that higher serum adiponectin levels may be a predictor of incident falls.

PDF Y Endnote Y

Identification of the unstable human postural control system

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Front. Syst. Neurosci. 2016; 10: 22.

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(Copyright © 2016, Frontiers Research Foundation)

DOI 10.3389/fnsys.2016.00022 **PMID** 27013990 **PMCID** PMC4786559

Abstract

Maintaining upright bipedal posture requires a control system that continually adapts to changing environmental conditions, such as different support surfaces. Behavioral changes associated with different support surfaces, such as the predominance of an ankle or hip strategy, is considered to reflect a change in the control strategy. However, tracing such behavioral changes to a specific component in a closed loop control system is challenging. Here we used the joint input-output (JIO) method of closed-loop system identification to identify the musculoskeletal and neural feedback components of the human postural control loop. The goal was to establish changes in the control loop corresponding to behavioral changes observed on different support surfaces. Subjects were simultaneously perturbed by two independent mechanical and two independent sensory perturbations while standing on a normal or short support surface. The results show a dramatic phase reversal between visual input and body kinematics due to the change in surface condition from trunk leads legs to legs lead trunk with increasing frequency of the visual perturbation. Through decomposition of the control loop, we found that behavioral change is not necessarily due to a change in control strategy, but in the case of different support surfaces, is linked to changes in

properties of the plant. The JIO method is an important tool to identify the contribution of specific components within a closed loop control system to overall postural behavior and may be useful to devise better treatment of balance disorders.

PDF Y Endnote Y

Instrumented shoes for activity classification in the elderly

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Gait Posture 2016; 44: 12-17.

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Abstract

Quantifying daily physical activity in older adults can provide relevant monitoring and diagnostic information about risk of fall and frailty. In this study, we introduce instrumented shoes capable of recording movement and foot loading data unobtrusively throughout the day. Recorded data were used to devise an activity classification algorithm. Ten elderly persons wore the instrumented shoe system consisting of insoles inside the shoes and inertial measurement units on the shoes, and performed a series of activities of daily life as part of a semi-structured protocol. We hypothesized that foot loading, orientation, and elevation can be used to classify postural transitions, locomotion, and walking type. Additional sensors worn at the right thigh and the trunk were used as reference, along with an event marker. An activity classification algorithm was built based on a decision tree that incorporates rules inspired from movement biomechanics. The algorithm revealed excellent performance with respect to the reference system with an overall accuracy of 97% across all activities. The algorithm was also capable of recognizing all postural transitions and locomotion periods with elevation changes. Furthermore, the algorithm proved to be robust against small changes of tuning parameters. This instrumented shoe system is suitable for daily activity monitoring in elderly persons and can additionally provide gait parameters, which, combined with activity parameters, can supply useful clinical information regarding the mobility of elderly persons.

PDF Y Endnote Y

Managing Agitation and Aggression in Congregate Living Settings: Efficacy and Implementation Challenges

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J. Am. Geriatr. Soc. 2016; 64(3): 489-491.

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DOI 10.1111/jgs.13947 **PMID** 27000322

Abstract [Abstract unavailable]Editorial

PDF Y Endnote Y

Nursing staff' attentiveness to older adults falling in residential care - an interview study

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J. Clin. Nurs. 2016; ePub(ePub): ePub.

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(Copyright © 2016, John Wiley and Sons)

DOI 10.1111/jocn.13240 **PMID** 27009497

Abstract

AIMS AND OBJECTIVES: The focus of this study is to explore how nursing staff experience safety promotion and fall prevention in residential care settings for older adults. The article calls for attentiveness to fall prevention within a broader lifeworld context of well-being and health promotion.

BACKGROUND: There is limited research on fall prevention and safety promotion where the lifeworld and well-being provide a direction for care.

DESIGN: This interview study has a hermeneutic phenomenological design.

METHODS: Fourteen interviews with nursing staff were carried out. The ethics of care and vulnerability within a lifeworld approach provide the theoretical framework and guide the interpretive process.

RESULTS: The findings can indicate that there is a generalised understanding of the needs of older persons in residential care. The focus of the staff was more on protection and prevention than safety promotion and well-being.

CONCLUSION: Risk prevention is not enough. The residents need protection against falls but they also need to be protected from situations that can be detrimental to their well-being and compromise their dignity. Acknowledging the complexities of safety promotion amongst older persons living in assisted care settings can prevent fall accidents and ensure attentiveness to a more fundamental sense of security that can promote the older person's well-being and health.

RELEVANCE TO CLINICAL PRACTICE: This study is relevant to clinical nursing practice as it shows that risk management in fall prevention is not enough. The findings show the need for educated nursing home staff that can incorporate contemplative and scientific knowledge into injury prevention practice.

PDF Y Endnote Y

Outcomes of a falls prevention education program among older adults in Grenada

Lyons BP, Hall RJ.

J. Community Health 2016; ePub(ePub): ePub.

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DOI 10.1007/s10900-016-0185-7 **PMID** 27013223

Abstract

In Latin America and the Caribbean, there is a scarcity of data on falls, the leading cause of death as a result of unintentional injuries, among older adults aged 65+ years of age. By 2050, 80 % of the 2 billion older adults worldwide are expected to be living in this region; therefore, it is imperative that this issue receive urgent attention from community health practitioners, health educators and policy makers. Guided by Pillar 1-awareness of the WHO fall prevention model for community-dwelling

older adults, the purpose of this paper was to describe the feasibility of implementing a falls prevention awareness educational initiative in the Eastern Caribbean Island of Grenada. Sixty-two older adults, average age 67, participated in a falls awareness workshop. An anonymous pre-workshop falls assessment checklist was distributed to establish baseline information followed by an interactive workshop. Eight fall risks were identified and 52 % of the participants reported a history of falls.

Based on the group's eagerness to participate, we are encouraged that falls prevention intervention initiatives are feasible among others of similar characteristics in Grenada and plan to implement Pillar II-objective falls assessment and Pillar III-on-going interventions.

PDF Y Endnote Y

Patient perceptions and experiences with falls during hospitalization and after discharge

Shuman C, Liu J, Montie M, Galinato JG, Todd MA, Hegstad M, Titler M.

Appl. Nurs. Res. 2016; 31: 79-85.

(Copyright © 2016, Elsevier Publishing)

DOI 10.1016/j.apnr.2016.01.009 **PMID** unavailable

Abstract

AIMS: The aim of this study was to describe hospitalized older adults' (> 60 years) perceptions about (1) their fall risks while hospitalized; (2) fall prevention interventions received while hospitalized; and (3) fall prevention discharge instructions.

BACKGROUND: Little is known about hospitalized older adults' perceptions regarding fall prevention interventions received during hospitalization and fall prevention discharge instructions.

METHODS: This is a prospective, exploratory study using qualitative methods.

RESULTS: This paper reports qualitative findings of patients' perspectives on fall prevention interventions during hospitalization and at discharge. Eight major themes supported by multiple minor themes emerged: overall perceptions of falling; overall perceptions of fall prevention interventions while hospitalized; "telling" fall prevention; "doing" fall prevention; effectiveness of fall prevention strategies; personal fall prevention strategies; fall-related discharge instructions; and most effective fall-related discharge instructions.

CONCLUSIONS: Findings suggest healthcare providers need to more fully engage patients and families in understanding fall prevention interventions and factors contributing to falls during hospitalization and at discharge.

PDF Y Endnote Y

Prevention of impaired mobility in the elderly in primary care: a brief report

Bonnefoy M, Berrut G, Gilbert T.

Geriatr. Psychol. Neuropsychiatr. Vieil. 2016; 14(1): 16-22.

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Abstract

The loss autonomy in the aging population is a major public health issue. Mobility impairment, which precedes loss of autonomy, could yet be accessible to multi-modal and personalised programs to enhance balance and physical performances, and avoid loss of autonomy. Moreover, such preventive programs are likely to be more effective when the patients are taken in charge before

presenting with difficulties in daily living. The aging demographics and the consequences of the loss of autonomy clearly indicate a need for better addressing these patients with lowering mobility, even though they will mostly have subtle symptoms and no spontaneous complaints. This could be achieved by improving the screening of mobility impairment and the development of specific personalised preventive programs in primary care. In this brief narrative review, we aimed to summarise the current body of knowledge on mobility impairment prevention in the elderly, and open the field for future research in primary care.

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Quality of life and fear of falling among an aging population in semi rural, Thailand

Yodmai K, Phummarak S, Sirisuth JC, Kumar R, Somrongthong R.

J. Ayub Med. Coll. Abbottabad 2015; 27(4): 771-774.

(Copyright © 2015, Ayub Medical College)

DOI unavailable PMID 27004319

Abstract

BACKGROUND: Thailand is the country where large numbers of old population are living in rural areas. Multiple factors are influencing the health of old people but falling is the biggest cause affecting their quality of life. This study explores the relationship between the quality of life, and fear of fall among aging people in the semi-rural, Thailand.

METHODS: A cross sectional study was conducted on 394 old aged individuals living in Nakornnayok Province. Participants were selected through simple random method (SRM) from village population list. Old people were interviewed by adapting World Health Organization quality of life instrument-older module (WHOQOL-OLD) to access the quality of life. Multiple logistic regression analysis was applied to identify factors associated with QOL.

RESULTS: Above half of respondents during this study were female, married, educated with age 70.45 ± 6.99 . Majority of aging had low income and were not enrolled for their health check-up at hospitals on regular basis. Over a half of them suffered from chronic diseases, and one third of them were using instrumental aids such as visual glasses, walker support, wheel chair and hearing aids etc. Majority, (70%) of the participants was living in safe houses but (34%) reported fall at least one time in past year. Mean of fear of fall score (FFS) was calculated (26.97 ± 4.31) and mean of FFS during using public transportation was (9.8756 ± 2.19467). Two third of aging population reported the moderate quality of life (QOL).

CONCLUSIONS: Study has concluded that the QOL in aging people is related with household safety and confidence to use public transportation.

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Self-selected and maximal walking speeds provide greater insight into fall status than walking speed reserve among community-dwelling older adults

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Am. J. Phys. Med. Rehabil. 2016; ePub(ePub): ePub.

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DOI 10.1097/PHM.0000000000000488 **PMID** 27003205

Abstract

OBJECTIVE: To determine the degree to which self-selected walking speed (SSWS), maximal walking speed (MWS), and walking speed reserve (WSR) are associated with fall status among community-dwelling older adults.

DESIGN: WS and 1-year falls history data were collected on 217 community-dwelling older adults (median age = 82, range 65-93 years) at a local outpatient PT clinic and local retirement communities and senior centers. WSR was calculated as a difference ($WSR_{diff} = MWS - SSWS$) and ratio ($WSR_{ratio} = MWS/SSWS$).

RESULTS: SSWS ($P < 0.001$), MWS ($P < 0.001$), and WSR_{diff} ($P < 0.01$) were associated with fall status. The cutpoints identified were 0.76 m/s for SSWS (65.4% sensitivity, 70.9% specificity), 1.13 m/s for MWS (76.6% sensitivity, 60.0% specificity), and 0.24 m/s for WSR_{diff} (56.1% sensitivity, 70.9% specificity). SSWS and MWS better discriminated between fallers and non-fallers (SSWS: AUC = 0.69, MWS: AUC = 0.71) than WSR_{diff} (AUC = 0.64).

CONCLUSIONS: SSWS and MWS seem to be equally informative measures for assessing fall status in community-dwelling older adults. Older adults with SSWSs less than 0.76 m/s and those with MWSs less than 1.13 m/s may benefit from further fall risk assessment. Combining SSWS and MWS to calculate an individual's WSR does not provide additional insight into fall status in this population.

PDF Y Endnote Y

Social acceptance by senior citizens and caregivers of a fall detection system using range sensors in a nursing home

Iio T, Shiomi M, Kamei K, Sharma C, Hagita N.

Adv. Robot. 2016; 30(3): 190-205.

(Copyright © 2016, Informa - Taylor and Francis Group)

DOI 10.1080/01691864.2015.1120241 **PMID** unavailable

Abstract

We developed a fall detection system with a status view function using range sensors in nursing homes and investigated how it was evaluated by seniors and caregivers about their intention to use and feelings of security. Our system calculates the positions and heights of seniors using range sensors for falling detection and sends an alert to the terminals of caregivers. Moreover, the system sends silhouette images from the range sensors that display the largest appearance of a person to the terminal to provide detailed information of seniors for the caregivers. In user evaluation, seniors and caregivers watched the three videos: simulated out-of-bed sensor, fall detection under constant observation and fall detection without constant observation. Participants answered questionnaires and were interviewed after watching each video. As a result, the seniors indicated significantly higher intention to use and feelings of security in the second and third videos than in the first video. Most seniors could accept being constantly monitored by the caregivers because they deemed safety to be more important than privacy. A few seniors (often healthy individuals) felt nervous under constant observation. Caregivers commented on the importance of flexibly switching the functions of the fall detection system to reflect individual status.

PDF Y Endnote Y

The complexity of daily life walking in older adult community-dwelling fallers and non-fallers

Ihlen EAF, Weiss A, Bourke A, Helbostad JL, Hausdorff JM.

J. Biomech. 2016; ePub(ePub): ePub.

(Copyright © 2016, Elsevier Publishing)

DOI 10.1016/j.jbiomech.2016.02.055 **PMID** unavailable

Abstract

Complexity of human physiology and physical behavior has been suggested to decrease with aging and disease and make older adults more susceptible to falls. The present study investigates complexity in daily life walking in community-dwelling older adult fallers and non-fallers measured by a 3D inertial accelerometer sensor fixed to the lower back. Complexity was expressed using new metrics of entropy: refined composite multiscale entropy (RCME) and refined multiscale permutation entropy (RMPE). The study re-analyses data of 3 days daily-life activity originally described by Weiss et al. (2013). The data set contains inertial sensor data from 39 older persons reporting less than 2 falls and 32 older persons reporting two or more falls during the previous year. The RCME and the RMPE were derived for trunk acceleration and velocity signals from walking epochs of 50 seconds using mean and variance coarse graining of the signals. Discriminant abilities of the entropy metrics were assessed using a partial least square discriminant analysis. Both RCME and RMPE successfully distinguished between the daily-life walking of the fallers and non-fallers (AUC > 0.8) and performed better than the 35 conventional gait features investigated in Weiss et al. (2013). Higher complexity was found in the vertical and mediolateral directions in the non-fallers for both entropy metrics. These findings suggest that RCME and RMPE can be used to improve the assessment of fall risk in older people.

PDF Y Endnote Y

The effect of a dual task on gait speed in community dwelling older adults: A systematic review and meta-analysis

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Gait Posture 2016; 44: 250-258.

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Abstract

BACKGROUND AND PURPOSE: Reduced walking speed in older adults is associated with adverse health outcomes. This review aims to examine the effect of a cognitive dual-task on the gait speed of community-dwelling older adults with no significant pathology affecting gait.

DATA SOURCES AND STUDY SELECTION: Electronic database searches were performed in, Web of Science, PubMed, SCOPUS, Embase and psychINFO. Eligibility and methodological quality was assessed by two independent reviewers. The effect size on gait speed was measured as the raw mean difference (95% confidence interval) between single and dual-task performance. Pooled estimates of the overall effect were computed using a random effects method and forest plots generated.

DATA EXTRACTION AND DATA SYNTHESIS: 22 studies (27 data sets) with a population of 3728 were reviewed and pooled for meta-analysis. The mean walking speed of participants included in all studies was >1.0m/s and all studies reported the effect of a cognitive dual-task on gait speed. Sub-

analysis examined the effect of type of cognitive task (mental-tracking vs. verbal-fluency). Mean single-task gait speed was 1.21 (0.13)m/s, the addition of a dual-task reduced speed by 0.19m/s to 1.02 (0.16)m/s ($p < 0.00001$), both mental-tracking and verbal-fluency tasks resulted in significant reduction in gait speed.

LIMITATIONS AND CONCLUSION: The cross-sectional design of the studies made quality assessment difficult. Despite efforts, high heterogeneity remained, possibly due to participant characteristics and testing protocols. This meta-analysis shows that in community-dwelling older adults, the addition of a dual-task significantly reduces gait speed and may indicate the value of including dual-task walking as part of the standard clinical assessment of older people.

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Vitamin D, falls and fractures in older adults: chronicle of a paradigm shift

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Geriatr. Psychol. Neuropsychiatr. Vieil. 2016; 14(1): 5-6.

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Abstract [Abstract unavailable]

PDF N Endnote Y

Association between obesity and falls among Korean adults: a population-based cross-sectional study

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DOI 10.1097/MD.0000000000003130 **PMID** 27015190

Abstract

The objective of this study was to evaluate the association between falls and obesity using Asian body mass index (BMI) classifications. Using the data from the Korean community health survey in 2011, a total of 229,226 participants ranging from 19 to 106 years old were included in this study. The BMI groups were classified as underweight (< 18.5), healthy ($18.5 \leq \text{BMI} < 23$), overweight ($23 \leq \text{BMI} < 25$), and obese (≥ 25) using Asian BMI classifications. The associations between BMI groups and falls (≥ 1 time or ≥ 2 times per year) were analyzed using multiple logistic regression analyses with complex sampling. A subgroup analysis was conducted according to age (19-40, 41-60, and ≥ 61 years) and the location of the fall (indoor and outdoor). Physical activity, household income, education level, alcohol consumption, smoking, stress level, and medical comorbidities were

adjusted as confounders. In total, 16.8% and 6.1% of the participants experienced falls ≥ 1 time and ≥ 2 times per year, respectively. Compared to the healthy weight group, the other BMI groups showed a significant U-shaped relationship with falls ≥ 1 time (AOR underweight = 1.12, 95% CI [confidence interval] = 1.05-1.19; AOR obese = 1.06, 95% CI = 1.02-1.10, $P < 0.001$) and ≥ 2 times (AOR underweight = 1.14, 95% CI = 1.04-1.26; AOR obese = 1.04, 95% CI = 0.99-1.10, $P < 0.001$). Obese status was significantly associated with falls (≥ 1 fall per year) in all age groups, whereas being underweight was significantly associated with falls in the 19 to 40 year age group only. In conclusion, both underweight and obese statuses were significantly associated with falls in this adult Korean population. However, the relationship between BMI group and falls varied according to age and the location of the falls.

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Effects of an exercise programme on functional capacity, body composition and risk of falls in patients with cirrhosis: a randomized clinical trial

Román E, García-Galcerán C, Torrades T, Herrera S, Marín A, Doñate M, Alvarado-Tapias E, Malouf J, Náchter L, Serra-Grima R, Guarner C, Córdoba J, Soriano G.

PLoS One 2016; 11(3): e0151652.

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Abstract

Patients with cirrhosis often have functional limitations, decreased muscle mass, and a high risk of falls. These variables could improve with exercise. The aim was to study the effects of moderate exercise on functional capacity, body composition and risk of falls in patients with cirrhosis. Twenty-three cirrhotic patients were randomized to an exercise programme ($n = 14$) or to a relaxation programme ($n = 9$). Both programmes consisted of a one-hour session 3 days a week for 12 weeks. At the beginning and end of the study, we measured functional capacity using the cardiopulmonary exercise test, evaluated body composition using anthropometry and dual energy X-ray absorptiometry, and estimated risk of falls using the Timed Up&Go test. In the exercise group, cardiopulmonary exercise test showed an increase in total effort time ($p < 0.001$) and ventilatory anaerobic threshold time ($p = 0.009$). Upper thigh circumference increased and mid-arm and mid-thigh skinfold thickness decreased. Dual energy X-ray absorptiometry showed a decrease in fat body mass (-0.94 kg, 95%CI -0.48 to -1.41, $p = 0.003$) and an increase in lean body mass (1.05 kg, 95%CI 0.27 to 1.82, $p = 0.01$), lean appendicular mass (0.38 kg, 95%CI 0.06 to 0.69, $p = 0.03$) and lean leg mass (0.34 kg, 95%CI 0.10 to 0.57, $p = 0.02$). The Timed Up&Go test decreased at the end of the study compared to baseline ($p = 0.02$). No changes were observed in the relaxation group. We conclude that a moderate exercise programme in patients with cirrhosis improves functional capacity, increases muscle mass, and decreases body fat and the Timed Up&Go time.

TRIAL REGISTRATION: ClinicalTrials.gov NCT01447537.

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Fall prediction in hypertensive patients via short-term HRV Analysis

Castaldo R, Melillo P, Izzo R, De Luca N, Pecchia L.

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(Copyright © 2016, Institute of Electrical and Electronics Engineers)

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Abstract

Falls are a major problem of later life having severe consequences on quality of life and a significant burden in occidental countries. Many technological solutions have been proposed to assess the risk or to predict falls and the majority is based on accelerometers and gyroscopes. However, very little was done for identifying first time fallers, which are very difficult to recognise. This paper presents a meta-model predicting falls using short term Heart Rate Variability (HRV) analysis acquired at the baseline. 170 hypertensive patients (age: 72 ± 8 years, 56 female) were investigated, of which 34 fell once in the 3 months after the baseline assessment. This study is focused on hypertensive patients, which were considered as convenient pragmatic sample, as they undergo regular outpatient visits, during which short term ECG can be easily recorded without significant increase of healthcare costs. For each subject, 11 consecutive excerpts of 5 minutes each (55 min) were extracted from ECGs recorded between 10:30 and 12:30 and analysed. Linear and nonlinear HRV features were extracted and averaged among the 11 excerpts, which were, then, considered for the statistical and data mining analysis. The best predictive meta-model was based on Multinomial Naïve Bayes, which enabled to predict first-time fallers with sensitivity, specificity and accuracy rates of 72%, 61%, 68% respectively.

PDF Y Endnote Y

Fall-related experiences of stroke survivors: a meta-ethnography

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Disabil. Rehabil. 2016; ePub(ePub): 1-10.

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Abstract

PURPOSE: Health professionals view falls after stroke as common adverse events with both physical and psychological consequences. Stroke survivors' experiences are less well understood. The aim of this systematic review was to explore the perception of falls-risk within the stroke recovery experience from the perspective of people with stroke.

METHODS: A systematic literature search was conducted. Papers that used qualitative methods to explore the experiences of individuals with stroke around falls, falls-risk and fear of falling were included. Two reviewers independently assessed the methodological quality of papers. Meta-ethnography was conducted. Concepts from each study were translated into each other to form theories that were combined through a "lines-of-argument" synthesis.

RESULTS: Four themes emerged from the six included qualitative studies: (i) Fall circumstances, (ii) perception of fall consequences, (iii) barriers to community participation and (iv) coping strategies. The synthesis revealed that stroke survivors' perceived consequences of falls exist on a continuum. Cognitive and emotional adjustment may be required in the successful adoption of coping strategies to overcome fall-related barriers to participation.

CONCLUSIONS: Stroke survivors' fall-related experiences appear to exist within the context of activity and community participation. Further research is warranted due to the small number of substantive studies available for synthesis. Implications for Rehabilitation Health care professionals should recognize that cognitive and emotional adjustment may be required for stroke survivors to

accept strategies for overcoming falls-risk, including dependence on carers and assistive devices. Several factors in addition to physical interventions may be needed to minimize falls-risk while increasing activity participation. These factors could include increasing public awareness about the effects of stroke and falls-risk, and ensuring access to psychological services for stroke survivors. Rehabilitation professionals should reflect on whether they perceive there to be an appropriate level of fear of falling post-stroke. They should understand that stroke survivors might not conceptualize falls-risk in this way.

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Greater fall risk in elderly women than in men is associated with increased gait variability during multitasking

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J. Am. Med. Dir. Assoc. 2016; ePub(ePub): ePub.

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DOI 10.1016/j.jamda.2016.02.009 **PMID** 27006336

Abstract

OBJECTIVE: As 90% of fractures are caused by falls, and as fractures are more common in elderly women than in elderly men, a better understanding of potential sex differences in fall rates and underlying mechanisms is needed. The purpose of this study was to determine whether women are more prone than men to falling, and to evaluate whether the risk of falling is associated with variations in gait patterns.

DESIGN, SETTING, AND PARTICIPANTS: The cohort for this prospective observational study consisted of 1390 community-dwelling men and women aged 70 years, examined in a health survey between July 2012 and November 2014.

MEASUREMENTS: Gait patterns were measured using a computerized walkway system during normal-speed, fast-speed, and dual-task trials. Triaxial accelerometers were used to collect objective data on physical activity, and self-reported fall data were collected by telephone 6 and 12 months after examination. Incident low-energy falls were defined as unexpected events in which participants came to rest on the ground.

RESULTS: During the follow-up period, 148 study participants (88 women, 60 men; $P = .01$) reported falls. After adjusting for multiple confounders, including objective measures of physical activity, socioeconomic factors, cardiovascular disease, and cognitive function, the odds ratio for falling in women was 1.49 (95% confidence interval [CI] 1.02-2.19). Variations in gait pattern were significantly (20%-40%) increased in fallers compared with nonfallers during the dual-task trial for step width, step length, stride length, step time, stance time, stride velocity, and single support time (all $P < .05$). Furthermore, women showed 15% to 35% increased variability in all of these gait parameters during the dual-task trial compared with men (all $P < .01$).

CONCLUSION: In the present cohort, 70-year-old women were at greater risk of falls compared with their male counterparts. This increased risk was associated with increased variation in gait pattern during dual-task activities, and may contribute to women's greater fracture risk compared with men.

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