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"Stay balanced" - effectiveness of evidence-based balance training for older adults transferred into a physical therapy primary care setting - a pilot study

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Abstract

PURPOSE: To evaluate the effects of the Stay Balanced program when this is transferred into a clinical setting regarding balance, gait speed, leg muscle strength, concerns about falling, and physical activity.

METHOD: Implementation pilot study with a pre-post intervention design. Fifteen older adults, 75-91 years of age, participated in a progressive balance training program with a focus on divided attention. The balance training was performed in group sessions twice a week for 10 weeks at a primary care physical therapy clinic. Training efficacy was evaluated after completion of training as well as after 3 months using the Mini-Balance Evaluation Systems Test (Mini-BESTest), 10-meter walk test, 30-s chair stand test, Fall Efficacy Scale-International (FES-I), and steps/day.

RESULTS: Significant improvements were shown at the 10-week follow up for balance, gait speed, leg muscle strength, and concerns about falling ($p < 0.008$). At the 3-month follow-up balance, leg muscle strength and concerns about falling showed persistent improvement compared to baseline ($p < 0.045$). No significant differences were found for physical activity.

CONCLUSIONS: This study confirms the results of our previous randomized controlled trials (RCTs), and suggests that the Stay Balanced program can be transferred to clinical physiotherapy practice. The program was appreciated by the participants and proved to be safe, effective, and feasible in primary care. Implication for rehabilitation The Stay Balance program can easily be transferred to clinical practice without losing the effectiveness of the intervention in older adults with balance problems. The program was appreciated by the participants and proved to be safe, effective, and feasible when executed in primary care. Stay Balance program is an individually adjusted and progressive group balance training including exercises with divided attention that can easily be transferred to tasks in daily life.

PDF Y Endnote Y

An ancient boxing exercise improves physical functions, balance, and quality of life in healthy elderly persons

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Abstract



It has been shown that traditional dances can be effective in improving physical functions in the elderly persons. Unlike other traditional dance exercises, the ancient Thai boxing exercise may be suitable for elderly persons in other ethnicities who are interested in boxing. This randomized controlled study aimed to evaluate the effects of the exercise on physical functions in elderly subjects. Healthy elderly subjects were recruited and randomly divided into two groups: the control group and the ancient Thai boxing group. The control group received education about the exercise and a home program of daily practice. The ancient Thai boxing group performed the modified ancient Thai boxing exercise for 12 weeks. There were six outcomes in this study which were recorded at baseline and at the end of study (week 12) including a six-minute walk test (6MWT), five times sit to stand test (FTSST), flexibility by trunk flexometer, time up and go test (TUGT), and Berg balance scale (BBS), as well as a test to determine quality of life (QOL). All outcomes were compared to the baseline, as well as between groups. There were 56 subjects enrolled in the study, 28 in the control group, and 28 in the ancient Thai boxing group, with mean ages of 68.6 and 65.9 years, respectively. The majority of subjects in both groups were women (96.4% and 89.3%). After 12 weeks of study, significant differences were found in terms of all seven outcomes between the two groups. For example, the 6MWT in the control group was 415.8 vs 480.3 m in the ancient boxing group. In conclusion, the 12-week ancient boxing exercise significantly improved physical functions, balance, and QOL in the elderly.

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Can treadmill-slip perturbation training reduce immediate risk of over-ground-slip induced fall among community-dwelling older adults?

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Abstract

The purpose of this study was to determine any potential falls-resistance benefits that might arise from treadmill-slip-perturbation training. One hundred sixty-six healthy community-dwelling older adults were randomly assigned to either the treadmill-slip-training group (Tt) or the treadmill-control group (Tc). Tt received 40 slip-like perturbations during treadmill walking. Tc received unperturbed treadmill walking for 30 min. Following their treadmill session, both groups were exposed to a novel slip during over-ground walking. Their responses to this novel slip were also compared to previously collected data from participants who received either over-ground-slip training (Ot) with 24 slips or over-ground walking (Oc) with no training before experiencing their novel over-ground slip. Fall rates and both proactive (pre-slip) and reactive (post-slip) stability were assessed and compared for the novel over-ground slip in groups Tt, Tc, and Oc, as well as for the 24th slip in Ot.

RESULTS showed Tt had fewer falls than Tc (9.6% versus 43.8%, $p < 0.001$) but more falls than Ot (9.6% versus 0%, $p < 0.001$). Tt also had greater proactive and reactive stability than Tc ($Tt > Tc$, $p < 0.01$), however, Tt's stabilities were lower than those of Ot ($p < 0.01$). There was no difference in

fall-rate or reactive stability between Tc and Oc, though treadmill walking did improve the proactive stability control of the latter. While the treadmill-slip-training protocol could immediately reduce the numbers of falls from a novel laboratory-reproduced slip, such improvements were far less than that from the motor adaptation to the over-ground-slip-training protocol.

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PDF Y Endnote Y

Cost-effectiveness of a therapeutic Tai Ji Quan fall prevention intervention for older adults at high risk of falling

Li F, Harmer P, Eckstrom E, Fitzgerald K, Akers L, Chou LS, Pidgeon D, Voit J, Winters-Stone K. *J. Gerontol. A Biol. Sci. Med. Sci.* 2019; ePub(ePub): ePub.

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DOI 10.1093/gerona/glz008 **PMID** 30629121

Abstract

BACKGROUND: Data on the cost-effectiveness of proven fall prevention exercise interventions are limited. We aimed to establish the cost-effectiveness of Tai Ji Quan: Moving for Better Balance (TJQMBB) compared to a conventional exercise intervention for older adults at high risk of falling. **METHODS:** We conducted a trial-based cost-effectiveness analysis involving 670 older adults who had a history of falling or impaired mobility. Participants received one of three interventions- TJQMBB, Multimodal Exercise, or Stretching Exercise (control)-each of which was implemented twice weekly for 24 weeks. The primary cost-effectiveness measure was the incremental cost per additional fall prevented, comparing TJQMBB and Multimodal Exercise to Stretching and TJQMBB to Multimodal Exercise, with a secondary measure of incremental cost per additional quality-adjusted life-year (QALY) gained. The intervention was conducted between February 2015 and January 2018, and cost-effectiveness was estimated from a health care system perspective over a 6-month time horizon.

RESULTS: The total cost to deliver the TJQMBB intervention was \$202,949 (an average of \$906 per participant); for Multimodal Exercise it was \$223,849 (\$1,004 per participant); and for Stretching it was \$210,468 (\$903 per participant). Incremental cost-effectiveness ratios showed that the Multimodal Exercise was cost-effective (\$850 per additional fall prevented; \$27,614 per additional QALY gained) relative to Stretching; however, TJQMBB was the most economically dominant strategy (i.e., having lower cost and being clinically more efficacious) compared to Multimodal and Stretching exercises with regard to cost per additional fall prevented and per additional QALY gained. TJQMBB had a 100% probability of being cost-effective, relative to Stretching, at a threshold of \$500 per each additional fall prevented and \$10,000 per additional QALY gained. Sensitivity analyses showed the robustness of the results when extreme cases, medical costs only, and missing data were considered.

CONCLUSIONS: Among community-dwelling older adults at high risk for falls, TJQMBB is a cost-effective means of reducing falls compared to conventional exercise approaches.

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Differences in prevalence and associated factors between mild and severe vertebral fractures in Japanese men and women: the third survey of the ROAD study

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DOI 10.1007/s00774-018-0981-5 **PMID** 30607619

Abstract

Vertebral fracture (VF) is a common osteoporotic fracture, while its epidemiology varies according to regions and ethnicities, little is known about it in Japan. Using whole-spine radiographs from a population-based cohort study, the Research on Osteoarthritis/Osteoporosis Against Disability study 3rd survey performed in 2012-2013, we estimated the sex- and age-specific prevalence of VF in the Japanese. Genant's semiquantitative method (SQ) was used to define VF; $SQ \geq 1$ as VF, $SQ = 1$ as mild VF, $SQ \geq 2$ as severe VF. We also revealed accurate site-specific prevalence, and associated factors with mild and severe VF. The participants were 506 men [mean age 66.3 years, standard deviation (SD):13.0] and 1038 women (mean age 65.3 years, SD: 12.6). The prevalence of VF in participants aged under 40, in their 40s, 50s, 60s, 70s, and ≥ 80 years was 17.4, 7.9, 18.5, 25.6, 26.3, and 41.5%, respectively, in men, and 2.9%, 2.4%, 7.3, 10.3, 27.1, and 53.0%, respectively, in women. Men had a significantly higher prevalence of mild VF (21.2%) than women (10.0%, $p < 0.001$); whereas, severe VF was significantly more prevalent in women (9.1%) than in men (4.7%, $p = 0.003$). VF was distributed with 2 peaks regarding site; one large peak at the thoracolumbar region, and another at the middle thoracic lesion. Low back pain and decreased walking ability were independently associated with severe VF, but not with mild VF, after adjustment for participant characteristics. Decreased walking ability was associated with multiple VFs in women, but not in men.

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Drug treatment, postural control and falls: an observational cohort study of 504 patients with acute stroke, the Fall Study of Gothenburg (FallsGOT)

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Abstract



OBJECTIVE: To identify whether, and to what extent, treatment with cardiovascular drugs and neurotropic drugs are associated with postural control and falls in patients with acute stroke.

DESIGN: Observational cohort study

SETTING: A stroke unit at a University hospital

PARTICIPANTS: A consecutive sample of 504 patients with acute stroke.

INTERVENTIONS: Not applicable.

MAIN OUTCOME MEASURES: Postural control was assessed using the modified version of the Postural Assessment Scale for Stroke Patients (SwePASS). Data including baseline characteristics, all drug treatments, and falls were derived from medical records. Univariable and multivariable logistic regression and Cox proportional hazards models were used to analyze the association of drug treatment and baseline characteristics with postural control and with falls.

RESULTS: In the multivariable logistic regression analysis, factors significantly associated with impaired postural control were treatment with neurotropic drugs (e.g.: opioids/sedatives/hypnotics/antidepressants) (Odds ratio (OR): 1.73, 95% confidence interval (CI): 1.01-2.97, $P=0.046$), treatment with opioids (OR: 9.23, 95% CI: 1.58-54.00, $P=0.014$), age (OR: 1.09, 95% CI: 1.07-1.12, $P<0.0001$), stroke severity (high NIHSS-score) (OR: 1.29, 95% CI: 1.15-1.45, $P<0.0001$) and sedentary life style (OR: 4.32, 95% CI: 1.32-14.17, $P=0.016$). No association was found between neurotropic drugs or cardiovascular drugs and falls.

CONCLUSIONS: Treatment with neurotropic drugs, particularly opioids, in the acute phase after stroke is associated with impaired postural control. Since impaired postural control is the major cause of falls in patients with acute stroke, these results suggest opioids should be used with caution in these patients. Copyright © 2018. Published by Elsevier Inc.

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Evaluating the effectiveness of the health management program for the elderly on health-related quality of life among elderly people in China: findings from the China Health and Retirement Longitudinal Study

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Int. J. Environ. Res. Public Health 2019; 16(1): e16010113.

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Abstract

The world's rapidly aging population brings serious challenges which could be addressed by changes in behaviour and policy that promote good health in older age. However, these cheap and simple interventions are not available in many countries. China is one of the fastest-ageing countries in the world. The health management programs for the elderly in basic public health services was introduced by the government to promote the health of the elderly in China and address the challenges related to ageing. However, the effectiveness of the program is uncertain. So, we use a propensity score matching difference-in-difference (PSM-DID) model to analyse the causal effect of the health management program for the elderly in basic public health services on the health-related quality of life (HRQoL) of the elderly in China. The result shows that the program has improved the

physical health of the elderly but has had no significant impact on mental health. Expanding the program to cover mental health could further benefit the HRQoL of the elderly. The program is a cost-effective approach to tackle the challenges of ageing and is a good example for other developing countries facing the same ageing challenges.

PDF Y Endnote Y

Falls prevention for people with dementia: a knowledge translation intervention

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Dementia (Sage) 2019; ePub(ePub): ePub.

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DOI 10.1177/1471301218819651 **PMID** 30621456

Abstract

PURPOSE: Strong evidence exists for falls prevention, yet uptake of strategies can be fragmented and limited. For people with dementia, adoption of strategies may be impacted by changes in memory and planning. This paper describes the findings of a knowledge translation intervention for adoption of falls prevention strategies for people with dementia.

METHODS: Twenty-five dyads (people with dementia and their caregivers) participated in this mixed method intervention. The Knowledge to Action framework guided: collation of existing evidence into a useable format; identification of individual issues; understanding context; and evaluation of change over time. Demographic details, functional status, dementia severity, activity level, self-efficacy, falls risk and readiness to change behaviour were collected at baseline, 6 and 12 months. Goal setting and action planning using a discussion tool drove implementation.

RESULTS: Falls rates were 5.4 falls per 1000 days for the 12-month period, with no significant change in functional capacity or self-efficacy. There was a non-significant trend towards reduced falls risk. Readiness to change behaviour for falls risk increased from 84% to 96% by 6 months, with most moving from contemplation into action (n = 16), or preparation into action (n = 36), with adoption of strategies high (82%).

CONCLUSION: Engagement with the person with dementia and their caregiver, through identification of their needs and preferences, and enabling choice resulted in high adoption of falls prevention strategies.

PDF Y Endnote Y

Fear of falling in sensory impaired nursing home residents

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Ageing Ment. Health 2019; ePub(ePub): ePub.

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Abstract

OBJECTIVES: Fear of falling (FOF) causes excess disability in nursing home (NH) residents and is associated with vision and hearing impairment. We explored factors associated with FOF in 225 NH

residents with vision, hearing or dual sensory impairment.

METHODS: We explored age, gender, cognition, depression, social engagement, illness burden, falls, physical function, mobility, falls self-efficacy and outcome expectancy as predictors of FOF using univariate logistic regression modeling, followed by multivariate analysis by group (visual, hearing, dual, total sample).

RESULTS: Fifty-one percent of residents had FOF. Residents who had FOF reported better cognition, lower falls self-efficacy, and higher outcome expectancy in the total sample and in most impairment groups. Falls outcome expectancy predicted FOF in the total sample and in the visual and hearing sensory impairment groups.

CONCLUSION: When addressing FOF in NH residents it is important to address sensory status along with fears about falling to promote function.

PDF Y Endnote Y

Hypertension treatment and control and risk of falls in older women

Margolis KL, Buchner DM, LaMonte MJ, Zhang Y, Di C, Rillamas-Sun E, Hunt J, Ikramuddin F, Li W, Marshall S, Rosenberg D, Stefanick ML, Wallace R, Lacroix AZ.

J. Am. Geriatr. Soc. 2019; ePub(ePub): ePub.

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(Copyright © 2019, John Wiley and Sons)

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Abstract

BACKGROUND/OBJECTIVES: A lower risk of falls is commonly cited as a reason to treat hypertension conservatively in older individuals. We examined the effect of hypertension treatment and control status and measured blood pressure (BP) level on the risk of falls in older women.

DESIGN/SETTING: Prospective cohort study.

PARTICIPANTS: A total of 5971 women (mean age 79 years; 50.4% white, 33.1% black, 16.5% Hispanic/Latina) enrolled in the Women's Health Initiative and Objective Physical Activity and Cardiovascular Health study.

MEASUREMENTS: BP was measured by trained nurses, and hypertension treatment was assessed by medication inventory. Participants mailed in monthly calendars to self-report falls for 1 year.

RESULTS: Overall, 70% of women had hypertension at baseline (53% treated and controlled, 12% treated and uncontrolled, 5% untreated). There were 2582 women (43%) who reported falls in the 1 year of surveillance. Compared with nonhypertensive women, when adjusted for fall risk factors and lower limb physical function, the incidence rate ratio (IRR) for falls was 0.82 (confidence interval [CI] = 0.74-0.92) in women with treated controlled hypertension ($p = .0008$) and 0.73 (CI = 0.62-0.87) in women with treated uncontrolled hypertension ($p = .0004$). Neither measured systolic nor diastolic BP was associated with falls in the overall cohort. In women treated with antihypertensive medication, higher diastolic BP was associated with a lower risk of falls in a model adjusted for fall risk factors (IRR = 0.993 per mm Hg; 95% CI = 0.987-1.000; $p = .04$). The only class of antihypertensive medication associated with an increased risk of falls compared with all other types of antihypertensive drugs was β -blockers.

CONCLUSION: Women in this long-term research study with treated hypertension had a lower risk of

falls compared with nonhypertensive women. Diastolic BP (but not systolic BP) is weakly associated with fall risk in women on antihypertensive treatment (<1% decrease in risk per mm Hg increase.

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PDF Y Endnote Y

Incidence and circumstances of falls among community-dwelling ambulatory stroke survivors: A prospective study

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Abstract

AIM: To elucidate the incidences and circumstances of falls and fall-related injuries, and to explore the physical characteristics of community-dwelling ambulatory stroke survivors who experienced falls.

METHODS: A total of 144 community-dwelling ambulatory survivors of hemiparetic stroke (mean age 68.0 years [SD 10.4 years]) who were undergoing rehabilitation in an adult daycare center participated in this prospective study. The mean duration from stroke onset was 5.21 years (SD 3.15 years). The occurrence of falls was collected for 1 year with a fall diary. The incidence rates of falls and fall-related injuries, and the detailed circumstances of falls were descriptively analyzed. The characteristics of fallers were explored by comparing background information, motor impairments and results of physical function tests, including the 10-m walk test, Timed Up and Go test and five-times-sit-to-stand test, between fallers and non-fallers.

RESULTS: The incidence rates of falls and fall-related fractures were 0.88 per person-year and 2.8 per 100 person-years, respectively. Falls occurred more frequently during daytime and in winter. Falls were caused most often by losing balance while walking indoors, especially on the way to the toilet. After falling, 34.1% of individuals who fell could not stand up by themselves. The time of the five-times-sit-to-stand test was significantly longer in fallers than in non-fallers ($P < 0.05$).

CONCLUSIONS: The incidence rate of falls was high among community-dwelling ambulatory survivors of hemiparetic stroke. Appropriate approaches, including mastering the skills to cope with falling, are required, especially for individuals with reduced lower limb muscle strength.

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PDF Y Endnote Y

Limb collapse or instability? Assessment on cause of falls

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DOI 10.1007/s10439-018-02195-9 **PMID** 30617642

Abstract



What causes an older adult to fall? Could the same factor lead to a recurring fall? The purposes of this study sought to address these questions by developing a causal-based assessment method for detection of the initial biomechanical cause of fall, and investigating the causation of 97 falls (out of 195 community dwelling older adults who participated in this study) based on this method. The unrecoverable limb collapse, or unrecoverable instability, along with its point of no return was defined, and the assessment method was established. Both the novel and the second slips of 97 participants who experienced laboratory induced slip related falls were assessed. The results showed that these older adults had more limb collapse (59.8%) initiated falls than instability (40.2%; and 32.0% of which from anteroposterior instability while only 8.2% from mediolateral instability) initiated falls. Interestingly, the majority (86.4%) of those 22 repeated fallers fell twice because of the same cause. These findings shed light on the vulnerability and the causation of recurring falls, which is one of the most challenging healthcare issues that an active but aging population is facing.

PDF Y Endnote Y

Longitudinal associations of falls and depressive symptoms in older adults

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Gerontologist 2019; ePub(ePub): ePub.

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(Copyright © 2019, Oxford University Press)

DOI 10.1093/geront/gny179 **PMID** 30605500

Abstract

BACKGROUND AND OBJECTIVES: Fall incidents and associated medical costs are increasing among older adults. This study examined longitudinal associations between older adults' falls status and depression at 2 time periods to further clarify bidirectional relationships.

METHODS: We used the National Health and Aging Trends Study (NHATS) Waves 5 and 6 data and included sample persons (N = 6,299) who resided in the community or residential care facilities (not nursing homes) at both waves (T1 and T2). We employed multinomial logistic regression analysis to examine the association of T2 falls status with T1 depressive symptoms, and negative binomial regression and logistic regression analyses to examine the association of T2 depressive symptoms with stability/change in T1-T2 falls status.

RESULTS: Over the study period, 46% of older adults (18 million Medicare beneficiaries) who lived in the community or residential care facilities reported a fall. T1 depressive symptoms were significantly associated with greater odds of T2 multiple falls, and increasing falls or continuing incidents of multiple falls between T1 and T2 were significantly associated with higher depressive symptoms and probable major depression at T2.

DISCUSSION AND IMPLICATIONS: The significant bidirectional relationships between T1 depression and T2 multiple falls point to the importance of incorporating depression treatment in fall prevention programs for older adults at high risk of increasing/multiple falls.

PDF Y Endnote Y

Medical, sensorimotor and cognitive factors associated with gait variability: a longitudinal population-based study

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Front. Aging Neurosci. 2018; 10: e419.

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(Copyright © 2018, Frontiers Research Foundation)

DOI 10.3389/fnagi.2018.00419 **PMID** 30618725 **PMCID** PMC6305368

Abstract

Background: Greater gait variability increases the risk of falls. However, little is known about changes in gait variability in older age. The aims of this study were to examine: (1) change in gait variability across time and (2) factors that predict overall mean gait variability and its change over time.

Methods: Participants ($n = 410$; mean age 72 years) were assessed at baseline and during follow up visits at an average of 30 and 54 months. Step time, step length, step width and double support time (DST) were measured using a GAITRite walkway. Variability was calculated as the standard deviation of all steps for each individual. Covariates included demographic, medical, sensorimotor and cognitive factors. Mixed models were used to determine (1) change in gait variability over time (2) factors that predicted or modified any change.

Results: Over 4.6 years the presence of cardiovascular disease at baseline increased the rate of change for step length variability ($p = 0.04$ for interaction), lower education increased the rate of change for DST variability ($p = 0.04$) and weaker quadriceps strength increased the rate of change for step width variability ($p = 0.01$). Greater postural sway predicted greater variability on average across the three phases ($p < 0.05$). Arthritis, a higher body mass index (BMI), slower processing speed and lower quadriceps strength predicted greater mean step time variability ($p < 0.05$). Arthritis and a higher BMI predicted greater mean step length variability, while slower processing speed and BMI predicted greater mean DST variability ($p < 0.05$).

Conclusion: Over a nearly 5-year period, variability in different gait measures do not show uniform changes over time. Furthermore, each variability measure appears to be modified and predicted by different factors. These results provide information on potential targets for future trials to maintain mobility and independence in older age.

PDF Y Endnote Y

Medication use in older patients and age-blind approach: narrative literature review (insufficient evidence on the efficacy and safety of drugs in older age, frequent use of PIMs and polypharmacy, and underuse of highly beneficial nonpharmacological strategies)

Fialova D, Laffon B, Marinković V, Tasić L, Doró P, Sóos G, Mota J, Dogan S, Brkić J, Teixeira JP, Valdiglesias V, Costa S.

Eur. J. Clin. Pharmacol. 2019; ePub(ePub): ePub.

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Abstract



INTRODUCTION: The importance of rational drug therapy is increasing with the aging of the population. Since one of the main reasons for inappropriate drug prescribing is also the "age-blind" approach, which results in ageist practices, this narrative literature review focuses on the description of the main barriers related to insufficient individualization of drug regimens associated with such age-blind approaches.

METHODOLOGY: A narrative literature review using the PubMed, WoS, Embase, and Scopus databases was conducted by the EU COST Action IS1402. Experts in different scientific fields from six countries (the Czech Republic, Spain, Portugal, Hungary, Serbia, and Turkey) worked in four specific areas: (1) underrepresentation of older adults in clinical trials and clinical and ethical consequences; (2) insufficient consideration of age-related changes and geriatric frailty in the evaluation of the therapeutic value of drugs; (3) frequent prescribing of potentially inappropriate medications (PIMs); and (4) frequent underuse of highly beneficial nonpharmacological strategies (e.g., exercise).

RESULTS: Older patients are underrepresented in clinical trials. Therefore, rigorous observational geriatric research is needed in order to obtain evidence on the real efficacy and safety of frequently used drugs, and e.g. developed geriatric scales and frailty indexes for claims databases should help to stimulate such research. The use of PIMs, unfortunately, is still highly prevalent in Europe: 22.6% in community-dwelling older patients and 49.0% in institutionalized older adults. Specific tests to detect the majority of age-related pharmacological changes are usually not available in everyday clinical practice, which limits the estimation of drug risks and possibilities to individualize drug therapy in geriatric patients before drug prescription. Moreover, the role of some nonpharmacological strategies is highly underestimated in older adults in contrast to frequent use of polypharmacy. Among nonpharmacological strategies, particularly physical exercise was highly effective in reducing functional decline, frailty, and the risk of falls in the majority of clinical studies.

CONCLUSION: Several regulatory and clinical barriers contribute to insufficient knowledge on the therapeutic value of drugs in older patients, age-blind approach, and inappropriate prescribing. New clinical and observational research is needed, including data on comprehensive geriatric assessment and frailty, to document the real efficacy and safety of frequently used medications.

PDF Y Endnote Y

Optimising costs in reducing rate of falls in older people with the improvement of balance by means of vestibular rehabilitation (ReFOVeRe study): a randomized controlled trial comparing computerised dynamic posturography vs mobile vibrotactile posturography system

Soto-Varela A, Gayoso-Diz P, Faraldo-García A, Rossi-Izquierdo M, Vaamonde-Sánchez-Andrade I, Del-Río-Valeiras M, Lirola-Delgado A, Santos-Pérez S.

BMC Geriatr. 2019; 19(1): e1.

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DOI 10.1186/s12877-018-1019-5 **PMID** 30606112

Abstract

BACKGROUND: Accidental falls, especially for the elderly, are a major health issue. Balance disorders are one of their main causes. Vestibular rehabilitation (VR) has proven to be useful in improving

balance of elderly patients with instability. Its major handicap is probably its cost, which has prevented its generalisation. So, we have designed a clinical trial with posturographic VR, to assess the optimum number of sessions necessary for a substantial improvement and to compare computerised dynamic posturography (CDP) (visual feedback) and mobile posturography (vibrotactile feedback).

METHODS: Design: randomized controlled trial. It is an experimental study, single-center, open, randomized (balanced blocks of patients) in four branches in parallel, in 220 elderly patients with high risk of falls; follow-up period: twelve months.

SETTING: Department of Otorhinolaryngology of a tertiary referral hospital.

PARTICIPANTS: people over 65 years, fulfilling two or more of the following requirements: a) at least one fall in the last twelve months. b) take at least 16 s or require some support in perform the "timed up and go" test. c) a percentage of average balance in the sensory organization test (SOT) of the CDP < 68%. d) at least one fall in any of the conditions in SOT-CDP. e) a score in Vertiguard's gSBDT > 60%.

INTERVENTION: Four different protocols of vestibular rehabilitation (randomization of the patients).

MAIN OUTCOME MEASURE: The percentage of average balance in the SOT-CDP. Secondary measures: time and supports in the "timed up and go" test, scores of the CDP and Vertiguard, and rate of falls.

DISCUSSION: Posturographic VR has been proven to be useful for improving balance and reducing the number of falls among the aged. However, its elevated cost has limited its use. It is possible to implement two strategies that improve the cost-benefit of posturography. The first involves optimising the number of rehabilitation sessions; the second is based on the use of cheaper posturography systems. **TRIAL REGISTRATION:** ClinicalTrials.gov identifier: NCT03034655. Registered on 25 January 2017.

PDF Y Endnote Y

Podiatry interventions to prevent falls in older people: a systematic review and meta-analysis

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Age Ageing 2019; ePub(ePub): ePub.

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(Copyright © 2019, Oxford University Press)

DOI 10.1093/ageing/afy189 **PMID** 30615052

Abstract

BACKGROUND: foot problems are independent risk factors for falls in older people. Podiatrists diagnose and treat a wide range of problems affecting the feet, ankles and lower limbs. However, the effectiveness of podiatry interventions to prevent falls in older people is unknown. This systematic review examined podiatry interventions for falls prevention delivered in the community and in care homes.

METHODS: systematic review and meta-analysis. We searched multiple electronic databases with no language restrictions. Randomised or quasi-randomised-controlled trials documenting podiatry interventions in older people (aged 60+) were included. Two reviewers independently applied

selection criteria and assessed methodological quality using the Cochrane Risk of Bias tool. TiDieR guidelines guided data extraction and where suitable statistical summary data were available, we combined the selected outcome data in pooled meta-analyses.

RESULTS: from 35,857 titles and 5,201 screened abstracts, nine studies involving 6,502 participants (range 40-3,727) met the inclusion criteria. Interventions were single component podiatry (two studies), multifaceted podiatry (three studies), or multifactorial involving other components and referral to podiatry component (four studies). Seven studies were conducted in the community and two in care homes. Quality assessment showed overall low risk for selection bias, but unclear or high risk of detection bias in 4/9 studies. Combining falls rate data showed significant effects for multifaceted podiatry interventions compared to usual care (falls rate ratio 0.77 [95% CI 0.61, 0.99]); and multifactorial interventions including podiatry (falls rate ratio: 0.73 [95% CI 0.54, 0.98]). Single component podiatry interventions demonstrated no significant effects on falls rate.

CONCLUSIONS: multifaceted podiatry interventions and multifactorial interventions involving referral to podiatry produce significant reductions in falls rate. The effect of multi-component podiatry interventions and of podiatry within multifactorial interventions in care homes is unknown and requires further trial data. PROSPERO REGISTRATION NUMBER: CRD42017068300.

PDF Y Endnote Y

Preventing falls among older fallers: study protocol for a two-phase pilot study of the multicomponent LIVE LiFE program

Granbom M, Clemson L, Roberts L, Hladek MD, Okoye SM, Liu M, Felix C, Roth DL, Gitlin LN, Szanton S.

Trials 2019; 20(1): 2.

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DOI 10.1186/s13063-018-3114-5 **PMID** 30606239

Abstract

BACKGROUND: Falls reflect sentinel events in older adults, with significant negative consequences. Although fall risk factors have been identified as intrinsic (e.g., muscle weakness, balance problems) and extrinsic (e.g., home hazards), most prevention programs target only intrinsic factors. We present the rationale and design of a home-based multicomponent fall prevention program-the LIVE LiFE program-for community-living older adults. The program adapts and expands the successful Lifestyle Intervention Functional Exercise (LiFE) program by adding home safety, vision contrast screening, and medication review. The specific aims of the study are to (1) adapt the LiFE program to a US context and expand it into a multicomponent program (LIVE LiFE) addressing intrinsic and extrinsic fall risks, (2) examine feasibility and acceptability, and (3) estimate program impact on multiple outcome measures to prepare for an efficacy trial.

METHODS: The study involves two phases: an open-label pilot, followed by a two-group, single-blinded randomized pilot trial. Eligible participants are community-living adults 70+ years reporting at least one injurious fall or two non-injurious falls in the previous year. Participants are randomized in a 2:1 ratio to the program group (LIVE LiFE, n = 25) or the control group (written fall risk assessment, n = 12). The open-label pilot participants (n = 3) receive the program without

randomization and are assessed based on their experience, resulting in a stronger emphasis on the participant's personal goals being integrated into LIVE LIFE. Fall risk and balance outcomes are assessed by the Timed Up and Go and the 4-Stage Balance Test at 16 weeks. Additional outcomes are incidence of falls and near falls, falls efficacy, fear of falling, number of home hazards, and medications assessed at 16 weeks. Incidence of falls and near falls, program adherence, and satisfaction are assessed again at 32 weeks.

DISCUSSION: By expanding and adapting the evidence-based LiFE program, our study will help us understand the feasibility of conducting a multicomponent program and estimate its impact on multiple outcome measures. This will support moving forward with an efficacy trial of the LIVE LIFE program for older adults who are at risk of falling. **TRIAL REGISTRATION:** ClinicalTrials.gov, NCT03351413. Registered on 22 November 2017.

PDF Y Endnote Y

Risk factors for falls in adults with knee osteoarthritis: a systematic review

Manlapaz DG, Sole G, Jayakaran P, Chapple CM.

PM R 2019; ePub(ePub): ePub.

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DOI 10.1002/pmrj.12066 **PMID** 30609282

Abstract

BACKGROUND: Falls are often reported by individuals with knee osteoarthritis (OA). Despite the increasing number of falls, the contributors underlying the occurrence of falls in individuals with knee OA are poorly understood.

OBJECTIVE: To examine the evidence of risk factors for falls in adults with knee OA.

DESIGN: Systematic Review

METHODS: A systematic literature search was performed in nine electronic databases from inception to July 2016. Two reviewers screened articles using set inclusion and exclusion criteria. Observational study designs that included participants with knee OA and history of falls were considered. Results reported as odds ratios, relative risks, prevalence ratios or hazard ratios were extracted to identify the potential risk factors for falls. Included articles were assessed for methodological quality and level of evidence.

RESULTS: The electronic data search yielded 4382 studies related to falls and knee OA. A total of 11 studies were included in the review. The risk factors for falls in individuals with knee OA included impaired balance, muscle weakness, presence of comorbidities, and increasing number of symptomatic joint. Presence of knee pain was also identified as risk factors for falls; however, the strength of evidence was conflicting due to the inconsistency of the findings. Limited evidence was found for knee instability, impaired proprioception and use of walking aids.

CONCLUSION: This review provides an evidence of risk factors for falls in individuals with knee OA. Although moderate and limited evidence was found, identification of this risk factors can be valuable information both for clinicians and fall prevention program developers. Further studies are warranted to examine modifiable risk factors for falls in a knee OA population. This article is

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Study protocol of a randomised controlled trial to examine the impact of a complex intervention in pre-frail older adults

Teh R, Kerse N, Waters DL, Hale L, Pillai A, Leilua E, Tay E, Rolleston A, Edlin R, Maxted E, Heppenstall C, Connolly MJ.

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DOI 10.1007/s40520-018-1106-7 **PMID** 30604208

Abstract

BACKGROUND: Frailty is a multidimensional geriatric syndrome associated with functional loss. The Senior Chef (SC, nutrition) and SAYGO (strength and balance exercise) programmes are well accepted among older adults but the impact of each, or a combination of both, on the frailty syndrome in pre-frail older adults is unknown. **AIMS:** To determine the effectiveness and cost-effectiveness of a complex intervention consisting of the SC and/or SAYGO programmes to prevent progression of frailty in pre-frail older adults.

METHODS: A multi-centre randomised controlled assessor-blinded study. The four intervention groups are SC, an 8-week nutrition education and cooking class; SAYGO, a 10-week strength and balance exercise class; SC plus SAYGO, and a social group (Control). Community-dwelling adults aged 75+ (60 + Māori and Pasifika) in New Zealand are recruited through health providers. Participants are not terminally ill or with advanced dementia, and have a score of 1 or 2 on the FRAIL questionnaire. Baseline assessments are completed using standardised questionnaires prior to randomisation. Four follow-up assessments are completed: immediately after intervention, 6, 12 and 24 months post-intervention. The primary outcome is frailty score, secondary outcomes are falls, physical function, quality of life, food intake, physical activity, and sustainability of the strategy. Study outcomes will be analysed using intention-to-treat approach. Cost analyses will be completed to determine if interventions are cost effective relative to the control group.

DISCUSSION: This trial is designed to be a real world rigorous assessment of whether the two intervention strategies can prevent progression of frailty in older people. If successful, this will generate valuable information about effectiveness of this nutrition and exercise strategy, and provide insights for their implementation. **TRIAL REGISTRATION:** Australian and New Zealand Clinical Trials Registry number-ACTRN12614000827639.

PDF Y Endnote Y

Trends in geospatial drivers of fall-related hospitalizations and asset mapping of fall prevention interventions for vulnerable older adults

Towne SD, Smith ML, Xu M, Lee S, Sharma S, Smith D, Li Y, Fucci Y, Ory MG.

J. Aging Health 2019; ePub(ePub): ePub.

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(Copyright © 2019, Sage Publications)

DOI 10.1177/0898264318822381 **PMID**30614341



Abstract

OBJECTIVE: Given that one in four older adults suffer potentially preventable falls annually, we aimed to identify areas with (a) delivery gaps of evidence-based programs (EBPs) targeting fall prevention among older adults, namely A Matter of Balance (AMOB), and (b) high rates of fall-related hospitalizations-hotspots.

METHOD: Analyses included multiple geospatially linked datasets.

RESULTS: EBPs were delivered ≥ 1 time in 84 counties in 2012 and 90 counties in 2014. Factors associated with EPB delivery gaps (absence; $p < .05$) included high-density older adult areas, non-fall-related hospitalization hotspots, lower population density, nonmetropolitan areas, high-density Hispanic adult areas, and areas with limited access to home health care agencies. Hotspots for fall-related hospitalization numbered 64 in 2012 and 62 in 2014. Factors associated with hotspots included low-density older adult areas, having AMOB delivered ≥ 1 time annually, high population density, and high-density Hispanic adult areas.

DISCUSSION: In resource-finite settings (e.g., the aging services sector), identifying high priority areas allows for precise allocation of limited resources.

PDF Y Endnote Y

Dynamic balance and instrumented gait variables are independent predictors of falls following stroke

Bower K, Thilarajah S, Pua YH, Williams G, Tan D, Mentiplay B, Denehy L, Clark R.

J. Neuroengineering Rehabil. 2019; 16(1): e3.

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(Copyright © 2019, Holtzbrinck Springer Nature Publishing Group)

DOI 10.1186/s12984-018-0478-4 **PMID** 30612584

Abstract

BACKGROUND: Falls are common following stroke and are frequently related to deficits in balance and mobility. This study aimed to investigate the predictive strength of gait and balance variables for evaluating post-stroke falls risk over 12 months following rehabilitation discharge.

METHODS: A prospective cohort study was undertaken in inpatient rehabilitation centres based in Australia and Singapore. A consecutive sample of 81 individuals (mean age 63 years; median 24 days post stroke) were assessed within one week prior to discharge. In addition to comfortable gait speed over six metres (6mWT), a depth-sensing camera (Kinect) was used to obtain fast-paced gait speed, stride length, cadence, step width, step length asymmetry, gait speed variability, and mediolateral and vertical pelvic displacement. Balance variables were the step test, timed up and go (TUG), dual-task TUG, and Wii Balance Board-derived centre of pressure velocity during static standing. Falls data were collected using monthly calendars.

RESULTS: Over 12 months, 28% of individuals fell at least once. The faller group had increased TUG time and reduced stride length, gait speed variability, mediolateral and vertical pelvic displacement, and step test scores ($P < 0.001-0.048$). Significant predictors, when adjusted for country, prior falls and assistance (i.e., physical assistance and/or gait aid use) were stride length, step length asymmetry, mediolateral pelvic displacement, step test and TUG scores ($P < 0.040$; IQR-odds ratio(OR) = 1.37-7.85). With comfortable gait speed as an additional covariate, to determine the

additive benefit over standard clinical assessment, only mediolateral pelvic displacement, TUG and step test scores remained significant ($P = 0.001-0.018$; IQR-OR = 5.28-10.29).

CONCLUSIONS: Reduced displacement of the pelvis in the mediolateral direction during walking was the strongest predictor of post-stroke falls compared with other gait variables. Dynamic balance measures, such as the TUG and step test, may better predict falls than gait speed or static balance measures.

PDF Y Endnote Y

Effectiveness of backward walking training on balance performance: a systematic review and meta-analysis

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Gait Posture 2019; 68: 466-475.

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(Copyright © 2019, Elsevier Publishing)

DOI 10.1016/j.gaitpost.2019.01.002 **PMID** 30616175

Abstract

BACKGROUND: Backward walking (BW) training is thought to impact balance performance through improving motor system proprioception and gait characteristic, but relevant evidence remains sparse and inconclusive.

OBJECTIVE: This study systematically reviewed and quantified the scientific evidence regarding the effectiveness of BW training on balance performance.

METHODS: Keyword and reference search on BW training interventions was conducted in six electronic databases (PubMed, Web of science, SPORTDiscus, CINAHL, Cochrane Library, and CNKI) for peer-reviewed articles published till November 2017. A standardized form was used to extract data from each selected article that met the pre-specified eligibility criteria. Meta-analysis was conducted to estimate the pooled effects of BW training on balance performance measures.

RESULTS: Eleven studies (nine randomized controlled trials and two pre-post studies) met the eligibility criteria and were included in the review. All studies reported some beneficial effects of BW training on balance performance. Compared to control, BW training was associated with a reduction in overall stability index score by 0.99 (95% CI = 0.37, 1.61; $I^2 = 0.0\%$; fixed-effect model), medial-lateral stability index score by 0.95 (95% CI = 0.34, 1.57; $I^2 = 0.0\%$; fixed-effect model), and anterior-posterior stability index score by 0.99 (95% CI = 0.37, 1.61; $I^2 = 0.0\%$; fixed-effect model). Meanwhile, BW training was associated with an increase in open-eyes single leg standing duration by 0.91 s (95% CI = 0.29, 1.53; $I^2 = 75.9\%$; random-effect model) in comparison to control.

CONCLUSIONS: BW training could serve as a potentially useful tool to improve balance performance among those with a high risk of fall. However, current evidence remains preliminary due to the small cohort of studies and possible learning effect in pre-post studies. Future work with larger scale and randomized experimental design is warranted to evaluate the effectiveness of BW training on balance performance across diverse population and disease subgroups, and elucidate the underlying biomechanical and neurological pathways.

PDF Y Endnote Y

Factors associated with falls in Japanese polio survivors

Imoto D, Sawada K, Horii M, Hayashi K, Yokota M, Toda F, Saitoh E, Mikami Y, Kubo T.

Disabil. Rehabil. 2019; ePub(ePub): ePub.

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(Copyright © 2019, Informa - Taylor and Francis Group)

DOI 10.1080/09638288.2018.1537381 **PMID** 30616444

Abstract

PURPOSE: To identify factors associated with falls in Japanese polio survivors and assess the extent of their impact.

MATERIALS AND METHODS: Subjects were 128 polio survivors. Fall history and fear of falling, lower limb muscle strength, gait ability (determined by walking speed and number of steps per day), post-polio syndrome incidence, and orthosis or walking aid use were assessed, and factors associated with falls were identified using logistic regression analysis.

RESULTS: The fall rate was 64%. Fallers (subjects with one or more falls in the preceding 12 months) had low lower limb muscle strength, slow walking speed, high total scores on the Fall Efficacy Scale-International, which assesses fear of falling, and a high orthosis use rate. Knee extension muscle strength on the weaker side was identified as a main factor influencing risk of falls (odds ratio: 0.72, 95% confidence interval: 0.56-0.96). Receiver operating characteristic curve analysis gave a cutoff value for knee extension muscle strength on the weaker side of 0.42 N/kg or lower.

CONCLUSION: Low knee extension muscle strength on the weaker side was associated with falls, but predictive ability using a single internal factor might be poor. It appears that a comprehensive examination, including other factors, is required. Implications for rehabilitation As polio survivors age, their risk of falling increases. To identify polio survivors who are at risk of falls, it is important to determine the factors associated with falls and their influence on fall risk. The results of this study showed that reduced knee extension muscle strength on the weaker side was a risk factor for falls in polio survivors. To precisely predict the risk of falls in polio survivors, a comprehensive evaluation of both internal and external factors is required.

PDF Y Endnote Y

Frailty as a predictor of falls in HIV-infected and uninfected women

Sharma A, Hoover DR, Shi Q, Gustafson DR, Plankey MW, Tien PC, Weber KM, Yin MT.

Antivir. Ther. 2019; ePub(ePub): ePub.

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(Copyright © 2019, International Society for Antiviral Research, Publisher International Medical Press)

DOI 10.3851/IMP3286 **PMID** 30604692

Abstract

BACKGROUND: Frailty and falls occur commonly and prematurely in HIV-infected populations.

Whether frailty in middle-age predicts future falls among HIV-infected women is unknown.

METHODS: We evaluated associations of frailty with single and recurrent falls 10 years later among 729 HIV-infected and 326 uninfected women in the Women's Interagency HIV Study (WIHS) with

frailty measured in 2005 and self-reported falls in 2014-2016. Frailty was defined as ≥ 3 of 5 Fried Frailty Index components: slow gait, reduced grip strength, exhaustion, unintentional weight loss, and low physical activity. Stepwise logistic regression models determined odds of single (vs. 0) or recurrent falls (≥ 2 vs. 0) during the two-year period; separate models evaluated frailty components. RESULTS: HIV-infected women were older (median 42 vs. 39 yr, $p < 0.0001$) and more often frail (14% vs. 9%, $p = 0.04$) than uninfected women. Over two years, 40% of HIV-infected vs. 39% of uninfected women reported a fall [single fall in 15% HIV+ vs. 18% HIV- women; recurrent falls in 25% HIV+ vs. 20% HIV- women (overall $p = 0.20$)]. In multivariate models, frailty independently predicted recurrent falls [adjusted odds ratio (aOR) 1.84, 95% CI: 1.13-2.97, $p = 0.01$], but not single fall. Among frailty components, unintentional weight loss independently predicted single fall (aOR 2.31, 95% CI: 1.28-4.17, $p = 0.005$); unintentional weight loss (aOR 2.26, 95% CI: 1.32-3.86, $p = 0.003$) and exhaustion (aOR 1.66, 95% CI: 1.10- 2.50, $p = 0.02$) independently predicted recurrent falls. CONCLUSIONS: Early frailty measurement among middle-aged women with or at-risk for HIV may be a useful tool to assess future fall risk.

PDF Y Endnote Y

Increasing referrals to a community paramedicine fall prevention program through implementation of a daily management system

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J. Trauma Nurs. 2019; 26(1): 50-58.

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(Copyright © 2019, Society of Trauma Nurses)

DOI 10.1097/JTN.0000000000000415 **PMID** 30624382

Abstract

This quality improvement project was undertaken to improve trauma service referral compliance to an existing home-based elderly fall prevention program through the implementation of a daily management system (DMS). Operational excellence, a hospital-wide initiative, provided the foundation for improvement efforts. This initiative went through a series of 5 plan, do, study, and act (PDSA) cycles and demonstrated significant improvement in referrals from 0% to 100%. Compliance with referrals after the retirement of the key performance indicator remained high at 95.5%.

RESULTS from this project provided support for the framework set forth in DMS and PDSA improvement methodologies as a feasible option to implement quality and process improvement projects. Further study in this area is warranted.

PDF Y Endnote Y

Investigation of the association between the acute ankle injury caused by fall from own height and body mass index

Acosta-Olivo C, Tamez-Mata Y, Elizondo-Rodriguez J, Rodriguez-Torres R, Diaz-Valadez A, Peña-Martinez V.

J. Foot Ankle Surg. 2019; ePub(ePub): ePub.

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DOI 10.1053/j.jfas.2018.08.037 **PMID** 30612873

Abstract

In the emergency settings, increased body mass index (BMI) is a risk factor for traumatic orthopedic injuries. The aim of this study was to assess the association between the acute ankle injuries (sprain or fracture) and BMI. This prospective cohort study included patients ≥ 18 years of age with acute traumatic ankle injuries (either sprain or fracture) caused by fall from own height when walking at ground level and who received primary treatment at the emergency room of a university hospital between May and October 2017. Of the 107 patients who met the inclusion criteria, 58 (54%) patients experienced acute ankle sprains and 49 (46%) experienced acute ankle fractures. No significant association was detected between fracture severity (as assessed by the Danis-Weber classification) and BMI ($p = .860$). The most frequent ankle injury in patients with normal BMI was ankle sprain. In our cohort, obesity was not the primary determinant of the severity of ankle injury. However, age was a key determinant of the type of injury; patients >30 years of age were 20% more likely to suffer an ankle fracture.

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Traumatic brain injury in patients screened for blood alcohol concentration based on the mechanism of injury

El-Menyar A, Consunji R, Asim M, Mekkodathil A, Latifi R, Smith G, Parchani A, Al-Thani H.

Brain Inj. 2019; ePub(ePub): ePub.

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(Copyright © 2019, Informa - Taylor and Francis Group)

DOI 10.1080/02699052.2018.1553065 **PMID** 30612471

Abstract

INTRODUCTION: We aimed to investigate in-hospital outcomes of traumatic brain injury (TBI) based on blood alcohol concentration (BAC) and mechanism of injury (MOI).

METHODS: We conducted a retrospective study for patients admitted with TBI between 2010 and 2014. Based on BAC, patients were classified into [negative (-BAC) and positive (+BAC) group]. Data were analyzed and compared according to the MOI.

RESULTS: Out of 8141 trauma patients, 946 (11.6%) were diagnosed with TBI and 681 (72%) were subjected to BAC screening. One out of seven TBI was related to alcohol consumption with a mean age of 32 years. Gender, age, and Injury Severity Scores (ISS) were comparable in the two groups. However, the proportion of patients with polytrauma was significantly higher in -BAC than +BAC group regardless of the MOI except for the fall-related TBI. The median BAC was higher in fall-related followed by pedestrians and MVC victims [55 mmol/L (10-101), 49(9-71), and 31(1-69), respectively], $p = 0.001$. Overall hospital mortality was comparable between the two groups except for the pedestrian-related TBIs in which (+BAC) had significantly fewer mortality.

CONCLUSIONS: Screening for BAC among patients with TBI increases substantially regardless of the

MOI. The high BAC value in Fall-related TBI needs more attention to set appropriate preventive measures.

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