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Our Mission: Helping to prepare Iowa's health practitioners to care for our growing population of elders. *E-NEWS* is one of our methods of teaching through technology.

Each month, *E-NEWS* delivers abstracts from current multidisciplinary healthcare journal articles related to a specific geriatric topic. This month's *E-NEWS* focuses on DEMENTIA, MOBILITY, AND DISABILITY.

DEMENTIA, MOBILITY, AND DISABILITY

In this issue of the *E-NEWS*, you will find abstracts for:

- A review that seeks to determine the effects of multi-domain interventions in (pre)frail older adults on frailty, functional, and cognitive status.
 - A study that examines the effects of mobility and cognition on maintenance of independence among women in late life.
 - A study that explores cognitive function and falling among older adults with mild cognitive impairment and slow gait.
 - An article that discusses cognitive-frailty in the context of results from the Gait and Brain Study.
 - A study that addresses the role of cognition in falls, with potential implications for managing and preventing falls in older adults.
 - An article that presents an overview of current perspectives and issues around frailty screening in populations and individuals.
 - A study that investigates frailty assessment in older adults using upper-extremity function.
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- Dedeyne L, Deschodt M, Verschueren S, Tournoy J, Gielen E. Effects of multi-domain interventions in (pre)frail elderly on frailty, functional, and cognitive status: a systematic review. *Clin Interv Aging*. 2017 May 24;12:873-896.

BACKGROUND: Frailty is an aging syndrome caused by exceeding a threshold of decline across multiple organ systems leading to a decreased resistance to stressors. Treatment for frailty focuses on multi-domain interventions to target multiple affected functions in order to decrease the adverse outcomes of frailty. No systematic reviews on the effectiveness of multi-domain interventions exist in a well-defined frail population. OBJECTIVES: This systematic review aimed to determine the effect of multi-domain compared to mono-domain interventions on frailty status and score, cognition, muscle mass, strength and power, functional and social outcomes in (pre)frail elderly (≥ 65 years). It included interventions targeting two or more domains (physical exercise, nutritional, pharmacological, psychological, or social interventions) in participants defined as (pre)frail by an operationalized frailty definition. METHODS: The databases PubMed, EMBASE, CINAHL, PEDro, CENTRAL, and the Cochrane Central register of Controlled Trials were searched from inception until September 14, 2016. Additional articles were searched by citation search, author search, and reference lists of relevant articles. The protocol for this review was registered on PROSPERO (CRD42016032905). RESULTS: Twelve studies were included, reporting a large diversity of interventions in terms of content, duration, and follow-up period. Overall, multi-domain interventions tended to be more effective than mono-domain interventions on frailty status or score, muscle mass and strength, and physical functioning. Results were inconclusive for cognitive, functional, and social outcomes. Physical exercise seems to play an essential role in the multi-domain intervention, whereby additional interventions can lead to further improvement (e.g., nutritional intervention). CONCLUSION: Evidence of beneficial effects of multi-domain compared to mono-domain interventions is limited but increasing. Additional studies are needed, focusing on a well-defined frail population and with specific attention to the design and the individual contribution of mono-domain interventions. This will contribute to the development of more effective interventions for frail elderly.

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- Diem SJ, Li-Yung L, Langsetmo L, Taylor B, Cawthon PM, Cauley JA, Ensrud KE; Study of Osteoporotic Fractures (SOF). Effects of Mobility and Cognition on Maintenance of Independence and Survival Among Women in Late Life. *J Gerontol A Biol Sci Med Sci*. 2017 Nov 1. doi: 10.1093/gerona/glx209. [Epub ahead of print]

Background: We examined the effects of mobility and cognition on maintenance of independence among women in late life. Methods: Prospective 5-year study of 1,010 independent community-dwelling women (mean age 88.0 years) participating in the Study of Osteoporotic Fractures Year 20 examination (2006-2008). Mobility, ascertained by walk speed, was categorized as good (≥ 0.9 m/s), intermediate (>0.6 m/s to <0.9 m/s), or poor (≤ 0.6 m/s). Cognitive status, adjudicated based on neuropsychological tests, was classified as normal or impaired (mild cognitive impairment or dementia). Loss of independence was defined as being unable to perform ≥ 2 activities of daily living or nursing home residence at 5-year follow-up. Possible outcomes were alive and independent, alive and dependent, and deceased. Results: 423 (41.9%) participants were independent at follow-up, while 208 (20.6%) were alive but dependent; 379 (37.5%) had died. Compared to women with good mobility, those with slow walk speed were less likely to be independent (Risk ratio, [RR] 0.40, 95% CI 0.29-0.52), after controlling for cognition and other risk factors. Similarly, those with impaired cognition were less likely to be independent, after controlling for walk speed and other risk factors (RR 0.60, 95% CI 0.49-0.71). Women with slow walk speed and impaired cognition were 6-fold less likely to be independent at follow-up compared to those with good walk speed and normal cognition (RR 0.15, 95% CI 0.08-0.23). Conclusions: Both mobility and cognition are associated with maintenance of independence among the oldest old of women even after accounting for each other and other conventional predictors.

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- Doi T, Shimada H, Park H, Makizako H, Tsutsumimoto K, Uemura K, Nakakubo S, Hotta R, Suzuki T. Cognitive function and falling among older adults with mild cognitive impairment and slow gait. *Geriatr Gerontol Int*. 2015 Aug;15(8):1073-8.

AIM: To examine the association of the combination of slow gait and mild cognitive impairment (MCI) with cognitive function and falling in community-dwelling older people. METHODS: Participants were selected from the Obu Study of Health Promotion for the Elderly ($n = 3400$), and underwent gait examination and a battery of neuropsychological examinations, including the Mini-Mental State Examination and the National Center for

Geriatrics and Gerontology Functional Assessment Tool (tablet version of Trail Making Test Part A and B, Symbol Digit Substitution Task, Figure selection task, Word memory and Story memory), and were interviewed with a series of questionnaires including medical history, physical activity, geriatric depression scale and fall history. RESULTS: Participants were classified into control (n = 2281), slow gait speed (SG; n = 278), MCI (n = 673) and MCI with SG (MCI+SG; n = 168) groups. All cognitive functions were significantly affected by the group factor, even adjusting for participant characteristics as covariates (P < 0.001). Post-hoc analysis showed that the control group had better performance than the other groups, and the MCI+SG group had worse performance than the other groups in all cognitive functions (all P < 0.05). In multiple logistic regression analysis, SG and MCI were independently associated with falling (all P < 0.05), and MCI+SG had a higher odds ratio for falling (adjusted OR 1.99, 95% CI 1.08-3.65). CONCLUSIONS: Our findings support the idea that slow gait and MCI were related, and concurrently associated with falling. Motor function among MCI subjects should be focused on to assess profile risks. © Japan Geriatrics Society.

- [Montero-Odasso MM, Barnes B, Speechley M, Muir Hunter SW, Doherty TJ, Duque G, Gopaul K, Sposato LA, Casas-Herrero A, Borrie MJ, Camicioli R, Wells JL. Disentangling Cognitive-Frailty: Results From the Gait and Brain Study. *J Gerontol A Biol Sci Med Sci.* 2016 Nov;71\(11\):1476-1482.](#)

BACKGROUND: Cognitive-frailty, defined as the presence of both frailty and cognitive impairment, is proposed as a distinctive entity that predicts dementia. However, it remains controversial whether frailty alone, cognitive-frailty, or the combination of cognitive impairment and slow gait pose different risks of incident dementia. METHODS: Two hundred and fifty-two older adults free of dementia at baseline (mean age 76.6±8.6 years) were followed up to 5 years with bi-annual visits including medical, cognitive, and gait assessments. Incident all-cause of dementia and cognitive decline were the main outcomes. Frailty was defined using validated phenotypic criteria. Cognition was assessed using the Montreal Cognitive Assessment while gait was assessed using an electronic walkway. Cox Proportional Hazards models were used to estimate the risk of cognitive decline and dementia for frailty, cognitive-frailty, and gait and cognition models. RESULTS: Fifty-three participants experienced cognitive decline and 27 progressed to dementia (incident rate: 73/1,000 person-years). Frailty participants had a higher prevalence of cognitive impairment compared with those without frailty (77% vs. 54%, p = .02) but not significant risk to incident dementia. Cognitive-frailty increased incident rate (80/1,000 person-years) but not risk for progression to dementia. The combination of slow gait and cognitive impairment posed the highest risk for progression to dementia (hazard ratio: 35.9, 95% confidence interval: 4.0-319.2; p = 0.001, incident rate: 130/1,000 person-years). None of the models explored significantly predicted cognitive decline. CONCLUSIONS: Combining a simple motor test, such as gait velocity, with a reliable cognitive test like the Montreal Cognitive Assessment is superior than the cognitive-frailty construct to detect individuals at risk for dementia. Cognitive-frailty may embody two different manifestations, slow gait and low cognition, of a common underlying mechanism. © The Author.

- [Montero-Odasso M, Speechley M. Falls in Cognitively Impaired Older Adults: Implications for Risk Assessment And Prevention. *J Am Geriatr Soc.* 2018 Feb;66\(2\):367-375.](#)

OBJECTIVES: To provide an overview of the role of cognition in falls, with potential implications for managing and preventing falls in older adults. DESIGN: Review. SETTING: Observational and interventional studies addressing the role of cognition on falls. PARTICIPANTS: Community-dwelling older adults (65 years and older). MEASUREMENTS: The relationship between gait and cognition in aging and neurodegeneration was reviewed in the medical literature to highlight the role of brain motor control deficits in fall risk. The benefits of dual-task gait assessments as a marker of fall risk were reviewed. Therapeutic approaches for reducing falls by improving certain aspects of cognition were appraised. RESULTS: Low performance in attention and executive function are associated with gait slowing, instability, and future falls. Drug-enhancement of cognition may reduce falls in Parkinson's disease, and cognitive training, dual-task training, and virtual reality modalities are promising to improve mobility in sedentary older adults and in those with cognitive impairment and dementia. CONCLUSION: Falls remain common in older people, with higher prevalence and morbidity in those who are cognitively impaired. Disentangling the mechanism and contribution of cognitive deficits in fall risk may open new treatment approaches. Mounting evidence supports that cognitive therapies help reduce falls. © the Authors Journal compilation.

- Santos-Eggimann B, Sirven N. Screening for frailty: older populations and older individuals. *Public Health Rev.* 2016 Aug 22;37:7.

The concept of frailty as a health dimension in old age is recent and has its origin in the development of geriatric medicine. Initially an unformulated clinical intuition, it is now defined by a diminished physiological reserve of multiple organs that exposes older individuals to increased vulnerability to stressors and a higher risk of adverse outcomes. The operational definition of frailty, however, is still debated. From a diversity of models, two emerged in the early 2000s from epidemiological studies conducted in large population-based aging cohorts. The body of research emphasized prospective associations between a frailty phenotype and a range of adverse outcomes or between a frailty index measuring the accumulation of deficits and death. A few studies showed promising spontaneous remissions in the early stages of frailty, raising expectations for effective interventions. Transitions between frailty stages and effective interventions on frailty nevertheless remain two fields needing further investigation. More recently, these tools have been applied as screening instruments in clinical settings to guide individual decision-making and orient treatments. New questions are raised by the use of instruments developed to screen frailty in epidemiological research for assessing individual situations. Inquiring whether frailty screening is relevant opens a Pandora's box of doubts and debates. There are many reasons to screen for frailty both from a public health and a clinical perspective that are only exacerbated by the current demographic evolution. Open questions remain about the feasibility of frailty screening, the properties of screening tools, the relevance of an integration of socioeconomic dimensions into screening tools, and the effectiveness of interventions targeting frailty. Fifteen years after the publication of the Fried and Rockwood landmark papers proposing operational definitions of frailty, this article presents an overview of current perspectives and issues around frailty screening in populations and in individuals.



- Toosizadeh N, Wendel C, Hsu CH, Zamrini E, Mohler J. Frailty assessment in older adults using upper-extremity function: index development. *BMC Geriatr.* 2017 Jun 2;17(1):117.

BACKGROUND: Numerous multidimensional assessment tools have been developed to measure frailty; however, the clinical feasibility of these tools is limited. We previously developed and validated an upper-extremity function (UEF) assessment method that incorporates wearable motion sensors. The purpose of the current study was to: 1) cross-sectionally validate the UEF method in a larger sample in comparison with the Fried index; 2) develop a UEF frailty index to predict frailty categories including non-frail, pre-frail, and frail based on UEF parameters and demographic information, using the Fried index as the gold standard; and 3) develop a UEF continuous score (points scores for each UEF parameter and a total frailty score) based on UEF parameters and demographic information, using the Fried index as the gold standard. METHODS: We performed a cross-sectional validation and index development study within the Banner Medical Center, Tucson, and Banner Sun Health Research Institute, Sun City, Arizona. Community-dwelling and outpatient older adults (≥ 60 years; $n = 352$; 132 non-frail, 175 pre-frail, and 45 frail based on Fried criteria) were recruited. For the UEF test, each participant performed a 20-s elbow flexion, within which they repetitively and rapidly flexed and extended their dominant elbow. Using elbow motion outcomes two UEF indexes were developed (categorical and score). The Fried index was measured as the gold standard. RESULTS: For the categorical index, speed of elbow flexion, elbow range of motion, elbow moment, number of flexion, speed variability and reduction within 20 s, as well as body mass index (BMI) were included as the pre-frailty/frailty predictor parameters. Results from 10-fold cross-validation showed receiver operator characteristic area under the curve of 0.77 ± 0.07 and 0.80 ± 0.12 for predicting Fried pre-frailty and frailty, respectively. UEF score (0.1 to 1.0) was developed using similar UEF parameters. CONCLUSIONS: We present an objective, sensor-based frailty assessment tool based on physical frailty features including slowness, weakness, exhaustion (muscle fatigue), and flexibility of upper-extremity movements. Within the current study, the method was validated cross-sectionally using the Fried index as the gold standard and the UEF categorical index and UEF frailty score were developed for research purposes and potentially for future clinical use.



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Gait and Balance: A Walk in the Park

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