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 GAIT ASSESSMENT AND DISTURBANCE IN OLDER ADULTS.

GAIT ASSESSMENT AND DISTURBANCE IN OLDER ADULTS

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

- A study that examines sensorimotor factors affecting gait in older adults.
- A study that evaluates the relationship between gait speed and survival.
- An article that discusses office assessment of gait and station.
- A study that explores neurological gait abnormalities and risk of falls in older adults.
- A study that researches quantitative gait markers and incident fall risk in older adults.
- An article that describes presentations and causes of gait disorders.
- A study that seeks to determine the validity of the Functional Gait Assessment (FGA) in community-dwelling older adults.

BACKGROUND: The study of factors associated with age-related gait decline may assist in developing methods to preserve mobility in older people. OBJECTIVE: To examine the associations between sensorimotor factors relevant to ageing and gait in the general older population. DESIGN: Cross-sectional population-based study. METHODS: Participants aged 60-86 years (n = 278) were randomly selected using electoral roll sampling. Sensorimotor factors (quadriceps strength, reaction time, postural sway, proprioception and visual contrast sensitivity) were measured using the Physiological Profile Assessment. Gait variables (speed, cadence, step length, double support phase and step width) were recorded with a GAITRite walkway. Linear regression was used to model relationships between sensorimotor and gait variables. RESULTS: Mean age of participants was 72.4 (7.0) years with 154 (55%) males. Better quadriceps strength, reaction time and postural sway (in men) predicted faster gait speed due to their effects on step length and/or cadence. Body weight (in men) and visual contrast sensitivity (in women) were modifying factors in these relationships. Better postural sway, reaction time (in men) and quadriceps strength (in women) predicted reduced double support phase. Modifying factors were quadriceps strength (in men) and proprioception (in women). Postural sway was the sole predictor of step width and in women only. CONCLUSION: Potentially modifiable sensorimotor factors were associated with a range of gait measures, with a different pattern of individual associations and interactions seen between the sexes. These results provide further mechanistic insights towards explaining age-related gait decline in the general older population.


CONTEXT: Survival estimates help individualize goals of care for geriatric patients, but life tables fail to account for the great variability in survival. Physical performance measures, such as gait speed, might help account for variability, allowing clinicians to make more individualized estimates. OBJECTIVE: To evaluate the relationship between gait speed and survival. DESIGN, SETTING, AND PARTICIPANTS: Pooled analysis of 9 cohort studies (collected between 1986 and 2000), using individual data from 34,485 community-dwelling older adults aged 65 years or older with baseline gait speed data, followed up for 6 to 21 years. Participants were a mean (SD) age of 73.5 (5.9) years; 59.6%, women; and 79.8%, white; and had a mean (SD) gait speed of 0.92 (0.27) m/s. MAIN OUTCOME MEASURES: Survival rates and life expectancy. RESULTS: There were 17,528 deaths; the overall 5-year survival rate was 84.8% (confidence interval [CI], 79.6%-88.8%) and 10-year survival rate was 59.7% (95% CI, 46.5%-70.6%). Gait speed was associated with survival in all studies (pooled hazard ratio per 0.1 m/s, 0.88; 95% CI, 0.87-0.90; P < .001). Survival increased across the full range of gait speeds, with significant increments per 0.1 m/s. At age 75, predicted 10-year survival across the range of gait speeds ranged from 19% to 87% in men and from 35% to 91% in women. Predicted survival based on age, sex, and gait speed was as accurate as predicted based on age, sex, use of mobility aids, and self-reported function or as age, sex, chronic conditions, smoking history, blood pressure, body mass index, and hospitalization. CONCLUSION: In this pooled analysis of individual data from 9 selected cohorts, gait speed was associated with survival in older adults.


Gait and station disorders are among the most common reasons patients seek outpatient neurologic consultation. A careful assessment of gait and station provides the clinician with an overview of the integrity of a patient's central and peripheral nervous systems. Therefore, clinicians may consider performing a gait and station examination as the prelude to their formal neurologic examination of the patient, regardless of their chief complaint, to gain insight into which areas of the remainder of the neurologic examination they should particularly focus on, to localize the patient's neurologic dysfunction. In this review, the author describes how a structured gait and station examination may be performed in the ambulatory setting, without any special equipment. Then, the precise mechanics of each component of normal gait and station are discussed, so that the potential localizations and significance of abnormalities, which may occur during various phases of the gait cycle, can be highlighted. In particular, some less common findings are emphasized, which may be mistaken as psychogenic in etiology.

To estimate the validity of neurological gait evaluations in predicting falls in older adults. We studied 632 adults age 70 and over (mean age 80.6 years, 62% women) enrolled in the Einstein Aging Study whose walking patterns were evaluated by study clinicians using a clinical gait rating scale. Association of neurological gaits and six subtypes (hemiparetic, frontal, Parkinsonian, unsteady, neuropathic, and spastic) with incident falls was studied using generalized estimated equation procedures adjusted for potential confounders, and reported as risk ratio with 95% confidence intervals (CI). Over a mean follow-up of 21 months, 244 (39%) subjects fell. Mean fall rate was 0.47 falls per person year. At baseline, 120 subjects were diagnosed with neurological gaits. Subjects with neurological gaits were at increased risk of falls (risk ratio 1.49, 95% CI 1.11-2.00). Unsteady (risk ratio 1.52, 95% CI 1.04-2.22), and neuropathic gait (risk ratio 1.94, 95% CI 1.07-3.11) were the two gait subtypes that predicted risk of falls. The results remained significant after accounting for disability and cognitive status, and also with injurious falls as the outcome. Neurological gaits and subtypes are independent predictors of falls in older adults. Neurological gait assessments will help clinicians identify and institute preventive measures in older adults at high risk for falls.


BACKGROUND: Identifying quantitative gait markers of falls in older adults may improve diagnostic assessments and suggest novel intervention targets. METHODS: We studied 597 adults aged 70 and older (mean age 80.5 years, 62% women) enrolled in an aging study who received quantitative gait assessments at baseline. Association of speed and six other gait markers (cadence, stride length, swing, double support, stride length variability, and swing time variability) with incident fall rate was studied using generalized estimation equation procedures adjusted for age, sex, education, falls, chronic illnesses, medications, cognition, disability as well as traditional clinical tests of gait and balance. RESULTS: Over a mean follow-up period of 20 months, 226 (38%) of the 597 participants fell. Mean fall rate was 0.44 per person-year. Slower gait speed (risk ratio [RR] per 10 cm/s decrease 1.069, 95% confidence interval [CI] 1.001-1.142) was associated with higher risk of falls in the fully adjusted models. Among six other markers, worse performance on swing (RR 1.406, 95% CI 1.027-1.926), double-support phase (RR 1.165, 95% CI 1.026-1.321), swing time variability (RR 1.007, 95% CI 1.004-1.010), and stride length variability (RR 1.076, 95% CI 1.030-1.111) predicted fall risk. The associations remained significant even after accounting for cognitive impairment and disability. CONCLUSIONS: Quantitative gait markers are independent predictors of falls in older adults. Gait speed and other markers, especially variability, should be further studied to improve current fall risk assessments and to develop new interventions.


Walking appears to be a simple innate ability, but it is an extraordinarily complex process involving three major afferent systems (visual, proprioception, and vestibular). Humans' unique gait is established around age seven. Velocity and step-length change with age, but the overall package we call "gait" remains stable. Age is the single most important factor in changing gait, with some normal changes expected. Gait disorders, beyond what are normal age-related changes, are common among elders. At 60 years of age, 15% of elders have gait problems, increasing to 82% for those 85 years of age and older. Abnormal gait movement can be broadly defined as hyperkinetic (too much movement) and hypokinetic (too little movement). Gait disorders are classified into lowest level (affecting one afferent system), middle level (more afferent system involvement), and highest level (characterized by planning deficits) disorders. Gait disturbances may be a manifestation of underlying conditions or may be drug-induced. To treat gait disorders appropriately, clinicians must review the patient's disease progression, medication status, and environmental conditions. Physical therapy, medication changes, and, rarely, surgery can help improve gait.

**BACKGROUND:** The Functional Gait Assessment (FGA) is a reliable and valid measure of gait-related activities. **OBJECTIVE:** The purpose of this study was to determine the concurrent, discriminative, and predictive validity of the FGA in community-dwelling older adults. **DESIGN:** This was a prospective cohort study. **METHODS:** Thirty-five older adults aged 60 to 90 years completed the Activities-specific Balance Confidence Scale (ABC), Berg Balance Scale (BBS), Dynamic Gait Index (DGI), Timed “Up & Go” Test (TUG), and Functional Gait Assessment (FGA) during one session. Falls were tracked by having participants complete a monthly fall calendar for 6 months. Spearman correlation coefficients were used to determine concurrent validity among the ABC, BBS, TUG, DGI, and FGA. To determine the optimum scores to classify fall risk, sensitivity (Sn), specificity (Sp), and positive and negative likelihood ratios (LR+ and LR-) were calculated for the FGA in classifying fall risk based on the published criterion scores of the DGI and TUG and for the FGA, TUG, and DGI in identifying prospective falls. Receiver operator curves with area under the curve were used to determine the effectiveness of the FGA in classifying fall risk and of the DGI, TUG, and FGA in identifying prospective falls. **RESULTS:** The FGA correlated with the ABC (r=.053, P<.001), BBS (r=.84, P<.001), and TUG (r=-.84, P<.001). An FGA score of <or=22/30 provides both discriminative and predictive validity. The FGA (scores <or=22/30) provided 100% Sn, 72% Sp, LR+ of 3.6, and LR- of 0 to predict prospective falls. **LIMITATIONS:** The study was limited by the length of time of follow-up and the small sample size that did not allow for evaluation of criterion scores by decade. **CONCLUSIONS:** The FGA with a cutoff score of 22/30 is effective in classifying fall risk in older adults and predicting unexplained falls in community-dwelling older adults.
Next Month's Issue:
Strength Training and Fall Prevention

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