

Measurement of Gait Speed of Older Adults is Feasible and Informative in a Home-care Setting

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ABSTRACT

Purpose: Although gait speed is widely recommended as a measure of activity limitation, it is not routinely used clinically with older adults. This retrospective study was undertaken to determine whether the measurement of gait speed is feasible and informative in a home care setting.

Methods: The therapy records of 27 ambulatory patients were examined for gait speed measures and other relevant data.

Results: Gait speed was documented for all patients. It was significantly lower than that of age and sex matched normals. A wide range of speeds were noted for patients who required total assistance or were completely independent according to Functional Independence Measure criteria or who were able to walk at least 150 feet.

Conclusions: Measurement of the gait speed of older adults is feasible in a home care setting. Its sensitivity to limitations not revealed by other measures provides support for broader use.

Key Words: gait, measurement, aging

INTRODUCTION

Gait speed is frequently used as a measure of activity limitation in studies of older adults.¹⁻⁴ Such use is not surprising given the importance of speed for ambulation in the community⁵ and speed's power as a predictor of outcome among older adults.^{4,6} The routine measurement of gait speed has been advocated among older adults. Studenski et al,⁴ and more recently Duncan and Tilson,⁷ have even suggested that it be considered a "vital sign" universally applicable to older adults. Nevertheless, therapists do not necessarily incorporate the measure into everyday practice.⁸ The present communication, therefore, was initiated to demonstrate that the measurement of gait speed of older adults in a home care setting is both feasible and informative.

METHODS

The institutional review board of the University of Connecticut granted exemption to the research as it involved the retrospective retrieval of data from initial therapy records maintained by the author on all of his personal patients. The therapy records of all 39 patients

were examined. Twelve of the records were excluded because the patients were either less than 60 years of age or nonambulatory.

Data gathered or derived from the 27 remaining patients' records were demographics (diagnosis, age, and gender) and 3 gait-related measures (speed, independence, and maximum distance). Gait speed was determined as patients walked past a steel measuring tape extended to lengths between 7 and 20 feet, as allowable by each patient's habitat. Patients were asked to walk at their own comfortable speed. They began walking a few feet before the tape and walked past its end. Timing began and ended as their mid-sagittal line crossed the beginning and end of the tape, respectively. Speed was derived by dividing the length of tape traversed by the time required to traverse it. Gait independence was rated based on information about assistance, device use, and distance documented in patients' records. The 1 (total assistance) to 7 (complete independence) scoring system of the original Functional Independence Measure (FIM) was used for this purpose.⁹ According to the original FIM system, a score of 1 is assigned for any distance less than 50 feet (regardless of actual assistance provided) and a score of 2 is the maximum that can be realized unless the individual reaches 150 feet (regardless of actual assistance). Scores of 3, 4, 5, or 6 are assigned to individuals requiring assistance (including supervision or a device) over distances of 150 feet or more. A score of 7 represents walking at least 150 feet without assistance (including device or supervision). Maximum gait distance was indicated by the total distance covered without stopping to rest. Depending on the habitat, the total distance walked might involve a loop or a back-and-forth course. Distance was determined by measuring tape, official documentation, or examiner striding (a distance within a few inches of 3 feet). Based on habitat, time constraints and patient factors, the distance was sometimes truncated at 150 feet. All statistical analysis was conducted using the Statistical Package for Social Sciences (SPSS, version 11.0). Gait speed was described for the patients as a whole as well as for patients within specific strata. Those strata were FIM scores 1, 2-6, and 7 and walking distances less than 150 feet and 150 feet or more. A paired T-test was used to compare the patients' actual walking speed with expected walking speed; that is, the mean speed of age and gender-matched individuals from the National Health and Nutrition Survey (NHANES) study.¹⁰

RESULTS

The age of patients of this retrospective study was a mean (standard deviation) 75.4 (9.2) with a range of 60-88 years. Thirteen were men and 14 were women. They presented with 13 different primary diagnoses, but fracture (n=4), osteoarthritis (n=4), stroke (n= 3), and congestive heart failure (n=3) were most common.

Gait speed was recorded for all 27 ambulatory patients. The distances over which speed was measured ranged from 7 to 20 feet. The patients' gait speed was a mean (standard deviation) 1.2 (.8) with a range of .1-2.9 ft/sec. Their expected speed based on the NHANES study was 2.9 (.3) with a range 2.5-3.4 ft/sec (Figure 1). All but 2 patients walked more slowly than expected. Actual and expected speeds differed significantly ($T = -11.193, p < .001$).

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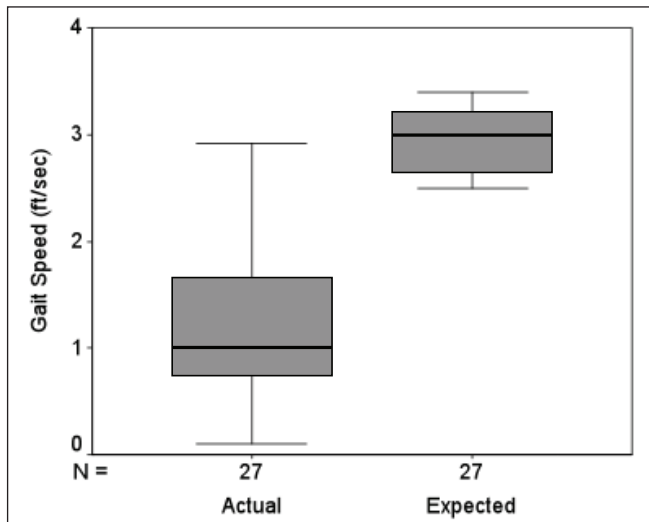


Figure 1. Box plot comparing older adults' actual gait speed and gait speed expected based on normal published values.¹⁰

Table 1 presents gait speeds for specific FIM scores (1, 2-6, 7) and walking distances (<150 vs ≥ 150 ft). The ability of gait speed to inform is reflected in its ability to distinguish between 12 patients classified as requiring total assistance (FIM score 1). Patients so classified had gait speeds ranging from .1 to 2.0 ft/sec. For the 5 patients classified as completely independent (FIM score 7), gait speeds ranged from 1.6 to 2.8 ft/sec. The ability of gait speed to inform is further indicated by its ability to distinguish between the 10 patients able to walk more than 150 feet. Their gait speeds ranged from .5 to 2.9 ft/sec.

Table 1. Gait Speed Associated with Alternative Measures of Gait Performance

Alternative Measures (n)	Gait Speed (ft/sec) Mean±SD (min-max)
Functional Independence Measure 1 (12)	1.0 ± .6 (.1 - 2.0)
Functional Independence Measure 2-6 (10)	1.0 ± .7 (.3 - 2.9)
Functional Independence Measure 7 (5)	2.2 ± .6 (1.6 - 2.8)
Distance < 150ft (17)	.9 ± .5 (.1 - 2.0)
Distance ≥ 150ft (10)	1.7 ± .9 (.5 - 2.9)

DISCUSSION

This study investigated whether the measurement of gait speed is feasible and informative for older adults encountered in a home-care setting. That the measurement of gait speed is feasible in such an environment is supported by its documentation for all ambulatory patients. Such documentation would not have been possible in some homes if distances of 20 or more feet were required. Shorter unobstructed expanses of floor, however, were universally available. A recent paper in this journal suggests that distances of 8 and 20 feet may provide comparable results,¹⁰ so long as at least one step is possible before measurement is begun.¹¹ Such was the case in this study.

That gait speed is an informative measure is clearly indicated by the finding that patients walked significantly more slowly than expected based on the performance of apparently normal age- and sex- matched subjects of the NHANES study.¹⁰ All patients walked slower than the 4.0 ft/sec (1.22 m/sec) usually allowed for crossing a street at a signalized intersection.¹² Further support for the informativeness of gait speed is found in its lack of floor and ceiling effects. A broad range of gait speeds was demonstrated at the low (FIM 1) and high ends (FIM 7) of the commonly used FIM and at distances of greater than 150 feet. This sensitivity upholds the use of gait speed in establishing objective short- and long-term goals. Speed may reflect changes in gait performance before or after ordinal measures such as the FIM are able to do so.

In conclusion, the measurement of gait speed is feasible and informative in a home-care setting. Broader use among older adults in such a setting is warranted.

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