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Is Timed Up and Go Better Than Gait Speed in Predicting Health, Function, and Falls in Older Adults?

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Abstract

OBJECTIVES—While gait speed (GS) predicts many outcomes in older adults, Timed Up and Go (TUG) is recommended for clinical assessment of mobility and fall risk. The two measures are rarely compared. We assessed whether TUG is superior to GS in predicting multiple geriatric outcomes.

DESIGN—Prospective cohort study.

SETTING—Medicare health maintenance organization and Veterans' Affairs primary care clinics.

PARTICIPANTS—Adults aged 65 years and older (N = 457).

MEASUREMENTS—Baseline GS and TUG were used to predict health decline by EuroQol and SF-36 global health; functional decline by NHIS ADL score and SF-36 physical function index; hospitalization; and single and recurrent falls over 1 year.

RESULTS—Mean age was 74 years and 44% were female. Odds ratios for all outcomes were equivalent for GS and TUG. Using area under the ROC curve ≥ 0.7 for acceptable predictive ability, GS and TUG each alone predicted decline in global health, new ADL difficulty, and falls, with no difference in predictive ability between performance measures. Neither performance measure predicted hospitalization, EuroQol decline, or physical function decline. As continuous variables, TUG did not add predictive ability to GS for any outcome.

CONCLUSION—GS predicts most geriatric outcomes, including falls, as does the TUG. The time alone in TUG may not add to information provided by GS, although its qualitative elements may have other utility.

Keywords

gait speed; Timed Up and Go; physical performance; falls; hospitalization

INTRODUCTION

Physical performance measures may be useful screening tools to identify older adults at high risk of health and functional decline. Performance measures may be especially useful in the outpatient clinical setting, as they require only a few minutes and are easy to perform.[1]

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Gait speed has been shown in previous research to predict hospitalization[1-2], declines in health and function[1, 3-4], falls[5-6], and survival[2] in older adults. The Get Up and Go test[7], in which a clinician assesses whether a person experiences difficulty or unsteadiness when standing up from a chair, walking 3 m, turning, walking back, and sitting down, is recommended as a clinical assessment tool for fall risk.[8] The timed version, Timed Up and Go (TUG), is highly correlated with functional mobility and gait speed[9]. However, the ability of either the untimed or Timed Up and Go test to predict falls is inconsistent in the literature. Of 6 studies looking at prospective fall risk in community-dwelling older adults, TUG predicted fall risk in 2 studies[10-11], predicted recurrent falls in 1 study[12], and did not predict fall risk in the others.[5, 13-14] In the few studies that examined the relationship between TUG and other outcomes, TUG was found to predict ADL disability[4, 10] and nursing home admission.[15]

TUG may provide more information than gait speed about risk of falls and other outcomes, as TUG includes standing, turning, and sitting. It is not clear from the literature, however, whether TUG predicts outcomes better than gait speed. Few studies have examined the relationship between TUG and outcomes other than falls. Only two studies, to the authors' knowledge, have compared TUG and gait speed in their ability to predict outcomes in older adults, and each looked at only one or two outcomes[4, 12]. The purpose of the present study was to assess whether TUG is superior to or adds to gait speed in predicting a wide range of health outcomes in older adults, including hospitalization, declines in health and function, and falls.

METHODS

Data used here were collected for a cohort study[1] whose purpose was to determine the effectiveness of gait speed and the Short Physical Performance Battery as predictors of future health and function. The Veterans' Affairs and university institutional review boards approved the study, and all participants provided informed consent.

Participants were recruited from two primary care clinics, a Medicare health maintenance organization clinic and a Veterans' Affairs clinic, in Pittsburgh, PA, and were assessed every 3 months for 12 months, then every 6 months for two more years. This study reports data from the first 12 months of follow-up. Eligible persons were aged 65 years or older, lived in the community, were able to walk 4 m, had a gait speed between 0.2 and 1.3 m/s, and were cognitively intact (Mini-Mental Status Examination[16] (MMSE) score ≥ 24), or were mildly impaired (MMSE score = 16-23) and had a caregiver.

Baseline assessment included demographics, cognition by MMSE (range 0-30),[16] self-report of comorbid conditions, an estimate of hospitalization risk (probability of repeated admissions (Pra[17]; range 0-1)), and physical performance measures. The decision to collect Pra data was made after subject accrual began, so data on 14 subjects were not obtained. Baseline and outcome rates did not differ between participants with and without Pra data. Outcome measures, including health status, functional status, hospitalization, and falls, were assessed at baseline and every 3 months over 12 months.

Performance measures included gait speed and Timed Up and Go.[9] Gait speed was performed over 4 m at the participants' usual pace. For TUG, participants were timed as they rose from a chair, walked 3 m at their usual pace, turned around, walked back, and sat down. Each performance measure was performed twice at baseline, and results are presented as the average of the two trials.

Health status was assessed by the EuroQol[18] health-related quality of life scale (range 0-1; higher score indicates better health) and the global health item from the Medical Outcomes

Study 36-item Short Form Health Survey[19] (SF-36; five-level scale ranging from excellent to poor). Functional status was assessed by the National Health Interview Survey (NHIS) activities of daily living (ADL) scale[20] and the SF-36 physical function index (PFI).[19] The NHIS ADL score ranges from 0-16 and assesses difficulty and dependence in 16 basic and instrumental ADLs. The PFI assesses limitations in activities involving physical mobility and ranges from 0-100, with a higher score representing better function. Hospitalization was determined based on hospital records and healthcare diaries completed by participants or caregivers. Falls were assessed at each study visit by asking participants how often they had fallen over the past 3 months. A fall is defined as unintentionally coming to rest on the ground or other surface.

A meaningful change in each outcome measure was defined a priori by a consensus panel of physicians, physical therapists, and a biostatistician.[21] An outcome was considered to have occurred if an outcome event or decline from baseline was detected at any point over the 12 month follow-up period. Meaningful changes in outcomes were defined as followed: for health status decline, a EuroQol score decrease of 0.1 points or a global health decline of two levels or reaching the lowest level; for physical function decline, the occurrence of a new difficulty in a basic ADL (eating, dressing, bathing, toileting, personal hygiene, transferring) or PFI decline of 10 points; for hospitalization, at least 1 hospitalization; for falls, falling at least once (any falls) or falling more than once (multiple falls).

All analyses were performed using SPSS version 16.0 (SPSS, Inc., Chicago, IL). The sample at baseline was characterized by descriptive statistics and was compared to drop-outs using chi-square for categorical variables and two-sample t-tests for continuous variables. Cross-tabulations using chi-square were used to assess univariate relationships between baseline physical performance measures and 1-year outcomes. For univariate analysis, performance measures were grouped into 3-level categories based on previously established cut-points of 0.6 and 1.0 m/s for gait speed[1] and 12 seconds[22] and 15 seconds[23] for TUG.

Logistic regression models were then performed to assess the ability of performance measures to predict 1-year outcomes. Regression models were performed using gait speed alone, TUG alone, and gait speed and TUG together in one model, with performance measures used as continuous and categorical variables. Potential covariates, including age (as a continuous variable), gender, education, and baseline status of the outcome, were added to the models. Only age and baseline status were significant predictors of each outcome and were included as covariates in the final regression models. An interaction term between physical performance and baseline status was significant for the PFI, so all analyses using this outcome are stratified by two levels of baseline status. Analyses using the outcome any falls were stratified by two levels of baseline falls, as recommended by Cumming, et al[27]. The outcome multiple falls could not be stratified because cell sizes were too small.

To compare the ability of performance measures to predict outcomes, receiver operating characteristic (ROC) curves were constructed for each regression model, and areas under the curves (AUC) were compared. An AUC between 0.7 and 0.8 is considered acceptable discrimination, between 0.8 and 0.9 is considered excellent discrimination, and greater than 0.9 is considered outstanding discrimination.[24] An AUC difference of ≥0.025 is considered substantial[25].

RESULTS

Of 492 individuals who entered the study, 457 were followed over 1 year. The 35 participants (7.1%) who did not complete the study were not significantly different in

baseline characteristics from those who did. Follow-up was incomplete in these 35 participants because 20 changed provider systems, 13 withdrew, and 2 moved out of the area. There were 18 deaths over the first year of follow-up. Data from participants who died or had another adverse event were included in analysis unless the participant died (n=5) or had an adverse event that prevented follow-up (n=2) prior to the first 3-month follow-up visit.

Baseline characteristics of the sample have been described in detail previously[1] and are summarized in Table 1. Participants had a mean age of 74 years, and 43.5% were female. Outcome rates over 1 year and odds ratios for regressions, adjusted for age and baseline status of the outcome variable, are presented in Table 2. The adjusted odds ratios represent the odds of the outcome occurring among one performance group compared to another, in this case slow vs. fast, slow vs. intermediate, and intermediate vs. fast, with the confounding influence of age and baseline status removed. The ability of performance measures to predict 1-year outcomes is described in Table 3 using the area under the ROC curve. AUCs were equivalent for performance measures as continuous and categorical variables except as noted below.

One or more hospitalizations occurred in 23% of participants. As continuous variables, odds ratios for both TUG and gait speed suggested that poorer performance was associated with increased risk of hospitalization after adjusting for age and baseline hospitalization risk. As categorical variables, TUG and gait speed were associated with hospitalization when comparing fastest to slowest performers, but not when comparing fastest to intermediate performers (Table 2). Gait speed, but not TUG, was associated with hospitalization when comparing slowest to intermediate performers. AUCs were < 0.7 for both performance measures alone and in combination, indicating only fair predictive ability (Table 3). AUCs were not substantially different.

Health status by EuroQol declined in 31% of participants. As continuous variables, odds ratios for both TUG and gait speed suggested that poorer performance was associated with EuroQol decline after adjusting for age and baseline health. As categorical variables, TUG and gait speed were associated with EuroQol decline when comparing fastest or intermediate performers to slowest performers, but not when comparing fastest to intermediate performers (Table 2). AUCs were < 0.7 for both performance measures alone and in combination, indicating only fair predictive ability (Table 3). AUCs were not substantially different.

Global health declined in 12% of participants. Participants with poor global health at baseline (n=13) are not included in analysis because further decline from the lowest level cannot be detected. As continuous variables, odds ratios for both TUG and gait speed suggested that poorer performance was associated with global health decline after adjusting for age and baseline health. As categorical variables, TUG and gait speed were associated with health decline when comparing fastest or intermediate performers to slowest performers, but only gait speed was associated with decline when comparing fastest to intermediate performers (Table 2). AUCs were between 0.7 and 0.8 for both performance measures alone and in combination, indicating acceptable predictive ability (Table 3). AUCs were not substantially different for performance measures as continuous variables. As categorical variables, global health decline was predicted more strongly by TUG and gait speed together (AUC 0.757) compared to gait speed alone (AUC 0.726). TUG fell between these values (AUC 0.742) but was not substantially different from the combined measures or gait speed alone.

Twenty-eight percent of participants experienced a new difficulty in a basic ADL. As continuous variables, odds ratios for both TUG and gait speed suggested that poorer performance was associated with ADL difficulty after adjusting for age and baseline difficulty. As categorical variables, both TUG and gait speed were associated with ADL difficulty when comparing fastest to slowest performers (Table 2). Only TUG was associated with ADL difficulty when comparing slowest to intermediate performers, and only gait speed was associated when comparing fastest to intermediate performers. AUCs were between 0.8 and 0.9 for both performance measures alone and in combination, indicating excellent predictive ability (Table 3). AUCs were not substantially different.

Physical function by PFI declined in 27% of participants. In regression models, performance measures were associated with functional decline only for participants with a higher initial level of function. As continuous variables, odds ratios for both TUG and gait speed suggested that poorer performance was associated with functional decline after adjusting for age and baseline function. As categorical variables, gait speed was associated with decline when comparing fastest performers to slowest or intermediate performers (Table 2). TUG was associated with decline only when comparing fastest to intermediate performers. Neither performance measure was associated with decline when comparing slowest to intermediate performers. AUCs were inconsistent with the regression results (Table 3). For TUG and gait speed, predictive ability was fair (AUC < 0.7) for participants with a higher initial level of function, but was acceptable (AUC between 0.7 and 0.8) for those with a lower initial level of function. There were no substantial differences between performance measures.

Thirty-eight percent of participants fell at least once, and 15% of participants fell more than once. Participants who missed follow-up visits and did not have a recorded fall at another visit were excluded from analysis because we could not determine if they had fallen in the interval prior to missed visits. Sample size is n=425 for any falls and n=417 for multiple falls. As continuous variables, odds ratios for both TUG and gait speed suggested that poorer performance was associated with falling at least once only for participants with a history of falls. As categorical variables, both TUG and gait speed were associated with any falls for participants with a history of falls when comparing fastest or intermediate performers to slowest performers. Neither measure predicted falls when comparing fastest to intermediate performers (Table 2). For participants with no history of falls, TUG but not gait speed was associated with any falls when comparing fastest to slowest performers only. However, the AUC for TUG in participants with no fall history was below the acceptable range (AUC < 0.7) and was equivalent to the AUC for gait speed, suggesting that neither TUG nor gait speed predicted falls in those with no history of falls (Table 3). Both performance measures alone and in combination had acceptable predictive ability for any falls in those with a history of falls, with AUCs ranging from 0.718 to 0.729. Differences in AUCs between performance measures were not substantial (Table 3). As continuous variables, odds ratios for both TUG and gait speed suggested that poorer performance was associated with multiple falls after adjusting for age and baseline falls. As categorical variables, TUG and gait speed were associated with multiple falls when comparing fastest or intermediate performers to slowest performers, but not when comparing fastest to intermediate performers (Table 2). Predictive ability for multiple falls was acceptable, with AUCs between 0.7 and 0.8 for performance measures alone and in combination, and AUCs were not substantially different (Table 3).

DISCUSSION

Timed Up and Go and gait speed both predict health decline, ADL difficulty, and falls in older adults living in the community. Although the risk of hospitalization and physical

function decline appears to increase with slower TUG and gait speed performance, overall predictive ability was only modest for these outcomes. Gait speed alone predicts outcomes as well as TUG, and combining the two does not add extra predictive ability.

Clinically, cut-points are often used with performance measures to categorize patients into risk groups. When categorized into three levels of performance, TUG and gait speed were most useful for predicting outcomes when comparing the fastest or intermediate performers to the slowest performers. Slower performers of TUG and gait speed had increased risk of all outcomes. However, when comparing slowest to intermediate gait speed, the risk of ADL difficulty was not significantly different, perhaps due to low power (69% in the slowest group compared to 29% in the intermediate group experienced ADL difficulty).

Gait speed was more useful than TUG when comparing intermediate performers to fast performers. Intermediate gait speed was associated with increased risk of global health decline and ADL difficulty, with trends for increased risk of any falls and multiple falls. For intermediate compared to fast performers, odds ratios for TUG were not significant for any outcome, although outcome rates showed trends for increased risk of global health decline and ADL difficulty in the intermediate group. These findings suggest that performance measures may be most useful at discriminating between the highest risk (i.e., slowest) group and others, although gait speed is more useful than TUG for predicting outcomes in intermediate performers.

How might these results be used clinically? A primary care provider could screen older adults using TUG or gait speed. Poor performance may indicate that there are underlying health problems placing the patient at increased risk of adverse outcomes. The provider could then search for underlying problems and attempt to intervene to prevent adverse outcomes.

This study adds to previous research about performance measures as predictors of future events. Of the few previous studies that have used both performance measures to predict outcomes in older adults,[4-5, 12, 14, 26] only two studies[4, 12] have compared TUG and gait speed, and each study was limited to only one or two outcomes. One study found that TUG predicted ADL disability at 6 months, but neither TUG nor gait speed were predictors at 12 or 18 months[4]. Contrary to those findings, the present study found that TUG and gait speed predict ADL difficulty at 12 months equally well. The second study found that TUG was superior to gait speed for predicting recurrent falls over one year, defined as falling once in those with a history of falls or falling multiple times, but neither measure predicted first-time falls[12]. Similarly, in the present study TUG and gait speed are most useful for predicting recurrent falls rather than first-time falls. Both measures have equivalent predictive ability for falling at least once in those with a history of falls and for multiple falls (i.e., recurrent falls). However, neither measure predicts falls in those without a history of falls (i.e., first-time falls). The finding that TUG predicts future falls brings the number of studies demonstrating this finding to three[10-11], while three other studies have found that TUG does not predict future falls[5, 13-14]. This study also confirms the ability of gait speed to predict falls[5-6].

This study has several strengths. The sample was large and included community-dwelling adults of a wide range of educational backgrounds, health, and physical function from two different provider systems, adding to the generalizability. Participants were assessed prospectively over 12 months to investigate future outcomes, rather than cross-sectional characteristics. Most importantly, we directly compared the ability of TUG and gait speed to predict a wide range of geriatric outcomes.

This study also has limitations. Although the sample was diverse, it was confined to one geographical area. The results are relevant to community-dwelling older adults in a primary care setting and may not be generalizable to the entire population of older adults. Although there were no differences in measured baseline characteristics between participants who did and did not complete the study, there may be unobserved differences. Finally, we could not examine whether qualitative information gained by observing Timed Up and Go performance adds to the assessment of geriatric patients. Qualitative assessment is recommended by the American Geriatrics Society for determining fall risk,[8] but previous studies investigating the qualitative use of Get Up and Go have not found it useful.[5, 23] The main issue limiting its utility may be that there are no clear guidelines for scoring qualitative aspects. Future research may develop standardized guidelines for assessing Get Up and Go performance qualitatively and investigate its use for identifying older adults at risk of adverse outcomes.

Gait speed alone predicts most geriatric outcomes as well as Timed Up and Go or the combination of the two. In an outpatient clinical setting where time is critical, clinicians can administer a single performance measure in a few minutes to assess risk of multiple health outcomes. In fact, gait speed may be more useful for this purpose than TUG for patients with an intermediate walking speed. Although the American Geriatrics Society recommends Get Up and Go for assessing fall risk, gait speed can also be used to predict falls. While either measure may be performed quickly and easily to assess risk of adverse outcomes, TUG may not add to information provided by gait speed unless its qualitative elements have other utility.

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Table 1

Baseline Characteristics of the Sample

Characteristic	Total Sample (n = 457)
Age (years), mean (± SD)	74.0 (± 5.7)
Female, n (%)	199 (43.5)
White, n (%)	363 (79.4)
Education (high school or more), n (%)	302 (66.1)
Gait speed (m/s), mean (± SD)	0.88 (± 0.24)
Timed up & go (seconds), mean (± SD)	12.3 (± 5.5)
Probability of repeated admission score [*], mean (± SD)	0.32 (± 0.11)
EuroQol score [†], mean (± SD)	0.76 (± 0.18)
Global health [‡]: fair or poor, n (%)	101 (22.1)
Difficulty in ADLs, n (%)	92 (20.1)
SF-36 physical function [§], mean (± SD)	64.1 (± 29.3)
Fell in past year, n (%)	135 (29.7)

[*] n = 443; scores range from 0-1, with higher scores representing greater probability of hospital admission.

[†] Scores range from 0-1, with higher scores representing better health-related quality of life.

[‡] Scores represent 5 levels of health ranging from excellent to poor.

[§] Scores range from 0-100, with higher scores representing better physical function.

SD = standard deviation; ADL = basic activities of daily living; SF-36 = 36-item short form health survey.

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Table 2

One-Year Outcome Rates by Fast, Intermediate, and Slow Categories of Timed Up & Go and Gait Speed Performance

Outcome	Timed Up & Go ≤12 s 12-15 s ≥ 15 s (n=285) (n=100) (n=64)						Gait Speed <0.6 m/s 0.6-1.0 m/s >1.0 m/s (n=56) (n=264) (n=137)					
	Rate* N (%)			Odds Ratio (95% CI)			Rate* N (%)			Odds Ratio (95% CI)		
				S-F†	M-F‡	S-M§				S-F†	M-F‡	S-M§
Hospitalized	49	30	25	2.55¶	1.65**	1.54††	26	63	17	3.83¶	1.64††	2.33¶
	(17.2)	(30.0)	(39.1)¶	(1.33 -4.88)	(0.92 -2.98)	(0.76 -2.98)	(46.4)	(23.9)	(12.4)¶	(1.73 -8.50)	(0.88 -3.09)	(1.24 -4.40)
EuroQol‡‡	79	31	28	3.53¶	1.42††	2.48#	25	80	36	4.44¶	1.37††	3.24¶
	(27.9)	(32.3)	(44.4)#	(1.77 -7.03)	(0.84 -2.40)	(1.21 -5.09)	(46.3)	(30.8)	(26.5)#	(1.99 -9.87)	(0.84 -2.23)	(1.62 -6.49)
Global health§§	21	12	19	6.24¶	1.96**	3.19¶	16	30	7	9.19¶	2.48#	3.70¶
	(7.5)	(13.0)	(33.3)¶	(2.85 -13.66)	(0.88 -4.35)	(1.37 -7.41)	(32.7)	(11.9)	(5.2)¶	(3.20 -26.39)	(1.02 -6.02)	(1.76 -7.79)
ADL difficulty‡‡	44	29	44	3.82¶	1.32††	2.89¶	37	74	14	4.20¶	2.09#	2.01**
	(15.5)	(30.2)	(69.8)¶	(1.75 -8.31)	(0.71 -2.44)	(1.31 -6.37)	(68.5)	(28.5)	(10.3)¶	(1.63 -10.83)	(1.08 -4.07)	(0.95 -4.26)
Physical function***												
PFI < 70	22	20	12	1.56††	1.19††	1.31††	10	35	10	1.03††	0.85††	1.21††
	(27.5)	(29.4)	(21.8)††	(0.57 -4.27)	(0.54 -2.62)	(0.50 -3.44)	(20.0)	(27.3)	(31.2)††	(0.32 -3.32)	(0.34 -2.09)	(0.49 -3.04)
PFI ≥ 70	49	14	3	1.54††	2.49#	0.62††	4	43	20	8.65#	1.95#	4.45**
	(23.9)	(43.8)	(33.3)**	(0.37 -6.49)	(1.11 -5.58)	(0.13 -2.94)	(66.7)	(31.6)	(19.0)¶	(1.44 -51.96)	(1.02 -3.72)	(0.78 -25.38)
Any falls (n = 425)												
No baseline falls	54	16	13	2.40#	0.92††	2.61**	10	51	24	2.39**	1.23††	1.94††
	(26.1)	(26.2)	(50.0)#	(1.02 -5.64)	(0.48 -1.79)	(0.99 -6.87)	(45.5)	(29.5)	(23.3)††	(0.90 -6.35)	(0.69 -2.20)	(0.79 -4.81)
≥ 1 baseline falls	29	14	29	12.41¶	1.61††	7.71¶	26	39	11	22.23¶	2.21**	10.04¶
	(45.3)	(56.0)	(90.6)¶	(3.32 -46.38)	(0.62 -4.18)	(1.84 -32.22)	(92.9)	(57.4)	(37.9)¶	(4.26 -115.97)	(0.91 -5.40)	(2.15 -46.82)

Outcome	Timed Up & Go ≤12 s 12-15 s ≥ 15 s (n=285) (n=100) (n=64)						Gait Speed <0.6 m/s 0.6-1.0 m/s >1.0 m/s (n=56) (n=264) (n=137)					
		Rate* N (%)		Odds Ratio (95% CI)				Rate* N (%)		Odds Ratio (95% CI)		
				S-F†	M-F‡	S-M§				S-F†	M-F‡	S-M§
Multiple falls (n=417)	23 (8.6)	9 (10.7)	26 (46.4)¶	12.98¶ (4.16 -40.49)	1.86†† (0.53 -6.51)	6.97¶ (1.88 -25.80)	24 (48.0)	31 (13.1)	10 (7.6)¶	14.94¶ (3.56 -62.68)	1.89†† (0.57 -6.25)	7.93¶ (2.57 -24.46)

*P-values are for comparison between faster and slower categories of Timed Up & Go (TUG) or gait speed by chi-square.

†S-F = Comparison of slowest to fastest category of TUG or gait speed, adjusted for age and baseline status of the outcome.

‡M-F = Comparison of middle to fastest category of TUG or gait speed, adjusted for age and baseline status of the outcome.

§S-M = Comparison of slowest to middle category of TUG or gait speed, adjusted for age and baseline status of the outcome.

¶p < .01;

#p = .01-.049;

**p = .05-.099;

††p ≥ .10

‡‡EuroQol declined ≥ 0.1 points (normal range 0 – 1). N = 450, excludes 7 persons who had adverse events in the first 3 months of the study.

§§Health fell 2 levels or reached lowest level (normal range 1 – 5). N = 437, excludes 13 persons who were in poor health at baseline and 7 who had adverse events in the first 3 months of the study.

***Physical function declined ≥ 10 points (normal range 0 – 100). N = 450, excludes 7 persons who had adverse events in the first 3 months of the study.

ADL = basic activities of daily living; CI = confidence interval; PFI = 36-item short form health survey physical function index

Table 3

Area Under the ROC Curve* for Gait Speed, Timed Up & Go, and Performance Measures Combined as Predictors of Outcomes over One Year, Adjusted for Age and Baseline Status of the Outcome.

Outcome	Timed Up & Go†	Gait Speed†	Timed Up & Go and Gait Speed
Hospitalizations	0.657	0.661	0.663
EuroQol decline	0.645	0.667	0.661
Global health decline	0.757	0.744	0.760
New ADL difficulty	0.831	0.835	0.833
Physical function decline			
Baseline PFI < 70	0.730	0.748	0.737
Baseline PFI ≥ 70	0.626	0.623	0.622
Any falls			
No baseline falls	0.600	0.598	0.600
≥ 1 baseline falls	0.718	0.726	0.729
Multiple falls	0.789	0.792	0.786

*Areas under ROC curve range from 0.5-1.0. Degree of discrimination: 0.7-0.8 is acceptable, 0.8-0.9 is excellent, 0.9-1.0 is outstanding[24]. Meaningful difference between areas ≥ 0.025[25].

†Timed Up and Go and gait speed are continuous variables.

ROC = Receiver Operating Characteristic curve; ADL = Basic activities of daily living. PFI = 36-item short form health survey physical function index.