The Feasibility of Six-Minute and Two-Minute Walk Tests in In-patient Geriatric Rehabilitation*

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RÉSUMÉ

Objectif : Déterminer la faisabilité des tests de marche de six et de deux minutes chez la personne âgée fragile.
Structure : Structure avant-après où la mesure des paramètres est effectuée à l'admission et au congé d'une unité de réadaptation gériatrique.
Participants : Au nombre de 52, dont 35 femmes et 17 hommes âgés en moyenne de 80 ± 8 ans.
Résultats : Seule une des huit premières personnes a pu terminer une application du test de marche de six minutes à l'admission. Par contre, le test de marche de deux minutes est applicable dans cette population comme l'illustre le fait que 50 des 52 participants ont effectué le test à au moins une reprise à l'admission. La distance franchie augmente quand le test de marche de deux minutes est subi à trois reprises, à l'admission et au congé ($p < 0,0001$).
Conclusion : Le test de marche de deux minutes est une mesure réaliste de la capacité fonctionnelle de la personne âgée en réadaptation gériatrique, et il est mieux toléré que le test de marche de six minutes. Il conviendrait de tenir compte de la possibilité d'un effet d'entraînement et de la nécessité de plusieurs mesures pour améliorer l'estimation quant au test de marche de deux minutes.

ABSTRACT

Objective: To evaluate the feasibility of the 6-minute and 2-minute walk tests in frail older persons.
Design: Pre/post–design with measures at admission and discharge to in-patient geriatric rehabilitation.
Participants: Fifty-two subjects (35 women, 17 men; age 80 ± 8 years).
Results: Only 1 of the first 8 subjects could complete a single trial of the 6-minute walk test at admission. The 2-minute walk test was feasible in this population, with 50 (out of 52) subjects able to complete at least one trial at admission. There was an increase in distance walked when three trials of the 2-minute walk were performed, at both admission and discharge ($p < 0.0001$).
Conclusion: The 2-minute walk test is a feasible measure of functional capacity and was better tolerated than the 6-minute walk test in older persons in geriatric rehabilitation. Consideration needs to be given to the potential of a training effect or the need for repeated measures to obtain a best estimate for the 2-minute walk test.

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Introduction

Walk tests are quantitative measures of speed and distance that provide information about functional exercise capacity.[1] There are many different timed walk tests, such as the 12-, 6-, or 2-minute walk tests.[1] The 6-minute walk test (6MWT) has been researched the most thoroughly and is considered a valid measure of functional status in individuals with respiratory and cardiac disease.[1] However, the 6MWT is not always feasible clinically, as some patients are unable to walk for 6 minutes because of muscle weakness, gait inefficiency, or fatigue. The 2-minute walk test (2MWT) may be more clinically feasible, and studies have shown this measure to be comparable to the more established 6MWT in some patient populations.[2,3] However, there is no literature on the use of the 2MWT and 6MWT for the frail elderly. The purpose of this brief report is to present our findings on the feasibility of the 6MWT and 2MWT in evaluating frail older persons attending in-patient geriatric rehabilitation.

Methods

Sample

Patients admitted to one of three in-patient geriatric rehabilitation programs were recruited for the study. The three programs were comparable in terms of the admission criteria for the patients (i.e., degree of impairment), goals for mobility and functional improvement, and program characteristics (e.g., staff composition, amount of rehabilitation provided, average length of stay). The three programs admitted patients with multiple conditions, with musculoskeletal impairment as the most common primary diagnosis. Length of stay ranged from 1 to 4 months and patients could be discharged to a private residence, retirement home, or nursing home. Programs included anywhere from 5 to 15 beds. Study inclusion criteria were ability to ambulate at least 3 m without physical assistance (i.e., assistance from another person) and perform at least one of the physical performance measures, ability to speak and understand English, and cognitive ability to understand and follow instructions and provide informed written consent. Patients with an acute medical condition that would prevent them from performing the measures were excluded. Since this was an exploratory study, no formal sample-size calculation was performed.

Protocol

The study received ethics approval from all centres. This report is part of a larger study, conducted between spring 2002 and fall 2005, that examined the validity of several physical performance measures in geriatric rehabilitation.[4] In the first 3 days of admission, we attempted to complete three trials of the 6MWT. On the following day, subjects performed three trials of the 2MWT, with rest periods between trials. The same testing was repeated at discharge. The three trials were performed on the same or different days, based on patient tolerance. If they were done on the same day, an adequate rest period was provided between trials that met the following criteria: the rest period was at least 30 minutes, the subject felt able to continue, and heart rate and respiratory rate had returned to baseline levels.

The walk tests were administered in a quiet corridor, approximately 30 m in length. Subjects were required to walk as far as they could in the 2 or 6 minutes, using their customary walking aid. Talking was discouraged; neither feedback on performance nor encouragement was provided. Subjects were allowed to stop and rest during the tests. The assessor used a digital stopwatch to time each test and a calibrated wheel with a counter to measure the distance (metres) walked.

The following instructions were used:

> The purpose of this test is to find out how far you can walk in six or two minutes. You will start from this point and follow the corridor/path to the pylon. You will walk back and forth between the two pylons. The goal is for you to cover as much ground as you possibly can in the six-minute period. When the six or two minutes are up, I will yell ''STOP.'' I want you to stop where you are. If you become too short of breath or fatigued during the test to continue, you can stop. When you feel more comfortable, you may start walking again. I will walk behind you because I don't want to influence the pace at which you are walking. You should try not to talk more than necessary during the test. I do want you to tell me if you develop any chest pain or tightness or if you become dizzy or light-headed during the test. Do you have any questions? Are you ready? Please begin when I say ''GO.''

Analysis

Means with standard deviations (*SD*) and frequencies were calculated for the walk tests. A repeated-measures mixed model was used to determine change across the three trials. The repeats of the tests were treated as a continuous variable and tested for a linear trend. SPSS software (version 11.0) was used for all analyses. A p-value ≤ 0.05 was considered significant.

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Results

A total of 52 individuals consented and then participated in the study, including 35 females (67%) and 17 males (33%). Age ranged from 62 to 94 (mean $\pm$ $SD = 80 \pm 8$) and the mean length of rehabilitation was 42 ± 18 days (range 15 to 84 days). Prior to admission to hospital, 45 (86%) lived at home, and 6 (12%) lived in a retirement home; one had missing data for residence. At discharge, 36 (69%) went to a private residence, 10 (19%) to a retirement home, and 2 (4%) to a nursing home (4 had missing data). Number of primary diagnoses ranged from 1 to 14 (2.5 ± 2.3), with the most common primary diagnoses being musculoskeletal ($n = 25$) and cardiovascular ($n = 15$) in nature. Due to deterioration in status or unexpected discharge from rehabilitation, we were only able to collect walking data on 36 subjects at discharge.

The timed ''Up and Go'' is a test of basic mobility and reflects the ability to transfer from sitting to standing and to walk a short distance (3 m), two basic functions for home safety. On average, the timed ''Up and Go'' in this sample was $31.9 + 20.9$ seconds (8.6–117). In the frail elderly population, Podsiadlo et al. reported, less than 10 seconds represents freely independent older adults, less than 20 seconds represents independent in basic tub or shower transfers and able to climb most stairs and go outside alone, and greater than 30 seconds represents dependent in most activities.[5] Over 85 per cent of the subjects completed the test in between 10 and 20 seconds.

All patients were able to complete the 2MWT. This was not the case for the 6MWT. Of the first 8 patients, only 1 was able to complete a single trial of the 6MWT. Five of the subjects felt that they could not walk for 6 minutes and their primary therapist concurred. Two subjects attempted the 6MWT but quit during the first trial. We abandoned use of the 6MWT after the eighth subject. There were no significant differences in age, gender, or number of co-morbidities (all p values > 0.2) between the first 8 subjects and the total sample, indicating that these findings were likely reflective of the 36 subjects.

At admission, 50 out of the 52 subjects (96.2%) were able to complete at least one trial of the 2MWT and 39 (78.0%) completed all three trials. At discharge, all 36 subjects were able to complete at least one trial and 32 (88.9%) completed all three trials. The results from the 2MWT are presented in Table 1. There was a significant difference between the admission and the discharge distances walked in 2 minutes (paired t test, $p < 0.01$). There was a significant difference across the three trials at admission (slope 2.2 ± 0.1, intercept 56.0 ± 4.7, $p < 0.0001$) and discharge (slope 2.1 ± 0.6, intercept 77.2 ± 6.3; $p < 0.0001$).

Discussion

When designing the original study,[4] we assumed that the 6MWT would be a practical measure to use in this population. Furthermore, the 6MWT is the most commonly validated measure among walk tests and has been recommended for use in clinical practice.[1] However, the majority of the subjects were unable to complete even one trial of the 6MWT. In contrast, the 2MWT test was practical, simple, easy to administer, and feasible in frail older persons admitted for in-patient geriatric rehabilitation. The 2MWT was more tolerable than the 6MWT in this population.

We found that there was a significant increase in the distance walked on repeated trials of the 2MWT in frail older persons. Repeated trials in pediatric patients with cystic fibrosis revealed no significant difference in distance walked.[6] In contrast, Guyatt et al.[7] demonstrated that, in repeated trials of patients with chronic airflow limitation and/or chronic heart failure, there was a training effect that stabilized after two trials. Brooks et al.[8,9] found an increase in the distance walked in both amputee patients and cardiac surgery patients that did not plateau after three trials.

Table 1: Results of the three trials of 2MWT on admission and discharge

	Admission			Discharge		
	Trial 1	**Trial 2**	**Trial 3**	**Trial 1**	**Trial 2**	**Trial 3**
Number of Subjects Who Completed Test	50	43	39	36	33	32
Mean Distance (metres) (SD)	57.6 (31.3)	64.5 (34.4)	66.7 (34.1)	79.5 (36.7)	82.3 (35.6)	86.6 (36.0)
Range for Distance (metres)	13.7–146.3	12.6–165.5	13.4–153.0	6.6–170.6	20.3–165.8	21.6–175.8
Mean Difference (*SD*) between This Trial and Preceding One (metres)[a]	N/A	3.9 (8.0)	0.8 (8.0)	N/A	1.7 (5.8)	2.6 (6.2)

[a] only for those subjects completing both this trial and the previous trial

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An interesting finding from this study was that the distance walked in 2 minutes increased over the three trials at discharge as well as at admission. The change between trials 1 and 2 at admission was greater than between trials 2 and 3, indicating that a plateau may have been reached. Information about the effect of a fourth trial is needed to be sure that a true plateau has been reached. The differences between trials 1 and 2 and trials 2 and 3 at discharge were similar. Although previous investigators did not examine a training effect where trials are separated by a period of time, there is an assumption that a training effect occurs at one point in time and that additional trials are not required at retesting.[1] Given the relatively long length of stay in our population, the time-frame between tests may have been long enough to require retraining. It is also possible that the differences observed are the result of the normal variability of the measure and that a mean of repeated measures is required to obtain a best estimate. Neither normative values nor the minimal clinically important difference for the 2MWT have been established, but the minimal clinically important difference has been reported to be 54 m for the 6MWT in patients with COPD who walk approximately 250 m in 6 minutes.[10] If there were a direct relationship between the clinically important difference of the 6MWT and that of the 2MWT, then a change of 12.5 m would be clinically important in those who walk about 58 m in 2 minutes (our population average at admission). This would suggest that the changes observed over the three trials may not be clinically important. However, with shorter total distances walked, smaller differences may be of clinical importance. Furthermore, extrapolating results form the 6MWT to the 2MWT may be misleading.

Future studies should confirm our findings, establish the minimal clinically important difference in 2-minute walk distances, and explore whether changes over repeated trials represent the normal variability of the distance walked in 2 minutes in this patient population. In addition, future studies should examine the effect of a fourth and possibly a fifth trial and determine the normative value for the 2MWT.

In conclusion, the 2MWT is a feasible measure of functional capacity in an in-patient geriatric rehabilitation population. We found an increase in the distance walked with repeated trials of the 2MWT in this population that may need to be taken into account when trying to evaluate change associated with treatment.

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