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Using The 6-Minute Walk Test As A Way To Measure Endurance Improvements In Older Individuals

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Scientific Inquiry II - Fall 2014
CAT Assignment #1

Title: Using the 6-Minute Walk Test as a way to Measure Endurance Improvements in Older Individuals

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Clinical Scenario: Patient is a 62-year-old female with a chronic progressive history of right hip and left knee osteoarthritis who noticed a functional decline over the past 2 years. Patient started on an aquatic program, per doctor request, to establish core strength as well as functional lower extremity strength. After 5 sessions of aquatic therapy, the patient requested to start a land program as well so she could strengthen more functionally. On her first day of land therapeutic exercise, we administered the 6 Minute Walk Test (6MWT) to establish the patient's baseline walking distance and thus her endurance. On the day of her initial evaluation, August 28, 2014, she walked 1,120 feet. On September 17, 2014, just 3 weeks later, she had increased to 1400 feet, a difference of 280 feet. The minimum clinically important difference, according to Rehab Measures, is 164 feet or 50 meters. We were able to use this number to see that her therapy had in fact been working to increase her endurance and decrease her pain, both enabling her to walk faster.

Clinical Question: Is the 6-Minute Walk Test a valid outcome measure to determine physical endurance in generally healthy, older men and women coming to physical therapy?[1]

P: Healthy, older men and women
I: 6-Minute Walk Test
C: Intentionally chose no comparison
O: Determining physical endurance

Clinical Bottom Line: According to Rikli, the 6MWT *can* be used to test endurance levels in generally healthy older adults. The 6MWT was shown to have test-retest reliability as well as being sensitive to change within different age groups and activity levels. It is important to note that there is a learning curve and a practice trial is necessary to overcome this variable.

In regards to my patient's Plan of Care, I now have to consider whether her clinically significant change from baseline to the second trial of the 6MWT was due to her knowing how to do the test better after the first time, if there were actually changes, or perhaps both. Since this patient has since been discharged, I cannot change her Plan of Care this time around. For future patients, I will do a practice trial of the 6MWT first. Following the practice trial, the following day but before their next sessions, we could try a second time and use that as our baseline score.

Search History:

Databases/Sites Searched	Search Terms	Limits Used
Medline – EBSCO SPORTDiscus	6 Minute Walk Test AND Endurance AND Older	Aged: 65+ years Language: English Academic Journals

Citations:

[1] I intentionally chose not to use a comparison in my clinical question

Rikli R, Jones C. The Reliability and Validity of a 6-Minute Walk Test as a Measure of Physical Endurance in Older Adults. *Journal Of Aging & Physical Activity* [serial online]. October 1998;6(4):363. Available from: SPORTDiscus with Full Text, Ipswich, MA. Accessed September 30, 2014.

Summary of Study:

Study Design: Randomized Controlled Trial

Setting: California State University, Fullerton, California 92834, USA

Participants: Participants were asked to participate from a nearby senior housing complex. They were also participating in a university-sponsored exercise program.

- Number of Participants: 77
- Mean Age: 73.1 years old with a SD of 7.2 (60 – 87 years old)
- Gender: 48 females & 29 males
- Inclusion: Over 60 years old, community residing, functionally independent and ambulatory without the use of an assistive device
- Exclusion: "No medical conditions that would contraindicate submaximal testing according to ACSM guidelines" (Rikli)

Intervention: The purpose of this study was to "test the effectiveness of a 6-minute walk as a measure of endurance in a sizeable sample of generally healthy, community-residing adults over age 60" (Rikli). They did this by having all patients first fill out a questionnaire and then performing 3 separate 6MWT's at least 2 days, but no more than 5 days apart. These results were compared to the outcome measures listed below to check for the 6MWT's effectiveness.

Outcome Measures:

- 6-Minute Walk Test: The 6MWT's were performed outdoors at a comfortable temperature of 68°-75°F. The course was set up on a 50-yard flat rectangular course. Subjects were encouraged by those giving the test while the subjects were asked to walk as fast but as comfortably as they could for 6 minutes. Heart rate was monitored throughout and patients were asked to give a rate of perceived exertion (RPE) score using the BORG 20-point scale at the end of the test.
- Treadmill Testing: Walking performance was measured using a modified Balke graded exercise test. The test started at 0% grade at 2.0 mph. At the end of each 3-minute interval, the grade was increased by 3.5% and HR & RPE were recorded. The test was ended when subjects reached 85% of their age-predicted maximal heart rate (220-age) or the subject asked to stop the test for whatever reason.
- Functional Ability: Functional ability was measured through self-report on the composite physical function (CPF) scale. This scale consists of a number of functional items and can be found on the last page of this document.
- Physical Activity Level: Physical activity level was also assessed through a self-report. Subjects answered the question "Do you currently participate in regular physical exercise that is strenuous enough to cause a noticeable increase in breathing, heart rate, and perspiration?" (Rikli). If yes, the subject was asked to state how many days per week. Subjects were classified into high active (≥ 3 days per week) or low active (≤ 2 days per week).

Data Analysis:

- Using a one-way ANOVA, test-retest reliability for the walking test was established.
  - Test 1 & 2: $.88 < R < .94$
  - Test 2 & 3: $.91 < R < .97$

    - Scores had a “good relative reliability across trials”. It should be noted that there was a significant improvement from Trial 1 to Trial 2 and a plateau between Trial 2 & Trial 3.
  - Pearson correlation analysis was also used to compare 6MWT scores against treadmill walking performance.
    - Moderate to moderately high correlation for men (r = .71) and women (r = .82)
- Construct validity was also assessed through ANOVA analyses to see if the 6MWT could discriminate between the high active and low active groups, as well as between age groups.
    - Significant (p < .0001) changes between age groups as well as self-reported activity levels were observed

Table 5 Mean Scores (Yards Walked), Standard Deviations, and ANOVA *F* Values for the 6-Min Walk Test for Age Group and Activity Level Categories

	n	*M*	*SD*	*df*	*F*	*p*
Age groups				2, 74	10.7	<.0001
60–69 years	20	677.8	95.0			
70–79 years	37	621.0	82.4			
80–89 years	20	550.1	86.7			
Activity groups				1, 74	36.5	<.0001
High active	59	647.6	81.5			
Low active	17	513.2	77.9			

[2]

- Lastly, correlation analysis was used to compare the 6MWT results with the self-reported CPF.
    - Correlation was lower than that of the 6MWT compared to treadmill walking between men (r = .71) and women (r = .61)
    - Still highly significant with a p-value of < .0001

Summary of Evidence: To begin answering my clinical question, the 6MWT *was* found to have reliability as well as validity when measuring physical endurance in healthy, older adults. The 6MWT was found to have good test-retest reliability (.88 < R < .94) when the first trial was used as a practice and not the baseline measurement. The 6MWT also showed convergent validity when compared to treadmill testing (.71 < r < .82). The 6MWT also had convergent validity when comparing age groups as well as fitness levels, meaning it is sensitive to change and measures what it claims to measure. All the data gathered fell within the 95% confidence intervals.

Additional Comments: The biggest issue with this study was that there was such a significant increase in yards gained between the first and second trial and a plateau between the second and the third. Because this was more than likely due to a learning curve, this would change how one would use it clinically. The question still remains whether the patient’s endurance actually improved between her initial evaluation and her discharge, if she knew how to perform the test better after practice, or perhaps a combination of the two. The internal validity of the study was well executed. I would be curious, however, to see the results from a population that was not from an exercise group at their facility, as this could cause a bias. In regards to external validity, I believe that these results could be applied to a general population. Again, I believe the external validity could have been higher, though, if they had randomly attained participants for the study. Overall, the study was well done, provided good validity and reliability, and can be easily administered in the clinic as a measure of endurance in older individuals.

[2] Chart can be found on page 371 of the Rikli article cited above

Composite Physical Function

Please indicate your ability to perform each of the following tasks. (Circle the appropriate response.)

	Can Do	**Can do with difficulty or help**	**Cannot Do**
A. Take care of own personal needs (such as dressing yourself)	2	1	0
B. Bathe yourself, using bathtub or shower	2	1	0
C. Climb up and down a flight of stairs (like to a second story in a house)	2	1	0
D. Walk outside one or two blocks	2	1	0
E. Do light household activities (such as cooking, dusting, washing dishes, vacuuming, raking leaves)	2	1	0
F. Do own shopping for groceries or clothes	2	1	0
G. Walk ½ mile (6-7 blocks)	2	1	0
H. Walk 1 mile (12-14 blocks)	2	1	0
I. Lift and carry 10 pounds (full bag of groceries)	2	1	0
J. Lift and carry 25 pounds (medium to large suitcase)	2	1	0
K. Do most heavy household chores (such as scrubbing floors, vacuuming, raking leaves)	2	1	0
L. Do <u>strenuous</u> activities (such as hiking, digging in garden, moving heavy objects, bicycling, aerobic dance exercises, strenuous calisthenics, etc.)	2	1	0

Total: _____

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