Standardization of Cardiopulmonary Skills: Measures of Aerobic Capacity

Background
Tests of aerobic capacity are used by PTs for evaluation and measurement of the progression of patients’ aerobic capacity. This literature review evaluated the applicability and best practice of the 6 minute walk test (6MWT), 2 minute walk test (2MWT), seated step test (SST), and 2 minute step test (2MST). Educational videos were made to educate the students of Northeastern University’s Doctorate of Physical Therapy (DPT) Class of 2017 on the correct standardized procedures to follow when performing these tests. These videos will assist in teaching the students how to choose which test is most appropriate for different patients and how to avoid common mistakes.

Methods

Needs Assessment
Students of Northeastern University’s 2017 DPT program were interviewed regarding their impressions on the current educational videos at their disposal. They provided feedback regarding how to make the videos more effective and informative.

Literature Review
The databases used include CINAHL, The Cochrane Library, Journals at Ovid, Medline, PT and Sports Medicine Collection, PubMed, Access Physiotherapy, Access Medicine, and EbscoHost. The researchers had access to all articles via Northeastern University.

Videos
When making the educational videos, a decision on the most accurate way to perform each aerobic capacity test was chosen based on the results of the literature review, followed by a discussion between the researchers of this project and the mentor regarding appropriate standardization and administration. These videos will be provided to future students through the Blackboard portal.

Conclusion
All of the aerobic capacity tests used in the videos have high levels of reliability and validity, as well as established norms and widespread use in the context of cardiopulmonary physical therapy. The 3MST was substituted for the 2MST due to a lack of evidence and information found. Students will need to administer these tests in their professional careers and our needs assessment concluded that students find educational videos to be a helpful tool in learning cardiopulmonary skills. Individual students have different learning styles and a video is a useful tool because it will be able to incorporate visual, auditory, written and demonstrative teaching methods. Similar videos have been implemented at Northeastern University with positive feedback, which has led the researchers to believe that this is a beneficial teaching strategy.

Results

<table>
<thead>
<tr>
<th>Test</th>
<th>Test Description</th>
<th>Population</th>
<th>Special Considerations</th>
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<tbody>
<tr>
<td>6MWT1</td>
<td>Standardized instructions from the American Thoracic Society. Patient is required to walk down and back along a 100 foot hallway as many times as he/she can in 6 minutes.</td>
<td>Patients with cardiac and pulmonary pathology, neurological pathology, and orthopedic pathology. Patients should be ambulatory.</td>
<td>Test is contraindicated in patients with unstable angina, MI within past month, or resting HR &gt;120 bpm. Patient should be at a fitness level where they may be expected to walk for 6 minutes.</td>
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<td>2MWT2</td>
<td>Similar to but less standardized than the 6MWT, the patient is given the instruction to walk “as far as you can for 2 minutes”.</td>
<td>Ambulatory populations who are unable to tolerate walking for 6 minutes, patients with neurological conditions, COPD, etc.</td>
<td>No encouragement is given during the test but patients are allowed to rest if needed.</td>
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<td>SST3</td>
<td>The patient steps to the beat of a metronome at one beat per second with an increasing step height for each stage of the test.</td>
<td>Non-ambulatory, frail, and community-dwelling patients, aging adults.</td>
<td>Consider the level of coordination of the patient when stepping. The Modified Seated Step Test is the first of the SST and is rated differently.</td>
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<td>3MST4-5</td>
<td>Patient performs a four step cadence on a 12 inch step for 3 minutes to the beat of a metronome set to 96 beats per minute. The number of steps completed in 3 minutes is compared to normative values of a patient’s age.</td>
<td>Adults and children in outpatient, inpatient, and home care settings, especially used with patients who have Cystic Fibrosis.</td>
<td>Four step cadence means that on the first beat of the metronome, the first foot steps onto the step. On the second beat, the second foot steps up. On the third beat, the first foot steps off the step. On the fourth beat the second foot steps off the step.</td>
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</table>

Selected References:
5. Holocaust A, Rosebush T, Wilson J, Burton B. Causation During the 5-Minute-Step Test Preceded Impaired 12-Month Outcomes in Adult Patients With Cystic Fibrosis. Respir Care. 2011;56(8):1387-1392