

PULMONARY FUNCTION TESTING:

The Six-Minute Walk Test

by Janet C. Sclafani, RRT, RPFT

Since the introduction of the 12-minute walk test by C.R. McGavin and colleagues in 1976, time-distance walk testing has become widely used as an indicator of functional capacity. In 1982, J.A. Butland further defined the test into two- and six-minute increments. While the two-minute version of the test is less discriminatory and the 12-minute test too long for most chronic obstructive pulmonary disease patients, the six-minute test has proven to offer the best results in terms of objectivity and clinical indications.¹

This test has become a standard evaluation tool at the start of a rehabilitation program to assess the patient's exercise capacity and set the exercise prescription. Exercise testing with gas analysis generally precedes the use of the six-minute walk as

the most comprehensive evaluation tool. At the conclusion of the rehabilitative process, the six-minute walk may be used to determine the outcome of the physical conditioning component of the program. The test has been used as part of the selection criteria of when to place patients on the lung transplantation list.

The six-minute walk test is a valued assessment tool by National Emphysema Treatment Trial (NETT) centers during the pre-surgical and post-surgical rehabilitation progress. Even patients themselves have realized their own success with the results of the six-minute test. Patients who have achieved approximately 170 feet increase in distance have rated themselves as doing "a little better" on evaluation tools assessing their perception of disability.² Cer-

tainly, clinicians can use this data as proof of a successful rehabilitation program when competing for health care reimbursement for their patients.

Testing environment and performance issues

A measured walking distance of at least 100 feet is required for performing this test. The walking path should be as unobstructed as possible, with minimal traffic and no stairwell or elevator exits into the walkway. The path should have rest areas where the patient can either sit or stand with support.

Blood pressure, heart rate, respiratory rate, and resting blood saturation by pulse oximetry should be obtained prior to testing. The patient, after being familiarized with the 10-point Borg Dyspnea Index Scale,

should rate their perception of the level of shortness of breath at rest.

If patients are using supplemental oxygen, it is best to test them on the system that they currently use. Supportive devices such as canes and walkers may also be used if needed. Rest stops are permitted as often as necessary, and the timer continues to run during rest stops.

According to the American Thoracic Society (ATS) recom-

mendations for evaluation of desaturation, SpO₂ (oxygen saturation as measured by pulse oximetry), heart rate, and distance should be recorded every minute. A recovery saturation reading after the walk should be noted. The test should be performed two times, with a minimum of 15 minutes of rest between trials. Though not essential, testing on separate days is the most ideal.

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Clinician's role

Staff supervising the walk test should instruct the patient about the walking path and test guidelines. They should also carry the patient's oxygen, if needed, and walk slightly behind them so they do not "pace" the walking speed. The patient may use any medication needed prior to the test and use their prescribed liter flow of oxygen for activity. Words of encouragement during the test have a positive effect on the results.³ The patient should follow instructions to walk the path and cover as much distance as possible in the six-minute time frame. The patient should not talk while walking. At the conclusion of the test, patients should again be rated on their level of shortness of breath. Instructions to the patient are necessary to place them at ease with the test.

The patient should be familiarized with both the walking path and the Borg scale prior to testing. The less apprehensive the patient is during the test, the better the results. Assurances should be given that they can stop the test at any time, medications may be used, and they will be performing two tests with a rest period in between each one.

Guidelines for desaturation

The ATS "Pulmonary Function Laboratory Management and Procedure Manual" provides guidance for oxygen titration at rest and with exercise.⁴ Each department should have a well-defined policy for oxygen titration. At our facility, we have successfully used the following procedure. For patients who desaturate to less than 88 percent on room air during a six-minute walk test, it is recommended to titrate the administration of oxygen until the desired SpO₂ is achieved. This should be followed with an arterial blood gas measurement after 20 minutes on the new liter flow. If the results are acceptable, the test is then repeated on 2 L/min. Arrangements may then be made for the patient to use the new liter flow during activity.

Patients who desaturate to less than 88 percent on their prescribed liter flow should have their liter flow increased by 1 L/min. for 20 minutes. The test is repeated at the increased liter flow, the physician is contacted, and adjustments are made to the prescribed liter flow with exercise. These changes can then be discussed with the patient before they leave. Patients presenting with a saturation level less than 88 percent on room air



are not tested. The physician should be contacted for further instructions and testing criteria.

Pulse oximetry devices

When using a pulse oximetry device, the limitations and validity of the results must be considered. The patient should be assessed for low perfusion and history of abnormal hemoglobin that may alter the results. Nail polish should not be worn. The stability of the readings and motion artifact should be considered when reporting results.

The clinician needs to assess the agreement between the palpitated heart rate and the reading on the device, along with the clinical appearance of the patient. The two determine the accuracy of the displayed results. The condition and placement of the probe is of particular consideration. The fit of the probe should not allow for exposure to ambient light conditions. Newer technology in pulse oximetry now affords the identification of venous blood signals. The venous signal can be canceled, allowing the arterial signal to be measured. Signal Extraction Technology (SET[®]) looks promising in relation to using pulse oximetry during movement and by decreasing the number of false alarms generated. Certainly this technology will afford the respiratory therapist a more accurate reflection of the saturation by eliminating motion artifact.⁵ If the issues regarding motion artifact can be resolved in the equipment, the clinician can make decisions regarding the patient's medical care with greater confidence in the device used to measure the saturation.

references

1. Butland, R.J., Pang, J., Gross, E.R., et al. (1982). Two-, six-, and 12-minute walking tests in respiratory disease. *British Medical Journal*, 284(6329), 1607-1608.
2. Redelmeier, D.A., Bayoumi, A.M., Goldstein, R.S., & Guyatt, G.H. (1997). Interpreting small differences in functional status: The six minute walk test in chronic lung disease patients. *American Journal of Respiratory Critical Care Medicine*, 155(4), 1278-1282.
3. Guyatt, G.H., Pugsley, S.O., Sullivan, M.J., et al. (1984). Effect of encouragement on walking test performance. *Thorax*, 39(11), 818-822.
4. American Thoracic Society. (1998). *Pulmonary function laboratory management and procedure manual*. New York: American Thoracic Society.
5. Harrington, S., Henderson, D., & Burton, G.G. (1999). Reliable pulse oximetry during exercise testing [Abstract]. *Respiratory Care*, 44(10), 1226.

Oxygen devices

Continuous flow or pulse delivery systems may be used during testing. It is recommended that patients use their personal system to assess their oxygen needs during activity. Patients who desaturate with a pulse delivery system may require continuous flow during activity.

There is no preference for oxygen delivery devices. As with the oxygen system, the patient's usual delivery device is used. The method of delivery should be noted on the report as well as whether the device was carried by the therapist or patient.

additional reading

American Association for Respiratory Care. (1991). AARC clinical practice guideline: Pulse oximetry. *Respiratory Care*, 36(12), 1406-1409.

Connors, G. (1999, March). *NETT seminar*. Presented by the American College of Chest Physicians in Orlando, FL.

Kadikar, A., Maurer, J., & Kesten, S. (1997). The six-minute walk test: A guide to assessment for lung transplantation. *The Journal of Heart and Lung Transplantation*, 16(3), 313-319.

McGavin, C.R., Gupta, S.P., & McHardy, G.J. (1976). Twelve-minute walking test for assessing disability in chronic bronchitis. *British Medical Journal*, 1(6013), 822-823.



Reporting results

Reporting formats vary from institution to institution; however, vital information must be included uniformly. Heart rate, blood pressure, respiratory rate, and a resting dyspnea index are basic evaluations that clinicians will look for initially on the report. A list of medications, current symptoms the patient may be experiencing, and limitations of the patient should also be included. The use of supportive devices, such as canes, walkers, or wheelchairs, should be documented.

Reporting formats include distance walked in feet, the average saturation, dyspnea index at

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the very conclusion of the walk, and a recovery saturation reading. A notation should indicate whether the test was on room air or with supplemental oxygen and the amount of oxygen used. Reasons for the termination of the test should be clearly documented and may include elevated heart rate, pain, desaturation, or patient request to stop.

Documented oxygen desaturation treated with the application of oxygen and any subsequent arterial blood gases should be documented. Information gathered from the second walk test should be the same as in the first and also be included in the report.

Tests that are not performed secondary to low saturations should document physician notification of such and any action taken.

Utility of results

Used appropriately, the six-minute walk test can supply critical information for the patient and the clinician. It can serve as an assessment for oxygen requirements, efficacy of the rehabilitative process, and as a part of the selection criteria for surgery. The test is simple to perform and the results easily appreciated by patients, providing them with positive feedback after an exercise program. 🧡

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