The 6 Minute Walk Test and Pulse Oximetry

One of the most popular clinical exercise tests is the Six-Minute Walk Test (6MWT). The 6MWT is a simple test that measures the distance that a patient can quickly walk on a flat, hard surface in a period of 6 minutes. It evaluates the integrated responses of all the systems involved during exercise, including the pulmonary and cardiovascular system, systemic circulation, peripheral circulation, blood, neuromuscular units and muscle metabolism.

Although the test is simple to perform, the results can be predictive of a range of information including medication response, risk of hospitalization and risk of mortality.

Enhancing the prognostic value of the 6MWT by measuring SpO₂:

Continuous pulse oximetry allows for analysis of desaturation curves, providing a comprehensive view of the time to a decrease in SpO₂, the intensity of that decrease, and the recovery time. This SpO₂ data can enhance the value of the 6MWT in multiple ways:

1. Prediction of Mortality:
   - Distance-Saturation Product (DSP), the product of the 6 minute walk distance (6MWD) and the lowest oxygen saturation during the 6 minute walk test (6MWT), was the most accurate predictor of mortality in idiopathic pulmonary fibrosis patient undergoing the 6MWT. A DSP <200 m% was associated with a seven-fold greater risk of mortality within 12 months and an 18.0% shorter median survival compared with a DSP > 200 m%.1
   - The multivariate analysis showed short distance and increase of DeltaSpO₂ (Start vs. Nadir) as significant independent predictors of the risk of death. 6MWT was also predictive of the prognosis of COPD patients.2

2. Clinical Severity of Disease:
   - Minimum SpO₂ and time to min SpO₂ are accurate predictors of COPD severity.3
   - In COPD patients, the time to desaturation in the 6MWD test can discriminate early desaturators, who desaturate during their daily living activities, and late desaturators, who do not desaturate.4
   - In patients with moderate to severe COPD, desaturation within the first minute of the 6MWT predicts the need for long-term home oxygen at 5-year follow-up.4

3. May Enhance Safety:
   - Approximately 6% of COPD patients achieved an SpO₂ of <=80 during the 6MWT, prompting the need for rest. Profound oxygen desaturation is the most common adverse event observed during the 6MWT in patients with stable ILD and COPD.5

Candidates for the 6MWT:

Primary:
- Pulmonary rehabilitation (pre/post)
- COPD
- Interstitial Lung Disease
- Thoracic Surgery
- Chronic Heart Failure
- Pulmonary Hypertension

Secondary
- Evaluation of exercise tolerance (peak oxygen uptake)
- Thoracic Surgery
- Chronic Heart Failure
- Pulmonary Hypertension
- Wellness evaluation
- Peripheral vascular disease
The Importance of Continuously Measuring Oxygen Saturation

Measuring Distance during the 6MWT is important; however, tracking progress with pulse oximetry during testing may show improvements or reduction in symptoms. A continuous SpO₂ measurement provides an objective measurement of a patient’s exercise tolerance.

The Nellcor™ Portable SpO₂ Patient Monitoring System, PM10N is a great option for the 6MWT.

For more than 30 years, clinicians have been using Nellcor™ pulse oximetry technology. Covidien provides a full offering of Nellcor™ pulse oximetry sensors and monitoring platforms, which can be used as tools for critical screenings.

The PM10N is a portable device that provides accurate, reliable SpO₂ and pulse rate readings for a broad range of patients and analytics for robust data analysis. The compact monitor offers a simple interface and has a rugged portable carrying case for ease of use when performing critical screenings, such as the six-minute walk test.

Accuracy

- LoSat expanded accuracy range (60% to 100% SpO₂) when used with Nellcor™ adhesive sensors with OxiMax™ technology

Speed

- Continuous SpO₂ pulse rate monitoring for measuring oxygenation. React to patient status with technology that displays patient oxygenation and pulse rate more quickly than other technologies.

Motion Tolerance

- The PM10N is a motion-tolerant pulse oximeter and is compliant with ISO 80601-2-61. This performance through motion is critical for an effective 6MWT as patient movement can interfere with accurate readings and could delay diagnosis of serious respiratory conditions.

Analytics

- Supports a robust data set, including real-time SpO₂ and PR values, SatSeconds alarm management, pleth waveform, blip bar and tabular trend data
- Up to 80 hours of data storage capability
- Supports wired data export to an external personal computer for data analysis and printing functions

Performance

<table>
<thead>
<tr>
<th>Measurement Range</th>
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<tbody>
<tr>
<td>SpO₂: 1% to 100%</td>
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<tr>
<td>Pulse rate: 20 to 250 bpm</td>
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<tr>
<td>Perfusion range: 0.03% to 20%</td>
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Accuracy

- Saturation (% SpO₂ ± 1 SD)
  - 70% to 100% ± 2 digits; ± 3 digits (Motion)
  - 60% to 80% ± 3 digits
  - Low perfusion: 70% to 100% ± 2 digits
  - Pulse rate: 20 to 250 bpm ± 3 digits
  - Low perfusion: 20 to 250 bpm ± 3 digits

6. Pinchukhov 2012