

NONIN® Avant® 4000 Bluetooth® Wireless Oximetry: Increased Safety and Accuracy When Administering the Six-Minute Walk Test

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The only wireless oximeter to meet all of the American Thoracic Society (ATS) guidelines for the Six-Minute Walk Test (6MWT), the NONIN Avant 4000 provides real-time monitoring without immediate patient contact. Conducting the 6MWT with the Avant 4000 allows patients to move at their own pace, resulting in a more accurate clinical evaluation. The technologist is able to focus more attention on the test administration while still monitoring the patient, resulting in decreased repeat testing and improved patient safety.

Clinical Setting

Cleveland Clinic, located in Cleveland, Ohio, is a not-for-profit, multi-specialty academic medical center that integrates clinical and hospital care with research and education. Founded in 1921, Cleveland Clinic was developed by four renowned physicians with a vision of providing outstanding patient care based upon the principles of cooperation, compassion and innovation. Today, Cleveland Clinic is one of the largest and most respected hospitals in the United States and worldwide.



With over twenty physicians, the Pulmonary Institute treats a wide variety of lung disorders including asthma, chronic obstructive pulmonary disease, sarcoidosis, histoplasmosis, pulmonary fibrosis and pulmonary hypertension. The Pulmonary Function Laboratory at the main campus is comprised of seven testing rooms and a staff of eight pulmonary function technologists who are respiratory therapists specializing in diagnostic testing. In 2006, this staff administered a total of 23,000 procedures on over 12,000 patients. Among these procedures are a variety of

tests involving pulse oximetry, including assessment of oxygen saturation at rest and with exercise, titration of supplemental oxygen, altitude simulation tests and 6MWT.

The 6MWT is a simple, objective procedure that assesses the sub-maximal level of functional capacity. Pulse oximetry during a 6MWT provides valuable information about improvement or worsening of the patient's condition as well as information about when to terminate the test for safety reasons. ATS guidelines for the 6MWT call for the pulse oximeter to be lightweight (less than two pounds), battery powered and held in place so the patient does not have to hold or stabilize it.¹

The clinical protocol for the 6MWT at Cleveland Clinic is to attach the pulse oximeter sensor using either a digit or a forehead reflectance sensor and have a technologist carry the oximeter while walking just behind the patient. The technician also carries a stopwatch and a lap counter.

Clinical Solution

All this changed in 2006 with the evaluation of the **NONIN Avant 4000 Bluetooth Wireless Oximeter**.

With this unique device, a module with pulse oximeter sensor attached is worn on the patient's wrist or forearm or can be placed in a pocket. Pulse oximetry results are transmitted to a table top display which can be placed anywhere within



a 30 foot radius. The wrist module unit weighs 4.4 ounces and does not impede rapid walking.² Free from the tether of the sensor to oximeter cable, the technologist is able to focus more attention on test administration while still monitoring the patient.

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Clinical Use/Implementation

The Avant 4000 has all of the standard features one expects from a clinical pulse oximeter: pulse signal quality assessment, high and low SpO₂ and heart rate alarms, and download capability. The display unit can be powered by line current or battery and can audibly signal each pulse detected – a feature that conveniently alerts all in the area that a walk test is in progress. This feature can also be silenced.

Avant 4000 Digital Pulse Oximetry System Specifications²

Wrist Module Weight: 4.4 oz.
SpO₂ and Heart Rate Alarms
Display Dimensions: 7.25" wide x 5.5" high x 4.5" deep
Audible Signal of Waveform Detection
Radius of Transmission: 30' radius
Memory: 33.5 hours
Battery Life: Wrist Module – 120 hours of continuous monitoring, Display – 18 hours of continuous monitoring

The interference of a finite length of cable would often slow down the faster-walking patient if the technologist lagged behind. This would sometimes cause the final 6MWT distance to be artificially low and require a repeat test. The Avant 4000 has minimized the need for repeat testing and allows for a more accurate clinical patient assessment.

References:

¹ Torrey, Brian. ATS guidelines for the six-minute walk test – American Thoracic Society Committee on Proficiency Standards for Clinical Pulmonary Function Laboratories. *American Family Physician*, Sept 1, 2002

² Avant 4000 Digital Pulse Oximeter Operator's Manual; Nonin Medical, Inc., 2005

NONIN Avant 4000: The Only Wireless Oximeter to Meet ATS Guidelines for the 6MWT



ATS Pulse Oximeter Guidelines for 6MWT¹:

- Technician must not walk with the patient
- Lightweight, <2 pounds
- Battery powered
- Held in place such that stride is not affected
- Motion tolerant

Clinic Staff and Patient Acceptance

Acceptance of the device by the testing staff was immediate and extremely positive. Gone was the need to carry an oximeter and be within three feet of the patient during the 6MWT. Patients with normal functional capacity can be allowed to walk very quickly without feeling constrained by the attachment to a device carried by a technologist. The Avant 4000 is easy to use. Training on device operation, facilitated by an informational CD, can be done in less than 30 minutes.

Summary

The only wireless oximeter to meet all of the ATS guidelines for the 6MWT, the NONIN Avant 4000 provides real-time monitoring without immediate patient contact. Conducting the 6MWT with the Avant 4000 allows patients to move at their own pace, resulting in a more accurate clinical evaluation. The technologist is able to focus more attention on the test administration while still monitoring the patient, resulting in decreased repeat testing and improved patient safety.

