SMALLER, INNOVATIVE SPIROMETERS MAKE PULMONARY FUNCTION TESTING A BREEZE

By Stephanie Richardson

Take a look around, and you'll see that the electronic devices you rely on day-to-day are shrinking. From cell phones to CPAP, manufacturers have innovated technology that packs the same punch in a compact, streamlined device. The latest spirometers incorporate advanced sensor technology in a portable design, making lung function testing even easier in pulmonary lab and primary care environments.

Depending on whom you ask, some physicians and respiratory therapists say they prefer smaller spirometers for their portability, while others hype a device's ergonomics. Regardless, large spirometers are almost extinct, primarily because of cost and sheer size. Physicians want a cost-effective device that fits in offices or clinical settings where space is at a premium.

Part of a spirometer's ease of use stems from its ergonomic design. Not only are new spirometers smaller and easier to carry, some are manufactured with textured handgrips that make using them more comfortable for adults and children. Because they are lightweight, any hand strain from picking up the device is eliminated as well.

In addition, nose clips have been more ergonomically designed so patients requiring them during testing can wear them more comfortably. Many of these nose clips are latex-free with secure cushioning that fits children and adults.

Pocket spirometry

Handheld diagnostic spirometry is fast becoming a necessity for clinicians. Pocket spirometers with optional SpO2 detection also are on the rise. These devices all can be used for recording, measuring and assessing flow-volume loop and associated parameters.

Key features of pocket spirometers include:

- Inspiratory and expiratory lung volumes (FEV1, FVC, PEF)
- Pre/post interpretation
- Direct printout without PC
- Flow/volume loops and SpO2 measurement
- Database with 500-plus test memory

Even though pocket spirometers are mere shadows of their desktop counterparts, they contain the same technology in a smaller package. Touchscreens provide graphic displays with menu-guided operations. By touching a graphic on the integrated touchscreen, clinicians can enter patient data and menu options can be chosen easily.

They also can be used as a remote data collection device or as PC spirometry systems by plugging them into a tabletop unit.

Most of these spirometers operate with rechargeable lithium ion batteries, which allow the device to work for up to two weeks without recharging. When recharging is required, these batteries can be powered up in two hours.

Additionally, pocket spirometers feature high-quality pneumotachs that can be easily disinfected. This guarantees higher patient safety and more precise results, as well as save money. For those pocket devices utilizing disposable filters and mouthpieces, they can be purchases for $2 a piece or less.

Transducer and sensor upgrades

A new digital transducer that follows the gold standard for spirometry is effective at low flows and complies with current American Thoracic Society and international standards for accuracy.

Increases in the use of spirometers for the diagnosis of chronic obstructive pulmonary disease have shed light on testing weaknesses where low flow is observed. Due to their lung capacity, COPD patients are notorious for providing low flows during spirometry tests. In the past, some spirometers were unable to accurately detect lung volumes for COPDers.

The digital transducer incorporates the advantages of inherent stability and protection from the effects of pressure, humidity and temperature that prevent accurate test results. It has shown a 40-percent improvement in testing accuracy, as well as an improved linearity at low flows.

Further, digital transducers have overcome problems associated with unheated pneumotachographs and wedge-bellows spirometers when testing COPD patients. Unlike a digital transducer, these alternative transducers have shown to have reproducibility and stability problems.

Another innovation in sensor technology provides accurate and reproducible flow/volume measurements to within ± 1 percent. This surpasses the current ATS/European Respiratory Society I guidelines of ± 3 percent. Available later in 2007, the flow sensor reduces trending variability in longitudinal FEV1 measurements common in many spirometers. This means clinicians will be able to detect small changes in pulmonary function quicker than before.

Additionally, this sensor is self-monitoring. It evaluates the spirometer in real time, detecting system problems and alerting

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Featured Spirometers

MicroLoop Spirometer

Micro Direct, Inc.

800-588-3381

www.micro-direct.com

Circle Reader Action# 94

EasyOne™ Spirometer

ndd Medical Technologies

877-904-0090

www.nddmed.com

Circle Reader Action# 95

AllFLOW™ IQ Spirometer

Alliance Tech Medical, Inc.

800-848-8923

www.alliancetechmedical.com

Circle Reader Action# 96

Discovery-2® Spirometer

Futuremed

800-222-6780

www.futuremedamerica.com

Circle Reader Action# 97

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users to hardware degradation, poor calibration and defective calibration syringes before they impact test results.

Ultrasound spirometry

A unique selling proposition of some handheld spirometers is ultrasound measurement. It's the measurement technique available on the only spirometer currently recommended by the National Lung Health Education Program for office spirometry.

Ultrasound spirometry has no moving parts like conventional spirometers and doesn't require a mechanical sensor to measure inhaled and exhaled breath. Measurement also is independent of gas composition, pressure, temperature and humidity. This eliminates errors due to these variables.

Another benefit of ultrasound spirometers is that no tubes are needed. Any part of the device that might become contaminated by infection is single-use, thus preventing the spread of nosocomial infections via lung function testing. In the future, this could be beneficial for immunocompromised patients.

Monitoring diabetes

With the advent of inhaled insulin for diabetes treatment, clinicians are administering spirometry to patients who never needed it before. Although inhaled insulin was in development for more than 10 years before it was approved, no drug is perfect, and a side effect is small changes in pulmonary function that may occur shortly after initial treatment.

Diabetes patients prescribed inhaled insulin must keep tabs on their pulmonary function as part of standard care. Patients are advised to have a spirometry test to determine baseline pulmonary function before starting inhaled insulin, after six months of treatment and annually thereafter.

With more diabetes patients turning to inhaled insulin for convenience, there's a need to test pulmonary function during a diabetes checkup rather than sending him or her to a specialist. In the long run, this saves money for both patient and physician.

Many office spirometers are now reimbursable for monitoring inhaled insulin, and a few will pay for themselves in less than 40 patient tests. Look for the following specifications when choosing an office spirometer to follow your diabetes patients:

- Measures forced vital capacity: FVC, FEV1, FEV6, FEV1/FVC, FEV1/FEV6 and PEF
- 0 to 16 L/sec flow range
- 50 Hz sampling frequency
- ± 3% (50 mL) volume and ± 5% (150 mL) flow
- Battery operated (alkaline or NiMH batteries)
- Communication port (printer or USB)
- Disposable filters

Because inhaled insulin is not recommended for patients with underlying lung disease and is contraindicated in smokers, it's always important to test lung function before prescribing it to a diabetic patient.

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