AIRWAY CLEARANCE FOR TODAY'S PULMONARY PATIENTS

By Stephanie Richardson

Airway clearance is an integral part of standard therapy for individuals with cystic fibrosis, bronchiectasis and other pulmonary diseases. Although the world of airway clearance therapy has not seen much change in the past decade, some devices are quietly moving to the forefront of patient care.

While many reviews have been produced that compare the efficacy of airway clearance techniques, patients have expressed interest some devices more than others to be used alone or in combination with traditional chest physiotherapy. Here are some of the techniques that have garnered the most popular response from patients and respiratory therapists in terms of efficacy and comfort.

A sound practice

One of the latest innovations in airway clearance therapies is a system that sends acoustic vibrations into the airways. This digitally controlled acoustical airway clearance device reduces mucus viscosity by applying low-energy resonant vibrations that help promote the flow of mucus. Although it is an advanced technology, the acoustic device requires no special training and only consists of a control unit and a transducer.

To use acoustic airway clearance, the patient may be sitting or reclined, whichever best promotes mucus flow. The caregiver or patient places the transducer on the area to be stimulated. He or she then adjusts the frequency and volume to create sympathetic resonance that can be felt in the lungs. After a few seconds, the acoustic vibrations begin to loosen mucus to promote coughing and the expectoration of sputum.

An open, controlled study compared postural drainage using chest physiotherapy with acoustic airway clearance therapy. The goal was to verify if acoustic airway clearance was a safe and effective method to help clear airway secretions in cystic fibrosis patients. All study participants underwent therapy with each method for 20 minutes, 18 to 24 hours apart. Their sputum was collected and weighed during therapy and five minutes post-therapy.

The study results indicated that acoustic therapy is as safe and effective as chest physiotherapy for inducing airway clearance in cystic fibrosis patients.

Good vibrations

Vibratory PEP systems combine the benefits of PEP and airway vibrations to mobilize pulmonary secretions. It can accommodate virtually any patient's lung capacity and allows inhalation and exhalation without removing the device from the mouth. Additionally, it can be used with a mask or mouthpiece nebulizer.

Some patients may prefer vibratory PEP therapy because they can administer it themselves from any position: sitting, standing or reclining. This is a key feature for pediatric airway clearance.

In a study comparing the effectiveness of vibratory PEP to traditional airway clearance, 20 patients with bronchiectasis with acute exacerbation were divided into two groups. The first group received vibratory PEP at home with oral antibiotics; the second group receive oral antibiotics at home with "usual airway clearance." The mean volume of sputum expectorated in the vibratory PEP group was higher than the second group. The study demonstrated that vibratory PEP provided acceptable user-friendly airway clearance to bronchiectasis patients.

Vibratory PEP also has been shown to be better tolerated in patients than traditional chest physiotherapy. It also facilitates the opening of airways in patients with lung diseases with secretion problems, including asthma, cystic fibrosis and chronic obstructive pulmonary disease. Depending on the degree of airway clearance required, the frequency and flow resistance of the vibratory PEP device can be adjusted with a dial to customize therapy.

A different model of vibratory PEP allows patients to interact even more with their therapy. With training, the patient can create his or her ideal frequency and percussive pressure by manually rotating the device's handle while breathing through it. Faster rotation gives lower pressure, while slower rotation gives higher pressure. The interaction helps contribute to a patient's disease self-management. This type of vibratory PEP is also helpful in that it generates vibrations during inhalation, unlike other similar devices.

Adding a vest to your wardrobe

Airway clearance devices fall into two categories, assisted and unassisted. Assisted means that the respiratory device actively works on the respiratory system. Vest therapy for airway clearance, high-frequency chest wall compression (HFCWC) or oscillation (HFCWO), is an assisted therapy.

While they are some of the most expensive airway clearance devices on the market, vest systems have shown positive results, particularly for cystic fibrosis patients. They have been shown to have equivalent results

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Featured Airway Clearance Devices

CoughAssist®

Philips Respironics

800-345-6443

http://coughassist.respironics.com

Circle Reader Action# 83

Quake®

Thayer Medical

800-250-3330

www.thayermedical.com

Circle Reader Action# 84

Frequencer™

Dymedso

877-396-3376

www.dymedso.com

Circle Reader Action# 85

SmartVest®

Electromed, Inc.

800-462-1045

www.SmartVest.com

Circle Reader Action# 86

acapella® duet

Smiths Medical

800-258-5361

www.smiths-medical.com

Circle Reader Action# 87

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to chest physiotherapy in stable and hospitalized cystic fibrosis patients. However, although patients have shown preference to vest therapy over chest physiotherapy, compliance is low at about 45 percent. More than 70,000 vest devices have been prescribed for airway clearance therapy.

HFCWO works by wrapping the patient's chest in the inflatable vest. When inflated, the vest applies pressure to the chest, compressing the chest wall to generate short bursts of expiratory flow. When the vest deflates, the chest wall goes back to its resting position, which causes inspiratory flow. A typical treatment period lasts 20 to 30 minutes, divided into smaller time segments for administration of different frequencies.

It was the opinion of one study author that HFCWO is probably more effective than chest physiotherapy for clearing secretions. Further, 80 percent of respiratory therapists who use vest systems believe it saves time over manual chest physiotherapy.

Choosing wisely

It's important to realize that the first airway clearance modality prescribed for a patient may not be the best fit in all cases. After a trial period, a respiratory therapist or pulmonologist should assess a patient's response and comfort level with therapy. If discomfort causes compliance failure, other options may need to be provided.

No matter which airway clearance method is prescribed, patients and their families should be fully educated about the proper use of the device and its benefits.

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Other Alternatives

For Airway Clearance

- Assisted cough devices (mechanical in-exsufflators) often are used for therapy in patients with neuromuscular weakness. These electric systems clear secretions by delivering gradually increasing positive pressure to a patient's airway. That pressure shifts rapidly to a negative pressure with high respiratory flow rates that help patients with inefficient coughs to expel sputum.

- Positive airway pressure masks and systems are another mode of airway clearance preferred by some COPD and cystic fibrosis patients. These devices provide pressures ranging from 5 to 25 cm H2O and can be self-administered by patients in any setting. They also can accommodate just about any patient's lung capacity.

- Intrapulmonary percussive ventilation delivers rapid high-flow bursts from a pneumatic flow interrupter into the lungs via a mouthpiece. Because it is hooked to a nebulizer and compressor, aerosol therapy can be delivered simultaneously.