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Assisted Cough Techniques— There's More Than One Way to Cough

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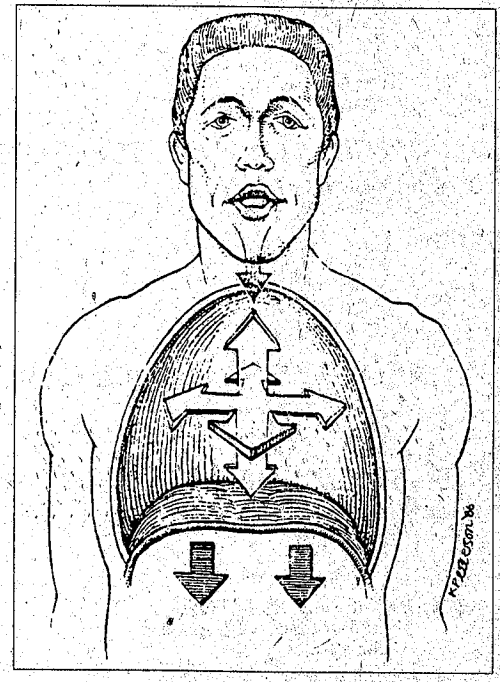
As therapists dealing with respiratory dysfunction, we frequently face neurologically impaired patients who are unable to cough independently. In these situations, the therapist needs to find alternative techniques to mobilize secretions. Unfortunately, suctioning is often the technique of choice because therapists are unaware of assistive cough procedures that can help the patient to produce an effective cough. When the therapist assists the patients in producing a more effective cough, the need for suctioning is reduced. This article describes eight such assistive cough techniques in three developmental postures that were initially developed for use with neurological patients, but whose application certainly applies to a broader range of patient populations (See Table One).

Two mechanisms are known for clearing airways of secretions— ciliary action and coughing. Our job is to assist the patient first in moving secretions to the point where the cilia can be effective, and then assist in the exhalation phase of coughing to expel the mucus from the upper airways. Coughing will only clear the level of segmental bronchi, consequently, secretions must be mobilized to that level for a cough to be effective. In neurologically impaired patients, postural drainage, or at least good positional rotation for drainage of secretions is very important.



The following assistive cough techniques will be broken up into three body postures— supine, sidelying or sitting. These are the positions pa-

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tients are most likely to assume or be positioned in by nursing. Giving eight techniques to consider allows the therapist or nurse many ways of helping the patient to mobilize secretions regardless of the position of the patient. It also helps the patient to realize that he/she can cough and mobilize his/her secretions in any posture.

Table One
Assistive Cough Techniques °

Supine
Costophrenic Assist
Anterior Chest Compression
Sidelying
Costophrenic Assist
Heimlich-Type Assist
Combination of above two
Massery Counterrotation Assist
Sitting
Quadriplegic Long-Sitting Assist
Paraplegic Long-Sitting Assist

Supine

Many patients need to be treated in supine due to their medical situation. The first technique is called the *Costophrenic Assistive Cough.* This is one of the most common techniques used in the clinical setting. The therapist places his/her hands on the costophrenic angle of the patient's rib cage, then applies a quick manual compression inferiorly and medially (down and in) during the exhalation phase of the cough to assist in chest closure, and to provide the force necessary to effectively move secretions along the tracheobronchial tree.

Another common technique is the *Heimlich-Type Assist* or the *Abdominal Thrust.* In this maneuver the therapist places his/her hand on the abdominal wall well below the xiphoid process. During the exhalation phase of the cough, the therapist quickly pushes upward toward the diaphragm similar to the Heimlich maneuver used during a choking episode. Several factors may interfere with the effectiveness of this technique: 1.) patient discomfort; 2.) reflex stimulation of the abdominal muscles; or 3.) trunk spasticity. The assisted cough generally is more successful when performed in a sidelying posture because abdominal tone is decreased and patient comfort is greater.

The third assistive cough in supine in the *Anterior Chest Compression.* The therapist places one forearm across the patient's upper chest and other arm across the abdomen. During the exhalation phase of the cough, compression is given diagonally with both arms toward the middle of the chest to maximize chest compression. Here, the therapist assists both the lower and upper chest in a way the two previous procedures were unable to accomplish.

Sidelying

Neurologically impaired patients with high muscle tone will find coughing in sidelying to be a more preferable posture. It is easier to control the tone of the trunk in sidelying through lower extremity positioning in flexion. In addition, abnormal reflexes will play a smaller role in this procedure.

The first technique in sidelying is the *Unilateral Costophrenic Assistive Cough,* which is performed as described previously with the hands on the lateral costal aspect of the chest giving compression inferiorly and medially during the exhalation phase of the cough. This technique works well in patients with: 1.) an isolated involved long segment such as the lateral segment of either lower lobe; 2.) hemiplegia; or 3.) unilateral surgical procedures.

The second technique, the *Heimlich-Type Assist,* applies a modified Heimlich maneuver during the exhalation phase of the cough as previously described.

The third and most effective technique is a com-

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bination of the *Costophrenic* and the *Heimlich-Type Assist* to maximize chest compression, which utilizes a preferred posture for neurologically impaired patients.

The final technique is the *Massery Counterrotation Assistive Cough* which compresses the upper and lower chest simultaneously, thus expelling a greater volume of air. Counterrotation of the trunk is used to maximize the inspiration prior to the cough and then uses the reverse rotation to more effectively compress the chest during the exhalation phase of the cough.

To prepare for the *Counterrotation Assist,* the therapist stands at the patient's hips facing the patient on a diagonal. If the patient is lying on the left side, the therapist's left hand is placed squarely on the patient's right scapula while the right hand is placed over the patient's anterior crest of the hip. During the inhalation prior to the cough, the therapist stretches the patient's chest augmenting that breath. The therapist's left hand pushes the thorax superiorly and away from him/her while the right hand pulls the patient's hip inferiorly and back towards him/her. The therapist then slides the left hand forward onto the anterior upper chest while his/her right hand slides back into the hollow of the buttocks. During the cough the left hand pulls the upper chest inferiorly and back towards him/her while the right hand pushes the buttocks superiorly and away from the therapist.

These two phases respectively, cause an increase in total chest cavity dimensions facilitating inhalation, followed by a compression of the whole chest cavity facilitating a forceful expulsion of air. It is the authors' opinion that this is the most effective assistive cough maneuver for patients without orthopedic precautions or other mitigating medical circumstances.

Sitting

Other postures, such as upright sitting, allow patients to learn independent assistive cough techniques for functional use. The paraplegic patient can do a *Long Sitting Assistive Cough* by sitting on a bed or on the floor with legs straight out in front. When the patient takes a breath in he/she brings the arms up over the head as far as he/she comfortably can. Then the patient coughs out while throwing the arms toward the feet and bending forward as far as he/she can. This procedure acts as an independent *Heimlich-Type Assist* and can be used by most patients with good independent sitting balance.

For patients with inadequate sitting balance, the *Quadriplegic Long Sitting Assist* is appropriate. The patient sits as above but with the arms extended behind him/her in a supportive position. With his/her balance supported by the upper extremities he/she takes in a deep breath extending the head back. Then he/she throws the head forward while coughing out. Although by no means as effective as the *Paraplegic Long Sitting Assistive* cough, it does give the patient an independent means for supplementing his/her own cough mechanism.

The final sitting maneuver, the *Short Sitting Assist,* is performed in a chair or wheelchair. The patient grasps his/her own hands in a fist and places them on the abdomen beneath the xiphoid process. During the cough, he/she pulls his/her fist up and under the diaphragm to aid in inferior expulsion.

Conclusion

Several assistive cough techniques were discussed utilizing three commonly assumed treatment positions— supine, sidelying and sitting. These cough techniques are only a few of the alternative ways to assist a patient in mobilizing secretions. Other techniques and postures exist to aid a patient in coughing more effectively. For example, the patient could cough while breathing in and backward to his/her heels for the exhalation phase of the cough. This article is intended to help therapists become more creative and identify alternative possibilities for effective airway clearance using non-invasive procedures such as an assistive cough technique.