



Fig. 2. Subjective (visual analog scale) ratings of nasal discomfort while receiving oxygen via nasal cannula, among patients with pulmonary disease. Only at flows ≥ 3 L/min was discomfort significantly greater during dry oxygen than during humidified oxygen. * $p < 0.05$ for dry versus humidified oxygen.

the second half or end phase of expiration. Only one healthy volunteer reported feeling no nasal discomfort while inhaling dry oxygen; all the other subjects reported some degree of discomfort and irritation. These data clearly demonstrate that humidification of oxygen reduces nasal discomfort that can occur in both young healthy volunteers and older patients with pulmonary disease, particularly at flows ≥ 3 L/min.

Two limitations of this study were that subjects reported their feelings after only 1 min at each oxygen flow, and that the healthy subjects were not in the same age range as the patient subjects. Thus, the differences in nasal dryness discomfort between the groups might be attributable to differences in nasal mucosa from aging or chronic respiratory disease, in addition to any potential differences in the dryness sensation itself.

In conclusion, humidification of oxygen may be worthwhile, based on patient request and/or symptoms when oxygen therapy via nasal cannula is prescribed, even for flows ≤ 4 L/min. Obviously further studies of longer duration are warranted.

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The authors report no conflict of interest related to the content of this letter.

REFERENCES

1. American Association for Respiratory Care. Clinical guideline for oxygen therapy in home or extended care facility. *Respir Care* 1992;37(8):918-922.
2. American Thoracic Society. Standards for the diagnosis and care of patients with chronic obstructive pulmonary disease. *Am J Respir Crit Care Med* 1995;152(5 Pt 2):S77-S120.
3. Lasky MS. Bubble humidifiers are useful: fact or myth? *Respir Care* 1982;27(6):735-737.
4. Estey W. Subjective effects of dry versus humidified low flow oxygen. *Respir Care* 1980;25(11):1143-1144.
5. Campbell EJ, Baker D, Crites-Silver P. Subjective effects of humidification of oxygen for delivery by nasal cannula. *Chest* 1988; 93(2):289-293.

Vocalization During Huff

This letter is regarding the recent recommendation by James B Fink PhD RRT FAARC, in the September 2007 special issue of *RESPIRATORY CARE* on airway clearance, regarding huff technique.¹

Fink advocated whispering the word "huff" while performing the huff technique. I believe this is not correct and would be detrimental to performing the huff. I am not aware of any authoritative source that advocates the whispered "huff."^{2,3}

The huff technique was so-named because the sound produced with a properly performed huff was similar to the spoken word "huff."

Huff is an open-glottis technique, designed to assist mucus clearance in patients who are unable to produce an adequate expiratory expulsive force, and maintaining an unobstructed open glottis is crucial to the technique. Whispering implies vocalization, and vocalization necessitates at least some degree of vocal cord closure, depending on how the act of whispering is performed. Even partial upper-airway closure must be detrimental to huff performance.

In addition, the huff requires the patient to fully focus while doing the expulsive portion of the procedure, and whispering would necessitate some element of distraction, even in well trained patients. Also, the sound of the huff is a valuable signal to both patient and therapist as to the adequacy of the huff performance.

For these reasons the whispered "huff" should not be performed.

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Deane Hillsman MD owns and operates Sierra Biotechnology Company, which manufactures technologies used in respiratory therapy. He reports no other conflicts of interest.

REFERENCES

1. Fink JB. Forced expiratory technique, directed cough, and autogenic drainage. *Respir Care* 2007;52(9):1210–1223.
2. Pryor JA. Physiotherapy for airway clearance in adults. *Eur Respir J* 1999;14(6):1418–1424.
3. Frownfelter D, Dean E. Cardiovascular and pulmonary physical therapy: evidence and practice, 4th ed. Elsevier; 2006.

The author responds:

Thanks to Dr Hillsman for his comments. The basic forced expiratory technique maneuvers described initially by Thompson and Thompson¹ and later by Pryor et al² did not include instruction to whisper “huff.” I agree that modifications to techniques previously established from a research base might add or detract from their efficacy. In retrospect, the readers might have been better served had I distinguished the role of the “whispered huff” as a teaching technique independent of the basic steps of the maneuver.

That said, I disagree that this vocalization interferes with the huff maneuver. Vocalization of the soft “huff” actually promotes an open mouth and open glottis, up to the formation of the “ff” sound, which is more of a motion of the upper teeth meeting the lower lip at the end of the expiratory maneuver.

The whisper is intended to be adjunctive to the maneuver, not to replace it. As the patient starts by initially whispering “huff,” the basic pattern is established, and the clinician builds on that effort, encouraging a stronger, more effective huff maneuver.

The suggestion to whisper “huff” has been used for over 20 years in teaching huff technique to young children with cystic fibrosis and older patients with chronic obstructive pulmonary disease. I adopted this technique from clinicians who were successfully using it with children as young as 2 years old.^{3,4}

During my work with older patients in the Veterans Affairs hospital and clinic system I found that instructing the patient to whisper “huff” was useful during initial sessions. These patients were so used to coughing (which starts with a closed glottis), often in uncontrolled paroxysmal spasms, that whispering “huff” helped them to control their breathing pattern and transition to the new open-glottis huff paradigm. As the tech-

nique is mastered, the “whisper” can (and possibly should) be dropped.

Interestingly, I find huff and forced expiratory technique of great benefit specifically because the maneuvers do not require great concentration once learned, compared to other secretion-mobilization techniques, and I have had great success with both small children and geriatric patients with chronic obstructive pulmonary disease during severe exacerbations, when they can concentrate the least and need it the most.

On a humorous note, with the really small children we used to call it the chicken cough and had them move their arms like wings, bringing them down to their sides during the huff maneuver, which made early instruction of the huff a part of their play activity. It certainly distracted the adults in the room, if not the children.

Although it was not described in the early definitive studies, I believe that the adjunctive whisper of “huff” is a valuable aid in training the patient to differentiate the huff maneuver from a closed-glottis cough.

My recommendation to use the whisper “huff” technique was based on training, experience, and anecdotal observations in instruction of a wide range of patients. To date, this teaching technique has not been rigorously studied in young children. Until such research is done I recommend an *n*-of-1 approach⁵ to determine whether an individual patient who has difficulty learning the huff maneuver benefits from whispering “huff” while learning the maneuver.

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REFERENCES

1. Thompson B, Thompson HT. Forced expiration exercises in asthma and their effect on FEV₁. *New Zealand J Physiother* 1968;3:19–21.
2. Pryor JA, Webber BE, Hodson ME, Batten JC. Evaluation of the forced expiration technique as an adjunct to postural drainage in treatment of cystic fibrosis. *Br Med J* 1979; 2(6187):417–418.
3. Hardy KA, Anderson BD. Noninvasive clearance of airway secretions. *Respir Care Clin N Am* 1996;2(2):323–345.

4. Davidson KL. Airway clearance strategies for the pediatric patient. *Respir Care* 2002; 47(7):823–825.
5. Hess DR. Secretion clearance techniques: absence of proof or proof of absence? *Respir Care* 2002;47(7):757–758.

Obstacles to Implementing Evidence-Based Guidelines

In the December 2007 issue of the *Journal*, Kaynar et al reported on the practice patterns of respiratory therapists and intensive care (ICU) nurses in preventing ventilator-associated pneumonia (VAP) based on evidence-supported guidelines.¹ Given our own investigations in the field of evidence-based recommendations for infection prevention,^{2–4} we read their paper and the related editorial⁵ with great interest. Kaynar et al describe a relatively high rate of adherence to ineffective VAP-prevention measures and suggest that this might be related to the poor translation of evidence into bedside practice, or to other barriers to this process.¹ We wish to draw your attention to some of our findings, which, at least to some extent, may help explain poor adherence to VAP guidelines.

We had 638 Flemish ICU nurses take a multiple-choice test on evidence-based VAP-prevention guidelines^{3,6} and found the mean test score to be a disappointing 41.2%.² Strikingly, although Kaynar et al used a different research design, our results strongly support theirs, and reveal important misconceptions about the effectiveness of VAP-prevention strategies. For example, 60% of the nurses in our study thought that both the oral and nasal route are recommended for intubation, 45% believed that it is recommended to change the suction system daily, and 59% thought that humidifiers should be changed every 48 hours.² Accordingly, ICU nurses' adherence to ineffective VAP-prevention measures seems to be, at least in part, simply associated with a lack of knowledge about which measures are effective and which are not.

The data provided by Kaynar et al¹ are important because they clearly demonstrate that the road from guideline-development to evidence-based practice is long and full of obstacles. The main reasons for nonadherence to guidelines are disagreement with the interpretation of clinical trials, unavailability of resources, and patient discomfort.⁷ High guideline compliance does not just happen; it requires education tailored to the