

Treatment Adherence: Airway Clearance Therapy in Cystic Fibrosis

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Employed by Hill-Rom

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The relationship between adherence to treatment and successful disease management is self-evident. Yet, poor adherence to prescribed treatment protocols is a universal problem.¹ Even in uncomplicated treatments limited to taking oral medications, adherence rates fluctuate around 50%.² Complete treatment adherence is an exceptional behavior, and to expect it is unrealistic. Instead, it is critical to understand the complex and varied reasons patients deviate from treatment plans and to find ways to promote at least adequate adherence.^{3,4}

Cystic fibrosis (CF) is a chronic, life-threatening illness. Effective management requires adherence to a daily, life-long regimen of a low-fat high-protein diet, oral pancreatic enzymes, vitamins, caloric supplements and, in some cases, special dietary formulas, bile salts, and antacids to control gastrointestinal malabsorption. To prevent harmful secretions from accumulating in the bronchial tree, patients require routine airway clearance therapy, traditionally administered via chest physiotherapy (CPT), accompanied by inhalations of nebulized drugs and coughing techniques. In addition, oral or inhaled bronchodilators, inhaled mucolytic agents, and oral expectorants may be prescribed, along with general physical and specific pulmonary exercise routines. Long courses of antibiotics are necessary to control the frequent respiratory infections characteristic of CF.⁵

In CF, as in other chronic, ultimately fatal disorders, therapeutic goals are most often compromised by poor treatment adherence.⁶ Both clinical experience and formal studies indicate that in CF, patients comply with about 50% of their prescribed treatments.⁷ However, the significance of that figure is distorted by the fact that compliance with individual components of the therapeutic regimen varies greatly.^{8,9} Evidence suggests that such variations occur in proportion to their perceived unpleasantness and the extent of infringement on daily activities.¹⁰

Effective CPT has been shown to modify the progression of pulmonary deterioration in individuals with CF.^{11,12} Although not all studies are in agreement, if regular CPT is omitted in previously treated patients for three weeks, there is progressive deterioration following treatment cessation. Such deterioration is partially reversed by a single CPT treatment, and fully reversed by the resumption of twice-a-day 30 minute therapy sessions.¹³ It is the consensus view that inadequate airway clearance therapy plays a major role in perpetuating the vicious cycle of recurrent pulmonary infection that define progressive lung disease in CF.¹⁴ However, in studies of treatment adherence, CPT ranks consistently as the least performed component of CF care.¹⁵ In three such studies, investigators found that rates of patient adherence to prescribed CPT protocols ranged from 26-47%.^{16,17} Davids and Henley (1990)¹⁰ and Fong et al (1988)⁸ found that 52.7 and 74%, respectively, of patients received their CPT treatments two or fewer times per week. The health consequences of neglecting CPT are serious. For some patients, medical contraindications preclude the

use of the method.¹⁸ Patients without disqualifying physical or mental problems cite a complex array of interacting factors to explain their poor adherence, including:^{19,20}

- **Social reasons:** CPT is time-consuming, uncomfortable, distasteful, painful, unhygienic, compromises personal privacy, requires imposing on others and/or disrupting family life.
- **Technical reasons:** CPT requires the reliable availability of a caregiver able to perform highly skilled percussive and vibratory maneuvers. To be effective, both patient and caregiver must cooperate to accomplish often difficult-to-achieve positioning as well as breathing and coughing techniques. Space and slant boards, pillows, wedges, etc. are required.
- **Health reasons:** Many patients claim to feel well without CPT and fail to understand the long-term implications of regular therapy. Others perceive no benefit.
- **Emotional/psychosocial reasons:** Denial of disease severity and feelings of resentment, anxiety, depression or embarrassment associated with chronic illness affect treatment adherence. In addition, many CF patients make certain complex cost-benefit decisions. They may, for example, judge that illness-associated dependency and demands on the time, resources, and priorities of friends and family members are selfish and disruptive, and prefer harmonious interpersonal relationships above personal well being.

CPT is the most prescribed component of CF treatment, yet it ranks poorly in terms of adherence. Health and survival in CF depend upon removal of microbial and inflammatory products from the bronchial tree to break the vicious cycle leading to progressive lung damage. Thus, it is essential to find less burdensome airway clearance methods. For an intervention to be effective, it must meet the specific needs of each patient. An acceptable alternative to CPT must at least equal that “gold standard” of airway clearance.²¹ In addition, it should be easy to administer, promote patient independence, and eliminate the disagreeable physical, technical, and psychosocial side-effects that influence poor compliance with CPT. High-frequency chest wall oscillation as delivered by The Vest™ Airway Clearance System meets or exceeds all these requirements.

The Vest™ system provides an alternative therapeutic modality that delivers consistent, high-quality airway clearance. Its method, high-frequency chest wall oscillation, achieves the outcomes for airway clearance therapy published by the American Association for Respiratory Care.²² The Vest™ system does not require positioning or postural drainage; it is not technique-dependent; it can be administered without a caregiver or with minimal caregiver supervision.

Clinicians anticipate high rates of compliance in patients who use The Vest™ system for a variety of reasons. For example, the simplicity of the method cancels out many traditional treatment disincentives. Most physicians prescribe between 10 and 40 minutes of The Vest™ system therapy per day. According to recent follow-up data obtained from usage meters located on The Vest™ system generator, therapy adherence during the first six months of The Vest™ system use averages 26.4 minutes per day, slightly over the mean use expectation of 25 minutes.²³

The structure of Hill-Rom programs and of The Vest™ system itself also promotes compliance. Not only does the usage meter record the length of each treatment for retrieval later, but Hill-Rom also uses a system of personal contacts to encourage compliance. Working on the assumption that early habits are a strong predictor of future compliance,²⁴ Hill-Rom employs clinically experienced staff who help people understand the importance of airway clearance, who train the patients on The Vest™ system, and who call patients periodically within the first six months of treatment. This one-on-one relationship keeps people accountable and offer support. The result is higher compliance rates.

References

- 1 Wright EC, Non-compliance-or how many aunts has Matilda? *Lancet* 1993; 9; 342(8876): 909-913. The ubiquity of poor treatment adherence is illustrated by a Hippocratic aphorism dating from the Fourth Century B.C.E: “Keep watch also on the faults of the patients, which often make them lie about the taking of things prescribed.”
- 2 Ibid. In a 1988 review of 4, 000 articles concerning compliance listed in *Index Medicus*, analysis indicates that only about 50% of patients take medications as prescribed.
- 3 In an excellent review article, Abbott and Gee discuss flaws in existing CF adherence studies, including problems with terminology, definition, methodologies, and data interpretation. Their paper examines the theoretical value of assessing both treatment adherence and quality of life measures in CF and whether such data should be used to inform clinical practice and policy decisions. Abbott, J, Gee, L. Contemporary psychosocial issues in cystic fibrosis: treatment adherence and quality of life. *Disabil Rehabil* 1998; 20 (6/7): 262-271.
- 4 There are many reasons it is not possible to characterize the prevalence of incomplete adherence, including lack of reliable measures, not agreed upon definition of adherence, poor research methodology and variations in compliance with different components of a regimen. Perhaps most importantly, investigators tend to polarize between adherence and non-adherence, instead of conceptualizing adherence along a continuum, from complete to no adherence. Lask B. Understanding and managing poor adherence in cystic fibrosis. *Pediatr Pulmonol* 1997; Suppl 16: 260-261.
- 5 Passero MA, Remor B, Salomon J. Patient-reported compliance with cystic fibrosis therapy. *Clin Peds* 1981; 20(4): 264-268.
- 6 Williams MT. Chest physiotherapy and cystic fibrosis: why is the most effective form of treatment still unclear? *Chest* 1994; 106: 1872-1882.
- 7 Paterson, JM, Budd J, Goetz F, Warwick WJ. Family correlates of a ten year pulmonary health trend in cystic fibrosis. *Pediatr* 1993; 91: 383-389.
- 8 For example, in a study completed at the Faculty of Health, University of Central Lancashire, 75% of patients exercised as directed, and 83% took enzymes as prescribed, but only 53% were judged adherent to their physiotherapy. Abbott, J, Dodd M, Bilton D, Webb AK. Treatment compliance in adults with cystic fibrosis. *Thorax* 1994; 49: 115-120.
- 9 The work of other investigators supports the notion of component-specific treatment adherence in CF: See, *inter alia*, Conway SP, Pond NM, Hamnett T, Watson A. Compliance with treatment in adult patients with cystic fibrosis. *Thorax* 1996; 51: 29-33; Shepard SL, Hovel MF, Harwood IR, et al. A comparative study of the psychosocial assets of adults with cystic fibrosis and their healthy peers. *Chest* 1990; 97: 310-316; Passero, et al. Op cite, (n.5).
- 10 Conway, et al. Op cite, (n.9).
- 11 Paterson, et al. Op Cite (n.7).
- 12 Thomas J, Cook DJ, Brooks D. Chest physical therapy management of patients with cystic fibrosis: a meta-analysis. *Am Rev Respir Crit Care Med.* 1995; 151: 846-850.
- 13 Desmond KJ, Schwenk WF, Thomas E, Beaudry PH, Coates AL. Immediate and long-term effects of physiotherapy in patients with cystic fibrosis. *J Pediatr* 1983; 103: 538-542.
- 14 Coates AL, Chest physiotherapy in cystic fibrosis: Spare the hand and spoil the cough. *J Pediatr* 1997; 131: 506-508.
- 15 In the first study of its sort, Passero et al. showed that of all parts of the CF treatment regimen, chest PT had the lowest compliance rate (<40%) and that compliance worsened as patients grew older. (Passero, et al. op cite, (n. 4). Subsequent studies support this finding.
- 16 Fong S, Dales R, Tierney M. Compliance among adults with cystic fibrosis. *Pediatr Pulmonol* 1988; 5 (Suppl 120): 140.
- 17 Currie DC, Munro C, Gaskill D, Cole PJ. Practice, problems, and compliance with postural drainage: a survey of chronic sputum producers. *Br. J. Dis Chest* 1986; 80: 249-253.
- 18 Medical contraindications for CPT are cited in: Peruzzi WT, Smith B.

Bronchial hygiene therapy. *Crit Care Clin* 1995; 1: 79-96. See also AARC Clinical Practice Guidelines: Postural Drainage Therapy. *Respir Care* 1991; 36: 1418-1426.

¹⁹ In one study, 60 patients gave a variety of reasons explaining their poor adherence to CPT, most of which related to the time and effort needed. Conway, et al. op cite, (n. 9). In another study, 68 responses cited social reasons, including lack of time, lack of space, distaste for the procedure, discomfort, lack of privacy, pain, and concerns about sputum disposal and the perception that CPT is unhygienic. Thirty-five responses cited technical factors, including difficulties in achieving the correct positions, in accomplishing effective percussion and vibratory movements, in breathing correctly, in understanding instructions, and in procuring equipment necessary for postural drainage. Currie, DC, Munro C, Gaskell D, Cole PJ. Practice, problems and compliance with postural drainage: A survey of chronic sputum producers. *Br J Dis Chest* 1986; 80: 249-253.

²⁰ In addition to poor adherence, Abbott, et al. has shown that CPT is the least tolerated component of CF therapy. Additional supporting studies are cited in this reference. Abbott, et al, Op cite, (n. 8).

²¹ In light of poor rates of adherence to CPT, the results of studies of CPT conducted under medical supervision may have yielded measures of clinical efficacy, such as improved pulmonary function scores, not realized during unsupervised use. This factor alone may account for the status of CPT as the traditionally prescribed airway clearance modality.

²² AARC Clinical Practice Guidelines: Postural Drainage Therapy. *Respir Care* 1991; 36: 1418-1426

²³ In a formal study of adherence to The Vest therapy, data was compiled for 82 patients who were instructed to use The Vest system at least 15 minutes daily. During the first arm of the study (51 ± 21 (SD)) days, patients used The Vest system for an average of 16 ± 12 minutes per day, and 41% used The Vest system for more than 15 minutes per day. During the last interval of the study, after The Vest therapy for a mean of 9 months (range 6-21 months), patients used The Vest system for 18 ± 13 minutes daily, and 52% of patients used The Vest system for more than 15 minutes per day. Anbar RD. Compliance with use of ThAIRapy® Vest by patients with cystic fibrosis. Department of Pediatrics, State University of New York Health Science Center, Syracuse, NY, USA.

²⁴ In a study of The Vest system use by 27 patients in one CF clinic who were prescribed The Vest™ Airway Clearance System Model 102, in the first three months the majority of patients' average use per day was very stable, suggesting that early use habits are a strong predictor of future compliance. D'Angelo S., Craigmyle L, Kanga J. *Pediatr Pulmonol* 1994; Suppl 10: 266, A314.

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