Cost Savings Associated with HFCWO Therapy

Abstract

A large registry of patients with bronchiectasis was used to examine patient outcomes before and after initiation of High Frequency Chest Wall Oscillation (HFCWO or vest therapy).[1] This study by Barto et al (2015) found that the rate of inpatient hospitalizations dropped from 0.887 admits/patient in the year prior to beginning vest therapy to 0.404 admits/patient in the year after, a reduction of 54.5%. On average, patients avoided 0.483 hospital admits per year, with an associated expenditure reduction of $14,039. This compares favorably to the cost of an HFCWO therapy system, which could pay for itself in less than one year.

The Benefits of Vest Therapy

HFCWO is a common airway clearance treatment for people with pulmonary disorders such as cystic fibrosis and bronchiectasis.[2] It consists of an inflatable vest attached to an air pulse generator that creates rapid compressions to the chest. The system's vibrations help loosen, thin and mobilize mucus so it can be expelled through coughing or suctioning. The safety and efficacy of HFCWO have been well documented in a number of peer-reviewed studies since the technology's introduction in the early 1990s. In general, HFCWO has been shown to sustain or improve long-term pulmonary function tests (PFTs).[3-5] Patients using HFCWO for airway clearance have experienced a lower incidence of pneumonias, hospitalizations and ICU days.[6-8] HFCWO therapy also has been associated with reduced healthcare expenditures.[9,10]

The Burden of Bronchiectasis-COPD Overlap

Bronchiectasis is a pulmonary disorder characterized by permanent bronchial dilatation and severe bronchial inflammation, with symptoms of chronic productive cough and recurrent infectious exacerbations.[11] Enlarged spaces in the bronchioles trap secretions, impairing the ability to clear secretions,[12] and leading to recurrent respiratory infections and declining pulmonary function.[13] Repeated infections, followed by damage to the bronchial tree, comprise the main impacts of the disease.[14] In the past, bronchiectasis was viewed as an orphan disease,[15] however it is now known that the prevalence of this condition has been growing at a rate of 8.7% per year since 2001[16] and may now be diagnosed in more than 500,000 people in the U.S.[17]

Bronchiectasis may arise from a variety of causes, but it has long been known that a sizable proportion of cases arise from or are comorbid with COPD.[18] In fact, a recent meta-analysis showed that over half of patients with moderate to very severe COPD were also diagnosed with bronchiectasis.[19] The high prevalence of COPD has increased the interest in bronchiectasis, particularly because research has shown that adding bronchiectasis as a comorbidity to COPD

almost doubles the risk of exacerbation or death.[20] It has been suggested that, rather than being coincidental, COPD and bronchiectasis comprise an "overlap syndrome" whereby both combine synergistically to produce particularly harmful outcomes.[21]

Avoiding Hospitalizations for Bronchiectasis

There is ample data showing that untreated or undertreated bronchiectasis is a risk factor for increased hospitalizations, reduced quality of life, and ultimately mortality.[20,22] Earlier intervention may avoid worsening conditions and the need for more serious interventions at a later stage of care.[23] Nicolini et al (2013) explored the efficacy of HFCWO in patients with bronchiectasis, finding that the HFCWO group showed an increase of sputum volume, significantly reduced cough, and significant improvement in both dyspnea and quality of life measures when compared to conventional therapies.[24] More recent research, using a large registry of bronchiectasis patients who were also vest users, showed measurable benefits associated with the use of vest therapy.[1] The number of patients who required no respiratory-related hospitalizations increased from 50.9% in the year before vest therapy to 76.0% in the year after starting vest therapy. Conversely, the number of patients who required three or more hospitalizations dropped from 14.3% in the year prior to vest therapy to 5.6% in the year after starting vest therapy. During this time, the yearly rate of hospitalization dropped 54.5%.[25]

Projected Savings Associated with Vest Therapy

Barto's data, along with other publicly available sources, makes it possible to estimate the reduction in hospital expenditures associated with the initiation of vest therapy. Using Barto's paired data, the rate of inpatient hospitalizations dropped from 0.887 admits/patient in the year prior to beginning vest therapy to 0.404 admits/patient in the year after, resulting in a difference of 0.483 hospitalizations avoided per patient per year.

Table 1. Inpatient Hospital Admissions Before and After Initiation of HFCWO Therapy (paired data)

Before			After		
# Admits	Patients	# Hosp.	# Admits	Patients	# Hosp.
0	199	0	0	297	0
1	93	93	1	52	52
2	43	86	2	20	40
3	56	168	3	22	66
Sum	391	347	Sum	391	158
Rate	0.887		Rate	0.404	

Utilization savings may be determined in a variety of ways, whether by using figures appropriate to a specific institution or by using published estimates. The average hospitalization charge due to a COPD exacerbation was recently reported as $29,043, based on a 4.3-day length of stay.[26] (Hospital "charges" refer to the cost borne by the payer and patient; hospital "costs" reflect the actual cost of patient care, which are typically lower.) Accordingly, the projected hospital charges avoided per patient in the Barto study were 0.483 x $29,043 = $14,039. When compared to the typical cost of HFCWO therapy, a one-time charge of approximately $12,000, vest therapy pays for itself in less than one year.

This analysis has its limitations. First, the Barto study was observational and cannot ascribe causality between vest use and outcomes. The improvement may be due, in part, to other medical interventions occurring at the same time, or to selection effects or regression to the mean. Second, the study used only the inCourage® System from RespirTech. Due to differences in the pulse waveform, the results may not be extendable to HFCWO products from other manufacturers. Third, the Barto study included patients with bronchiectasis who may or may not be comorbid with COPD. Therefore healthcare costs derived from COPD will only be an estimate for patients with bronchiectasis alone. Lastly, estimates of hospitalization cost vary widely and depend on the specific sample used for the calculation.

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