A Place For Airway Clearance Therapy In Today’s Healthcare Environment

Michigan Society for Respiratory Care
2015 Fall Conference

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Objectives

- Describe patients who will benefit from Airway Clearance Therapy (ACT) and options for therapy
- Health care reform and chronic respiratory conditions — an important intersection
- Discuss an emerging picture of ACT efficacy
Why This Matters

- ACT needs in your patient population — pediatric and adult
- More attention paid to frequent and expensive conditions
- Triple Aim
Poor Secretion Clearance

- Inflamed airways
- Chronic cough
- Lung congestion
- Decreased ability to exercise
- Shortness of breath
- Respiratory infection
- Lung damage
- Pneumonia
- Respiratory failure

Potential Consequences
ACT Can Help

May Have Impaired Ability To Clear Lungs

- Chronic Bronchitis
- Bronchiectasis
- Cystic Fibrosis
- Quadriplegia/High-level Spinal Cord Injury
- Primary Ciliary Dyskinesia
- Neuromotor/Neuromuscular Diseases

Chronic Obstructive Pulmonary Disease
Complex Intersections In Chronic Respiratory Conditions

- Chronic Bronchitis
- Emphysema
- Bronchiectasis
- Asthma
### ACT Options

**TECHNIQUES**

- Percussion & postural drainage
- Positive expiratory pressure
- Active-cycle-of-breathing technique
- Autogenic drainage
- IPV
- Exercise
- HIGH FREQUENCY CHEST COMPRESSION (HFCC; also known as vest therapy)

**CONSIDERATIONS**

- Cost
- Ease-of-use/implementation
- Adherence
- Evidence
Effective ACT Matters…
Maybe More Than Ever
Value-based Purchasing

“In healthcare, value can be broadly considered to be a function of quality, efficiency, safety and cost. In VBP, providers are held accountable for the quality and cost of healthcare services they provide.”

“Incentive payments for achieving performance targets or demonstrating improved quality and efficiency will be derived from progressive reduction in reimbursement.”
Targeting the “Hotspotter”

- High-cost patients (referred to as “hotspotters” by some) become much more important
- 1% of patients consume 28% of total healthcare costs
- New behaviors as we shift from individual payments to fixed cost for a population
- Implementing evidence-based practices offers a way to manage “hotspotters” to:
  - Better clinical outcomes
  - Lower overall costs
Hospital Readmission Reduction Program

- 2010 estimates of health care costs directly related to avoidable hospital readmissions within 30 days of discharge = $17.5 billion
- Seven conditions and procedures account for 30% of potentially preventable readmissions

- Heart Attack
- Congestive Heart Failure
- Pneumonia
- COPD
- Coronary Artery Bypass
- Angioplasty
- Other Vascular Procedures
Cost of Readmissions*

- 2011 estimated cost of avoidable readmissions: $41.8 billion
- CHF: $1.75 billion (134,500 readmits)
- Pneumonia: $1.15 billion (88,000 readmits)
- COPD/Bronchiectasis: $924 million (77,000 readmits)

* Agency for Healthcare Research and Quality
Key Steps To Managing Costs, Improving Quality and Reducing Readmissions

- Diagnosis: Early and Accurate
- Effective Treatment: Interventions That Work
- Improvement: Care, Quality of Life and Costs
- Reduce Hospital Visits
Vest Therapy As A Preferred Approach To ACT

- Safe
- Easy to use
- Technique independent
- Effective
- Self-directed therapy — fosters patient independence
- Effective treatment leads to extended compliance
Conditions Treated by Vest Therapy

- Bronchiectasis (BE)
  - 50%+ of moderate to severe COPD patients have BE
  - Known population of patients exceeds 475,000
  - Forecasted to grow about 9% per year with greater use of CT scans

- Cystic Fibrosis (CF)
  - More than 30,000 patients in US
  - 87% of CF patients aged 6-17 years use vest therapy

- Neuromuscular conditions such as cerebral palsy and ALS (NM)

- Other smaller segments
Bronchiectasis

- Common, progressive respiratory disease—recurrent chest infections, high morbidity, reduced QOL
  - Long-term cohort of 91 patients: about 30% mortality during 13-year period; median age 60

- Has been poorly studied

- Evidence for treatment largely based on CF studies or expert opinion

- Often unrecognized or poorly diagnosed as asthma or COPD—underestimated prevalence

- Expensive, particularly if not diagnosed early

Bronchiectasis Symptoms

- A daily cough for months or years, with large amounts of sputum containing mucus, trapped particles, pus
- Shortness of breath and wheezing
- Chest pain
- Clubbing (thickening of flesh under fingernails, toenails)
- Failure to thrive
- Death (e.g., due to associated heart failure)

http://www.nhlbi.nih.gov/health/health-topics/topics/brn/signs
Bronchiectasis — Pathophysiology

- **Scarring condition of bronchial tubes**
  - Irreversible widening of airways

- **Basic defect is a cycle of airway infection, inflammation, and injury**
  - Damage to airway walls
    - Destruction of cilia
  - Mucus accumulation
  - Bacterial overgrowth
  - Inflammation
  - Scar formation
What Causes Bronchiectasis?

- 30-50% idiopathic
- Lung infections: pneumonia, whooping cough, TB, fungal infections
- Cystic fibrosis: almost 90% of adult CF patients have BE
- Immunodeficiency disorders
- Allergic bronchopulmonary aspergillosis
- Disorders affecting cilia: primary ciliary dyskinesia
- Chronic pulmonary aspiration
- Connective tissue diseases: rheumatoid arthritis, Sjögren’s syndrome, Crohn’s disease
- Other conditions causing airway blockage: tumors, inhaled material

http://www.nhlbi.nih.gov/health/health-topics/topics/bri/causes
Bronchiectasis — Estimated Prevalence

- An estimated 50%+ of moderate to severe COPD patients have BE, with estimates of total diagnosed COPD patients at 14 million.
- The known population of bronchiectasis patients is more than 475,000.
- Patient population forecasted to grow about 9% per year with greater use of CT scans.

2. Company estimates
3. Matinez-Garcia et al, Factors associated with bronchiectasis in patients with COPD, Chest, 140, 1130-1137
### Bronchiectasis Common among Moderate-to-Severe COPD Patients

**Probability of the presence of HRCT-confirmed bronchiectasis in patients with moderate to severe COPD**

<table>
<thead>
<tr>
<th></th>
<th>Moderate/Severe COPD Probability – 58%</th>
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</thead>
<tbody>
<tr>
<td>Moderate COPD only</td>
<td>Moderate COPD only (FEV, levels of 50-70%) Probability = 39%</td>
</tr>
<tr>
<td>Severe COPD only</td>
<td>Severe COPD only (FEV, levels of &lt;50%) Probability = 73%</td>
</tr>
<tr>
<td>Plus: 1 or more pathologic organisms isolated from sputum:</td>
<td>50%</td>
</tr>
<tr>
<td>Plus: 1 or more previous-year hospitalizations for pulmonary exacerbations:</td>
<td>83%</td>
</tr>
</tbody>
</table>

Martinez-Garcia, MA, et. al., CHEST 2011;140:1130-1137.
Symptoms

- Daily productive cough
- Chest pain
- Fevers
- Fatigue
- Shortness of breath
- Coughing up blood
- Frequently diagnosed as chronic bronchitis or recurrent pneumonia (think COPD readmission)

A clinical question: When do you order a CT to confirm BE?
Bronchiectasis – Diagnosed by HRCT

- Bronchial wall thickening
- Airway dilatation
- Lack of tapering
- Mucus plugging
- Cystic features
- Air-fluid levels
- Lung scarring
Bronchiectasis HRCT Scan

This lung is normal

This lung is affected by Bronchiectasis
Bronchiectasis Treatment

- Antibiotics, expectorants, mucus thinners, bronchodilators, inhaled corticosteroids (w/ wheezing, asthma)
- Hydration
- Breathing techniques: Forced-expiration technique (FET) and active cycle breathing (ACB)
- CPT: manual, mechanical; PEP devices; HFCC
  
  “Some of these methods and devices are popular with patients and doctors, but little information is available on how well they actually work. Choice usually is based on convenience and cost.”
  (We'll come back to this.)
- Surgery or lung transplant

http://www.nhlbi.nih.gov/health/health-topics/topics/brn/treatment
An Evolving Outcomes Story

HFCC and Bronchiectasis
Bronchiectasis — Quality of Life Survey Summary Data

**PATIENTS SURVEYED**

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<th>Patient Age</th>
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<td>85+</td>
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**Distribution of Patients by Survey Interval**

- Base: 1857
- 1 mo: 1356
- 3 mo: 959
- 6 mo: 648
- 12 mo: 306
- 18 mo: 108
- 24 mo: 10
Pre-HFCC Patient Status

BEFORE STARTING VEST THERAPY, PATIENTS TOLD US:

![Pie chart showing expectations for therapy]

- **Unknown**: 21%
- **Sleep better**: 6%
- **More energy**: 2%
- **Decrease hospitalizations**: 1%
- **Decrease antibiotics**: 2%
- **Breathing Easier**: 0%
- **Other**: 6%
- **Able to clear lungs better**: 2%

![Bar chart showing number of hospitalizations in 12 months]

- **0 admits**: 806
- **1 admit**: 463
- **2 admits**: 220
- **3+ admits**: 324
- **Unknown**: 44
Overall Respiratory Health

How would you rate your overall respiratory health?

Months Since Initiating HFCC Therapy

Good-Excellent

Poor-Fair
Ability to Clear Lungs

*How would you rate your ability to clear your lungs?*

![Graph showing the ability to clear lungs over months since initiating HFCC therapy. The graph compares Good-Excellent vs Poor-Fair categories.](image)
Hospitalizations Since Onset Therapy

How many times have you been in the hospital?

12 Months Before and After Initiation of HFCC Therapy

<table>
<thead>
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<th>1</th>
<th>2</th>
<th>3+</th>
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<tbody>
<tr>
<td>12 Months Before</td>
<td>1</td>
<td>2</td>
<td>3+</td>
</tr>
<tr>
<td>12 Months After</td>
<td>1</td>
<td>2</td>
<td>3+</td>
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Antibiotic Use

Are you currently taking antibiotics for breathing problems?

![Graph showing the percentage of patients taking antibiotics over time since initiating HFCC therapy. The graph shows a decline in the percentage of patients taking antibiotics, from around 50% at the start of therapy to around 30% after 12 months.](image-url)
### Preliminary Outcomes Data

#### 12 months before and after initiation of inCourage System vest therapy

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<tbody>
<tr>
<td><strong>FEV1 (predicted)</strong></td>
<td>![Up Arrow]</td>
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<tr>
<td><strong>FVC (predicted)</strong></td>
<td>![Up Arrow]</td>
</tr>
<tr>
<td><strong>Hospital admits per patient/month</strong></td>
<td>![Down Arrow]</td>
</tr>
<tr>
<td><strong>Office visits per patient/month</strong></td>
<td>![Down Arrow]</td>
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Based on Respirtech outcomes database, cross-referenced with patient chart data. Results calculated and validated by independent actuarial firm Cirdan Health Systems.
Re: HFCC and Bronchiectasis

- Confirm bronchiectasis with CT when symptoms warrant
- Initiate ACT to provide symptom relief
- Ask patients about QOL factors and denote outcomes-related measures (hospital admissions, antibiotic use)
- Track your patient populations to see how vest therapy helps
  - Add to the growing information about vest use
ACT and Today’s Healthcare

- The environment we work in—must deliver more effective care at a lower cost
- Chronic respiratory conditions represent a significant challenge
- Effective airway clearance therapy in selected patients will add therapeutic and QOL value
Thank You!