



## **Airway Clearance Indications: Restrictive Airway Disorders**

### **Scoliosis/Kyphoscoliosis**

Scoliosis is a progressive condition that causes lateral (side to side) curvature of the spine into a classic “C” or “S” shape. The term kyphosis describes spinal curvatures from front to back rather than side to side. At times, both types of curvature may be present, a condition called kyphoscoliosis. 80-85% of all cases of scoliosis/kyphoscoliosis are idiopathic, meaning no underlying cause for the condition can be found. In other cases, scoliosis/kyphoscoliosis develops secondary to conditions that impair muscle tone or structural integrity of the chest wall and rib cage like muscular dystrophy or other neuromuscular disorders. Scoliosis/kyphoscoliosis is a common condition affecting 1 in 10 people. Most cases are mild, requiring no intervention, however 1 in 1,000 people will have scoliosis/kyphoscoliosis severe enough to require surgical repair. Scoliosis/kyphoscoliosis occurs in all races and ethnic groups and in both genders. It is slightly more common in girls than in boys and tends to run in families.

#### **What Happens In Scoliosis/Kyphoscoliosis?**

Scoliosis/kyphoscoliosis and other conditions in which the spine and thorax (chest cavity) are impaired by structural defects restrict the ability of the lungs to expand and contract fully, a condition known as restrictive lung disease. Restrictive lung disease creates a disruption in air flow, characterized by reduced lung volumes (total amount of air contained in the lungs during breathing) and vital capacities (ability of the lungs to effectively use that air). In diseases where respiratory muscles are weak and the spine and thorax deformed, the ability to take in sufficient air may be constrained by the physical deformity. Insufficient inhalation may impair the ability to generate the expiratory force necessary to create an effective cough, resulting in atelectasis (collapse of the small airways and/or alveoli) and mucus plugging. In conditions where muscle tone is weakened, cough clearance is further compromised and repeated respiratory infections and pneumonia are common, resulting in a vicious cycle of secretion retention, infection, inflammation and airway damage may set in.

#### **How Airway Clearance Therapy Can Help Scoliosis/Kyphoscoliosis**

There is currently no known cure for patients with scoliosis. The goal of treatment is to maximize function and maintain or improve quality of life. Keeping the airways clear of excess secretions and thereby reduce the incidence of inflammation and/or infection and is crucial to maintaining respiratory health. Airway clearance therapy using High Frequency Chest Wall Oscillation (HFCWO) has been demonstrated by clinical study to promote excess mucus clearance and improve bronchial drainage. Shear forces are created by HFCWO treatment that mechanically releases adhered secretions from the walls of the pulmonary tract. HFCWO has also been shown to reduce the viscosity of secretions which significantly improves mobilization of excess mucus. By replicating cough, HFCWO can effectively mobilize pulmonary secretions from smaller airways to larger airways where they can be coughed out, swallowed or suctioned.



## **Symptoms of Scoliosis/Kyphoscoliosis**

Scoliosis severe enough to cause restrictive lung disease is generally visible to the naked eye:

- One shoulder is higher than the other
- One shoulder blade is higher and possibly more noticeable
- One hip is more noticeable than the other
- There is an unequal distance between the arms and body
- Clothes don't "hang right"
- In females one breast may be more prominent

Signs of increasing respiratory distress due to restrictive lung disease in scoliosis/kyphoscoliosis include:

- Cough
- Shortness of breath
- Shallow breathing
- Chest pain
- Cyanosis
- Digital clubbing

## **For More Information on Scoliosis/Kyphoscoliosis**

1. Mayo Clinic Scoliosis Fact Sheet: <http://www.mayoclinic.com/health/scoliosis/DS00194>
2. National Institute of Arthritis and Musculoskeletal and Skin Diseases (NIAMS) Scoliosis Fact Sheet: [http://www.niams.nih.gov/Health\\_Info/Scoliosis/scoliosis\\_ff.asp](http://www.niams.nih.gov/Health_Info/Scoliosis/scoliosis_ff.asp)
3. iScoliosis Fact Sheet: <http://www.iscoliosis.com/>
4. American Academy of Orthopedic Surgeons Scoliosis Fact Sheet: <http://orthoinfo.aaos.org/topic.cfm?topic=a00236>