



Airway Clearance Indications: Neuromuscular/Neuromotor Disorders

Multiple Sclerosis

Multiple sclerosis is a central nervous system disorder affecting the brain, spinal cord and optic nerve. Nearly 400,000 people in the United States and 2.5 million worldwide have multiple sclerosis. The disorder can affect anyone, but is more common in people of northern European heritage and strikes women twice as often as men. Typical age of onset is between 20 and 50.

What Happens in Multiple Sclerosis?

Nervous system function relies on accurate communication between the brain and spinal cord and the various body systems they control. The nerves must be able to send signals via nerve pathways through the spinal column and to the brain and the brain must be able to send instructions back. These pathways are made up of nerve cell fibers which are covered in a white, fatty, protective substance called myelin that insulates the nerve fibers. For reasons not yet understood, in multiple sclerosis the body starts to attack the myelin sheath around the nerve fiber, causing scarring and interfering with communication between the brain and the nerves. Eventually communication may become severely compromised resulting in serious deficits of motor, sensory, or visual function. Since the brain and central nervous system are involved in mood, emotion and behavior regulation, damage from multiple sclerosis may also lead to psychiatric symptoms.

The symptoms of multiple sclerosis are highly variable and severity of impairment depends on the location and amount of damage to the nerve fibers. In very mild cases, symptoms may be easily managed and cause little disruption in function. In severe cases of multiple sclerosis, however, affected individuals may become bedridden or suffer from daily chronic pain and disability. Eventual loss of respiratory and bulbar (swallowing) muscle function is a significant cause of illness and death in multiple sclerosis.¹ Ineffective cough due to weakened respiratory muscles and the inability to manage oral secretions due to inadequate bulbar function can contribute to impaired airway clearance. Oral secretions that can't be swallowed may be aspirated into the airways overwhelming the mucociliary clearance system. Ineffective cough compounds the problem and a vicious cycle of secretion retention, infection, inflammation and airway damage may set in. Additionally, some individuals with multiple sclerosis may require ventilatory support. Ventilator-associated pneumonia and other respiratory infections are well-documented complications of prolonged ventilator dependence and create additional risk factors for compromised airway health in multiple sclerosis.

¹ R Gosselink, L Kovacs, and M Decramer. *Respiratory muscle involvement in multiple sclerosis*. European Resp Journal. 1999; 13: 449-454



How Airway Clearance Therapy Can Help Multiple Sclerosis

There is currently no known cure for multiple sclerosis. 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 Multiple Sclerosis

The symptoms of multiple sclerosis vary by affected nerve region and severity of damage, so it is not possible to compile a comprehensive list. However, there are some frequently occurring symptoms, including:

- Visual:
 - Optic neuritis (inflammation of the optic nerve)
 - Visual changes, including double vision
 - Pain around the eyes or with eye movement

- Non-Visual:
 - Pain
 - Loss of or change in sensory perception
 - Loss of muscle strength
 - Problems with bowel and bladder function
 - Balance or coordination problems
 - Changes in cognitive function
 - Changes in mood
 - Numbness or tingling
 - Tremor
 - Fatigue

For More Information on Multiple Sclerosis:

1. National Multiple Sclerosis Society: <http://www.nationalmssociety.org/index.aspx>

2. Fact sheet from the National Institute of Neurological Disorders and Stroke (NINDS): http://www.ninds.nih.gov/disorders/multiple_sclerosis/multiple_sclerosis.htm

3. Fact sheet from the Mayo Clinic: <http://www.mayoclinic.com/health/multiple-sclerosis/DS00188>

4. Fact sheet from E Medicine: <http://emedicine.medscape.com/article/793013-overview>