Pulmonary Considerations in Patients with Multiple Sclerosis

Introduction
Breathing is affected in patients with MS because UMN s of muscles of inspiration and expiration may be damaged. For example, damage to UMN s innervating the phrenic nerve means decrease in strength of the diaphragm. Another important example is that damage to UMN s that innervate intercostal nerves results in decrease in function of external, internal, and innermost intercostals. Respiratory infection is one of the primary causes of death in patients with MS due to aspirations and to inability to rid the lungs of secretions.

Objective measures of pulmonary function:
- Spirometry (inspiratory and expiratory)
- Pulse oximetry (to determine the saturation of O₂ in the blood)
- Pulmonary dysfunction index

PT Goal:
- Maintain respiratory muscle strength
  - Maintain expiratory muscular strength especially in order to clear secretions
- Maintain respiratory health and ability to exchange O₂ and CO₂
- Decrease mortality by decreasing risk of respiratory infections

Early Stage: Restorative Rehabilitation
- Pilates (taught in a course or support group) breathing techniques: (5)
  - Focuses on breathing deeply while reducing the work of respiratory muscles (8)
  - Performed lying down (5)
  - Examples with a ball (8)
    - Abdominal breathing: ball on abdomen; focus on lifting ball with each breath
    - Rib cage breathing: ball on sternum; focus on barely moving ball with each breath
    - Side breathing: lying on side on ball to stretch/open up one side of body
- Abdominal exercises (3):
  - Strengthen inspiratory and expiratory muscles to facilitate breathing
  - Strengthen core muscle strength (transversus and rectus abdominis) and expiratory muscles:
    - To maintain ability to increase intra-abdominal pressure and ability to cough and thus to clear secretions
• **Cardiopulmonary endurance (1):**
  - UBE for cardiopulmonary endurance exercise with UE because UEs are usually less affected by MS.
  - Important to maintain strength of inspiratory and expiratory muscles in order to maintain sufficient tidal volume (500mL minimum) to allow sufficient exchange of O₂ and CO₂.

• **Muscle energy techniques** to stretch/mobilize joints involved in breathing (2), (7)

• **Pt education: Postural awareness (9)** to enhance lung expansion in the thoracic cage and promote good airflow
  - Keep spinal curvature. Use towel roll at lumbar curve. Do not allow kyphotic posture!! Teach the family members and caregivers as well.

• **Employ safe Chewing and swallowing techniques** to reduce the risk of aspiration of solids or liquids into the pulmonary system. (10)
  - Chew thoroughly and smaller portions. Multiple successive swallows
  - Dietary habits to reduce mucus production. Consider reducing and/or eliminating fatty foods, dairy products, wheat gluten (11)
  - Medications such as mucolytic drugs, expectorants and wetting agents may be prescribed by MD to help the patient deal with mobilizing and removing secretions (12)
  - Learn and practice the Heimlich maneuver in case choking ever occurs (4), (13)

• **Breathing techniques**
  - Avoid shallow chest breathing
  - Diaphragmatic breathing and pursed lip breathing. (14) Use hands on belly/chest and practice supine and in sitting
  - Blow up a balloon or into a straw to practice

**MIDDLE STAGE: PREVENTATIVE REHAB**

- Adapt all stage One techniques as tolerated by patient
- Teach **assisted coughing** using small pillow or folded towel (15)
- Teach **huffing** to increase intra-abdominal pressure and practice forced expiration (12)
- **Inspiratory spirometer** exercises, by training inspiration both it and exhalation are strengthened. (12)

**LATE STAGE COMPENSATORY REHAB**

- **Caregiver education** on positioning, dietary, and assisted coughing techniques (16)
- **Maintain an open airway**: Intubation and PEG tube
References


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