

RECOGNIZING RESPIRATORY FAILURE IN THE NEUROMUSCULAR PATIENT

Presented By :

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Common Neuromuscular Disorders

Post polio syndrome: Effects roughly 25% of survivors

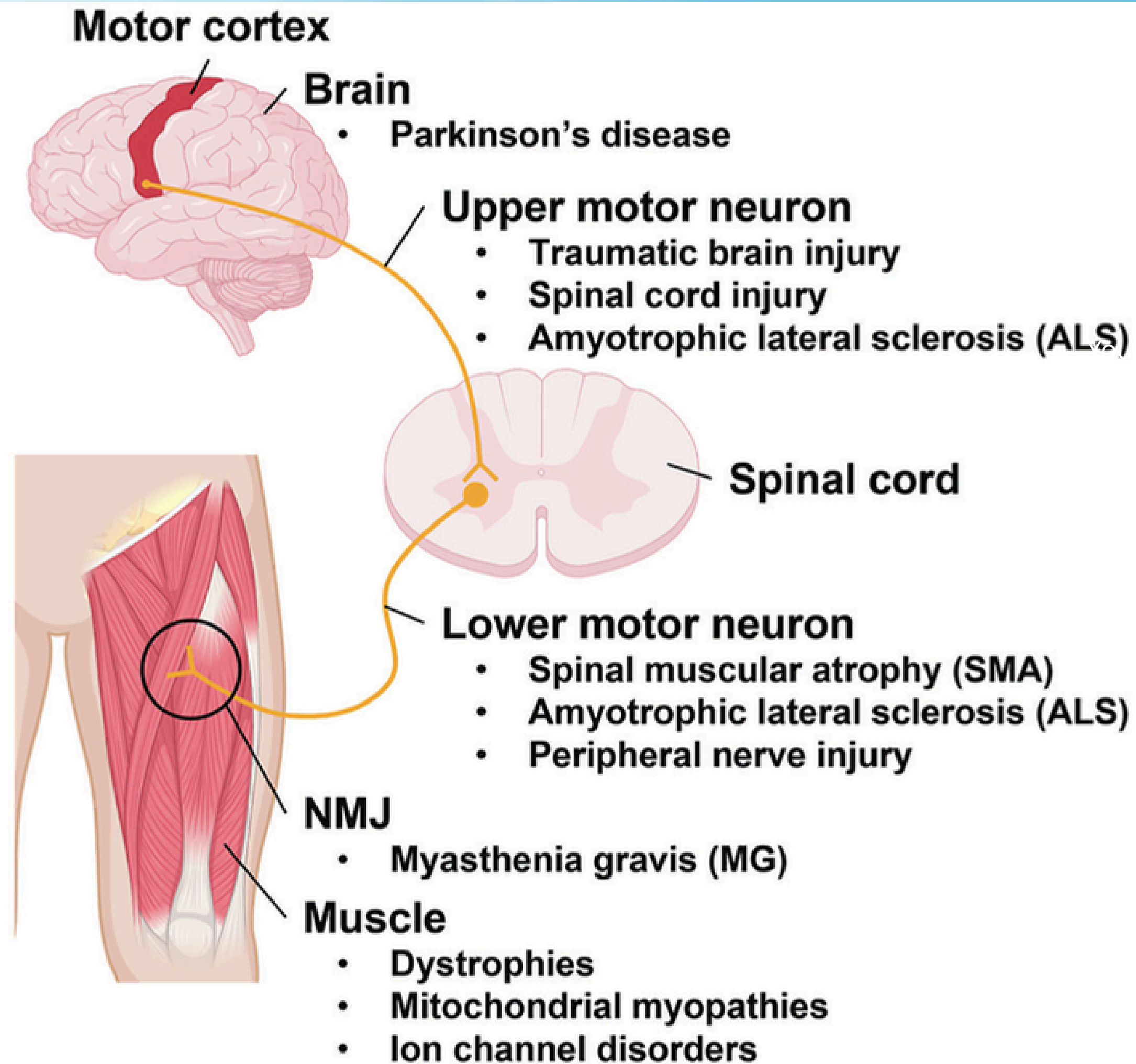
Amiotrophic Lateral Sclerosis: Affects both upper and lower motor neurons.

Spinal Muscular Atrophy: Progressive weakness in the hips, legs, and trunk.

★ **Guillain Barre: Auto immune disorder attacking the peripheral nerves**

★ **Myasthenia gravis: autoimmune disorder of the neuromuscular junction.**

Muscular Dystrophy- 30 different forms. Duchennes (DMD) most common and severe



Paragraph text

HOW NEUROMUSCULAR DISEASE FAILS THE RESPIRATORY SYSTEM

1) Neuromuscular Insult — the cascade begins at the signal source



2) Diaphragm, scalenes & intercostals lose force-generating capacity → decreased tidal volume and vital capacity



3) Decreased ability to clear secretions

HOW NEUROMUSCULAR DISEASE FAILS THE RESPIRATORY SYSTEM

4) CO_2 rises as $\dot{V}_E$ decreases. Hypercapnic failure precedes hypoxic failure in NM disease — a key diagnostic signature



5) Loss of upper airway tone (Bulbar involvement) → difficulty swallowing, pooling of secretions, aspiration risk, and obstructive episodes — especially during sleep



6) Inability to sustain minute ventilation

TREATMENT: NIV

- **Initiation: CMS criteria**
 - **PaCO₂ on awake arterial blood gas ≥ 45 mmHg**
 - **Sleep oximetry with SpO₂ $\leq 88\%$ for five minutes or more**
 - **MIP < 60 cmH₂O or FVC $< 50\%$ predicted.**
- **Non-Invasive Positive Pressure Ventilation:**
 - **BiPap**
 - **AVAPS**

Challenges of use

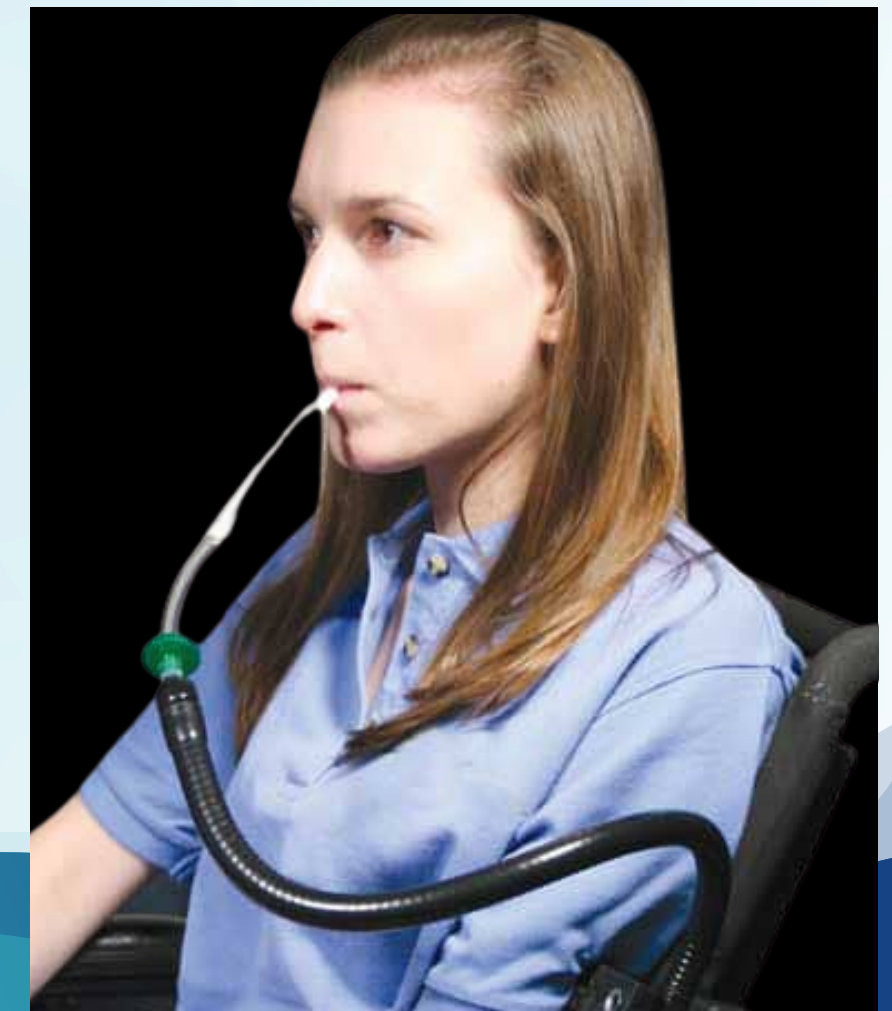
- **Low compliance**
- **Mask Intolerance**
- **Gastric Distention**
- **Sinus Pressure**



TREATMENT

Ventilatory Support: Continued

- **On demand Ventilation (sip and puff)**
 - **Comfortable**
 - **Not for continuous use**
- **Negative Pressure Ventilation**
 - **Mimics the natural breath cycle**
 - **Not for use in bulbar dysfunction**
- **Invasive**
 - **Tracheostomy**
 - **Mechanical Ventilation**



TREATMENT

Secretion Clearance

- High Frequency Chest Wall Oscillation
- IPV
- Chest Percussion

Cough Augmentation:

- Manual Assisted Cough
- Mechanical In/Exsufflation





EARLY CLINICAL RED FLAGS



**RAPID/SHALLOW
BREATHING**

WEAK/INEFFECTIVE COUGH

WEAK VOICE

ACCESSORY MUSCLE USE

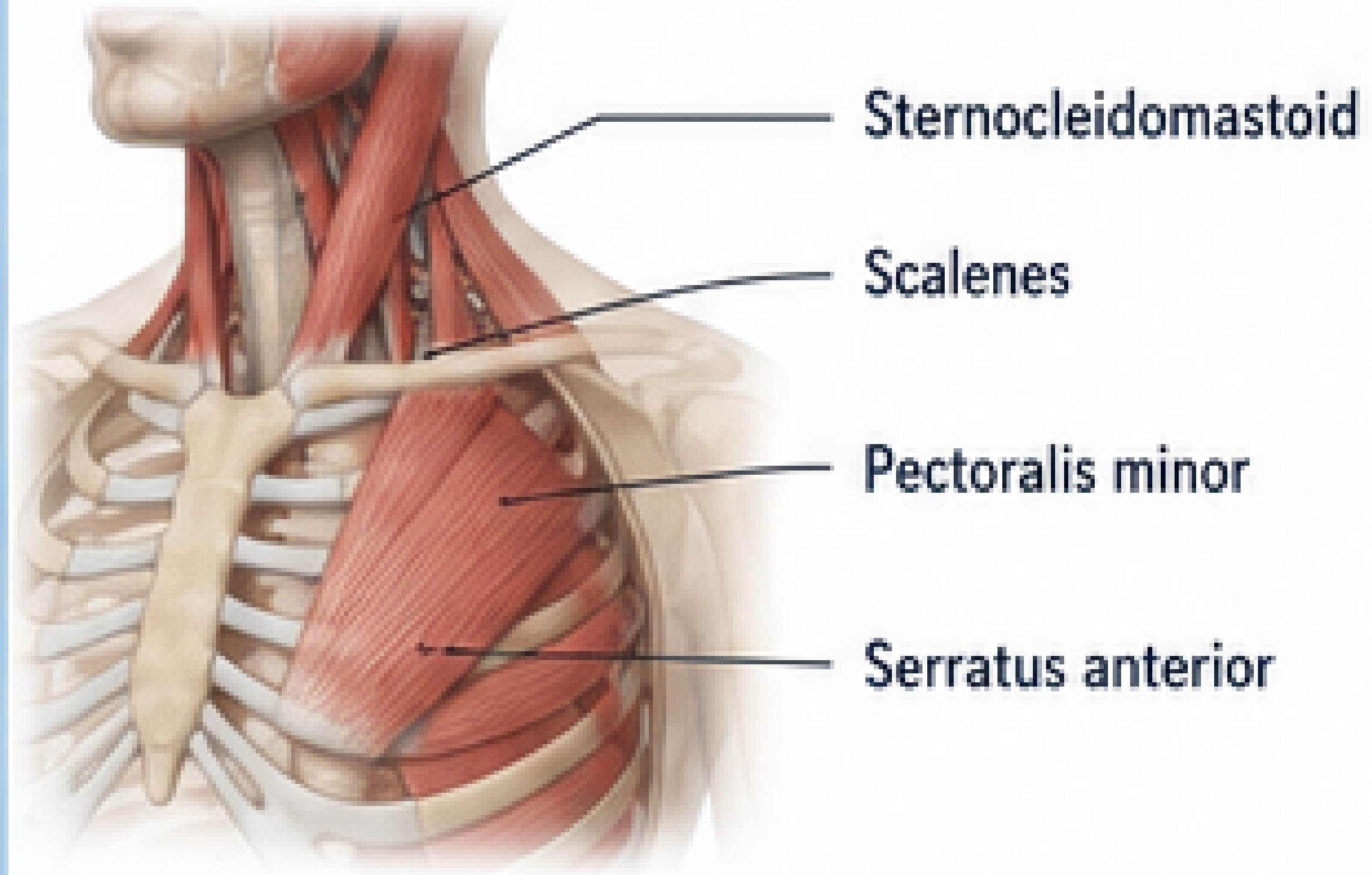
ORTHOPNEA

**MORNING HEADACHE/DAYTIME
SLEEPINESS**

PTOSIS/DIPLOPIA/FATIGUE

INABILITY TO LIFT HEAD

ACCESSORY INSPIRATORY



SPIROMETRY THRESHOLDS

THE 20-30-40 RULE



$VC < 20\text{ML/KG}$

Patient not able to maintain an adequate minute volume

$MIP/NIF < 30\text{ cmH}_2\text{O}$

Severely impaired insp. muscle strength/high risk of hypoventilation and aspiration

$MEP < 40\text{ cmH}_2\text{O}$ (Normal= > 80)

Ineffective cough clearance/High risk of secretion retention and pneumonia

SPIROMETRY THRESHOLDS



PEAK COUGH FLOW

160-270L (Assisted cough recommended)/ <160 (Mechanical Cough Assist)

SNIF NASAL INSPIRATORY PRESSURE (SNIF)

<40 cmH₂O-Significant diaphragmatic weakness.
Alternative when mouth seal is poor

BEDSIDE OBSERVATIONS

Head lift test >5 sec/ Supine vs Seated Dyspnea
Accessory muscle use/Voice Quality Assessment



**TREND SERIAL SPIROMETRY
EVERY 4-8 HOURS**



APPLY THE 20-30-40 RULE



**VENTILATION/SECRETION
CLEARANCE/ COUGH AUGMENTATION**



**THE RT IS THE FIRST LINE OF
DEFENSE**

CORE PRINCIPLES

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THANK YOU

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