RESPIRATORY MUSCLE ASSESSMENT IN THE ICU

Professor Rik Gosselink, PT, PhD
Faculty of Kinesiology and Rehabilitation Sciences
Department Intensive Care
University Hospital Leuven
KU Leuven Belgium
Weaning failure: 12-50%

Respiratory muscle pump

CNS output
Respiratory drive

Pump Capacity

Load on the pump

Respiratory muscle pump

After Moxham J.

Ventilatory Failure
Respiratory muscle weakness in critically ill patients

Hermans et al. Crit. Care 2010; 14: R127
Diaphragm thickness in mechanically ventilated patients

Goligher et al. AJRCCM 2015; 192: 1080
Clinical signs ventilatory failure

- Rapid shallow breathing
- Accessory muscle recruitment
  - Inspiratory muscles
  - Expiratory muscles
- Paradoxical chest wall motion
- Respiratory alternans
VENTILATORY PUMP CAPACITY ASSESSMENT

- PULMONARY FUNCTION (FVC)
- STRENGTH ($P_{I \text{max}}, P_{E \text{max}}$)
Techniques to measure respiratory muscle function

\[ P_{\text{sniff}} \]
\[ P_{\text{mouth}} \]
\[ P_{\text{oes}} \]
\[ P_{\text{abd}} \]
Maximal inspiratory pressure = MIP / PImax

ETT / canule with cuff inflated / one-direction valve*:

- HD stability: bradycardia!
- Delta Stc O₂ >90%
- 30s occlusion with encouragement every 5s
- at least 2 min pause
- 3 times

MIP non-volitional

PlateauP: -30cmH20
PiekP: -58cmH20
Assessment Respiratory muscles
RESPIRATORY MUSCLE STRENGTH ASSESSMENT: 
MAGNETIC STIMULATION

Polkey & Moxham. 
PHRENIC NERVE STIMULATION

CERVICAL STIMULATION