NON INVASIVE VENTILATION.

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OBJECTIVES.

- Definitions.
- Advantage and disadvantage.
- Indications.
- Contraindications.
- Modes.
INTRODUCTION.

• NIV is the delivery of mechanical ventilation to the lungs using techniques that does not need endotracheal intubation.
• Initially used for treatment of hypoventilation secondary to neuromuscular disease.
• Now accepted in the treatment of respiratory failure.
PHYSIOLOGY.
PHYSIOLOGY.

- Inspiration needs energy.
-Expiration is passive.
-Energy is needed to overcome resistance and elastic forces for the flow of gas.
-Respiratory failure occurs when resistance or elastic forces increases.
BENEFICIAL EFFECTS OF NIV.

• Increases the FRC.
• Moves the fluid out of the lungs.
• Avoids lung collapse.
• Increases the alveolar ventilation.
• Decreases the work of breathing.
• Improves the V/Q mismatch.
• Improves shunt.
• This leads to better oxygenation, CO2 clearance and Reduces WOB.
ADVANTAGES.

- Non invasive.
- Comfortable.
- No need of sedation.
- Oral patency maintained.
- Avoids complications of ETT.
- Reduced cost and LOS.
DISADVANTAGES.

- Slow correction.
- Mask problems - leak, eye irritation and skin injury.
- Lack of airway access - suction, aspiration.
- Claustrophobic.
- Workload and supervision.
TYPES OF RESPIRATORY FAILURE AND TYPE OF NIV.

• Type 1 or hypoxemic failure.
• Type 2 or hyper carbic failure.

• Type 1- CPAP.
• Type 2- BiPAP.
CPAP.

- Improves oxygenation.
BIPAP.

- **EPAP**
  - Provides PEEP
  - Increases FRC
  - Reduces FiO2

- **IPAP**
  - Decrease WOB and oxygen demand
  - Increase TV
  - Decrease RR
WHEN TO USE NIV

- Indication
- Contraindication
- Assessment - sick but not moribund, can protect airway, cooperative and stable hemodynamics.
- Ceiling of therapy
CONTRAINDICATIONS

• Agitated
• Unable to protect airway
• Excessive vomiting
• Unstable CVS
• Untreated pneumothorax
• Bowel obstruction
• Facial trauma, burns, surgery
• Fixed airway obstruction
COMPLICATIONS

- Failure
- Hypoxia
- Aspiration
- Low BP
- Pressure ulcers
- Gastric distension
- Barotrauma
LVF.

- CPAP- 5 to 8 to a maximum of 15.
- Titrate with saturation and ABG.
- Aim to achieve TV 7ml/kg and RR< 25.
COPD.

- EPAP - 3 to 8.
- IPAP - 15 to 30.
- Trigger - maximum sensitivity.
- Back up rate 15.
- I/E ratio 1:3.
- Titrate with saturation and ABG.
SETTING UP.

- Communication and reassurance.
- Correct mask size.
- Documentation.
- Follow up and recording observations.
Summary for providing acute non-invasive ventilation.

**Indications for NIV**
- **COPD**
  - pH < 7.35
  - PCO2 > 6.5
  - RR > 23
  - If persisting after bronchodilators and controlled oxygen therapy
- **Neuromuscular disease**
  - Respiratory illness with RR > 20 if usual VC < 1L even if PCO2 < 6.5
  - pH < 7.35 and PCO2 > 6.5
- **Obesity**
  - pH < 7.35, PCO2 > 6.5, RR > 23
  - Or Daytime PCO2 > 6.0 and somnolent

**Contraindications for NIV**
- **Absolute**
  - Severe facial deformity
  - Facial burns
  - Fixed upper airway obstruction
- **Relative**
  - pH < 7.15
  - (pH < 7.25 and additional adverse feature)
  - GCS < 8
  - Confusion/ agitation
  - Cognitive impairment
  - (warrants enhanced observation)

**Indications for referral to ICU**
- AHRF with impending respiratory arrest
- NIV failing to augment chest wall movement or reduce PCO2
- Inability to maintain Sao2 > 85-88% on NIV
- Need for IV sedation or adverse features indicating need for closer monitoring and/or possible difficult intubation as in OHS, DMD.

**NIV SETUP**
- **Mask**
  - Full face mask (or own if home user of NIV)
- **Initial Pressure settings**
  - EPAP: 3 (or higher if OSA known/expected)
  - IPAP in COPD/OHS/KS: 15 (20 if pH < 7.25)
  - Up titrate IPAP over 10-30 mins to IPAP 20—25 to achieve adequate augmentation of chest/abdo movement and slow RR
  - IPAP should not exceed 30 or EPAP 8* without expert review
  - IPAP in NM: 10 (or 5 above usual setting)
- **Backup rate**
  - Backup Rate of 16-20. Set appropriate inspiratory time
- **I:E ratio**
  - COPD: 1:2 to 1.3
  - OHS, NM & CWD: 1:1
  - 0.8-1.2s CPOD
  - 1.2-1.5s OHS, NM & CWD
  - Use NIV for as much time as possible in 1st 24 hours.
  - Taper depending on tolerance & ABGs over next 48-72 hours
  - SEEK AND TREAT REVERSIBLE CAUSES OF AHRF

**Possible need for EPAP > 8**
- Severe OHS (BMI > 35), lung recruitment eg hypoxia in severe kyphoscoliosis, oppose intrinsic PEEP in severe airflow obstruction or to maintain adequate PS when high EPAP required

**NIV Monitoring**
- **Oxygenation**
  - Aim 88-92% in all patients
  - Note: Home style ventilators CANNOT provide > 50% inspired oxygen.
  - If high oxygen need or rapid desaturation on disconnection from NIV consider IMV.
- **Red flags**
  - pH < 7.25 on optimal NIV
  - RR persisting > 25
  - New onset confusion or patient distress
- **Actions**
  - Check synchronisation, mask fit, exhalation port; give physiotherapy/ bronchodilators, consider anxiolytics
  - CONSIDER IMV

A Craig Davidson et al. Thorax 2016;71:ii1-ii35
• Thank You.