Year 2004 Paper two: Questions supplied by Megan

**Question 43 – respiratory NPPV**

For which of the following conditions is non-invasive positive pressure ventilation (NPPV) least likely to be of benefit?

A. COPD with acute hypercapnic hypoxic respiratory failure  
B. Obesity-hypoventilation syndrome with chronic hypercapnic respiratory failure  
C. Pneumonia in a stem cell allograft patient with acute hypoxic respiratory failure  
D. Community-acquired pneumonia with acute hypercapnic hypoxic respiratory failure  
E. Duchenne muscular dystrophy (DMD) with chronic hypercapnic respiratory failure

**NPPV**

- Decrease work of breathing  
- Improves alveolar ventilation  
- Improves gas exchange

**Indications:**

- PaCO2 > 45mmHg  
- pH < 7.35 but > 7.10

**Diagnosis:**

- COPD exacerbations  
- APO  
- Pneumonia  
- Chronic hypoventilation

**Contraindications:**

- Respiratory arrest  
- Trauma/surgery to face  
- Excessive secretions  
- Aspiration risk  
- Impaired mental status/uncooperative  
- Haemodynamic instability  
- Life-threatening refractory hypoxaemia

**Exacerbations of COPD**

- Reduces mortality  
- Reduces intubation  
- Reduces complications

**Hypoxaemic Respiratory Failure**

- Hypoxaemic respiratory failure is defined as PaO2:FiO2 ratio < 200 in the absence of CO2 retention  
- May increase lung volumes, recruit collapsed alveoli and reduce work of breathing  
- Conflicting results  
- Less efficacious than in hypercapnic exacerbations of COPD  
- Not for routine use
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APO
- CPAP effective
- Improves oxygenation and hypercapnia
- Decreases work of breathing
- Reduces intubation
- Reduces mortality
- BiPAP can be used if CPAP fails

Acute Asthma
- No randomised control trials
- Uncontrolled trial suggest benefit in severe asthma but not routinely recommended

Immunosuppressed
- Reduces intubation and thus complications of intubation including nosocomial infections

Neuromuscular Disorders
- No randomised control trials due to ethical considerations
- Several uncontrolled trials demonstrate benefit in symptoms

Obesity-Hypoventilation Syndrome
- Definition = obesity and alveolar hypoventilation during wakefulness which cannot be attributed to pulmonary or pleural pathology
- NPPV is mainstay of treatment
- CPAP and BiPAP used
- Should receive PPV at night to reduce daytime somnolence and improve alveolar ventilation

Guidelines for selecting patients with chronic respiratory failure for non-invasive ventilation

Chronic hypoventilation:
- Daytime PaCO2 ≥45 mmHg OR
- Nocturnal hypoventilation with sustained O2 desaturation AND symptoms (such as morning headache, hypersomnolence, etc)
- Appropriate diagnosis
  - Neuromuscular diseases
  - Thoracic deformity
  - Obesity hypoventilation syndrome
  - OSA unresponsive to CPAP

In Summary:
A. BiPAP of the most benefit in the setting of acute hypercapnic exacerbation of COPD
B. and E. NPPV is the mainstay of treatment in these conditions and provides significant symptomatic relief
C. NPPV is of proven benefit in immunocompromised patients as it reduces intubation and nosocomial infections
D. NPPV may be of benefit in the setting of pneumonia but the main problem is the VQ mismatch which cannot be corrected with NPPV