

Reduction in ITU admission after introduction of Non Invasive Ventilation in a Regional Unit

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Background

- NIV (non invasive ventilation) - acute respiratory failure (ARF)
 - COPD with acute hypercapnic failure
 - Chest wall deformity
 - Obstructive sleep apnoea
 - Neuromuscular disorders
- (BTS 2002)
- Pneumonia and atelectasis - most frequent post operative pulmonary complications

NICE Guidelines COPD (2003)

NIV;

- Reduces mortality
- Need for intubation
- Fewer complications
- Shorter duration of stay



Evidence

Growing evidence for NIV following thoracic surgery

- 2 RCTs
 - ARF (hypoxaemic / hypercapnic)
 - Improved physiological measures (Aguilo et al, 1997)
 - Reduced ETMV/ mortality (Auriant et al, 2001)

- 1 prospective observational study (Lefebvre et al, 2008)
 - ETMV/ mortality
 - Efficacy demonstrated

Aims

- Establish number of thoracic surgery HDU patients with hypercapnic ARF suitable for NIV treatment
- Evaluate the impact of a thoracic surgery NIV service on ITU admissions

Methods

- Regional thoracic surgery HDU
- 7 month prospective observational study 2005
- Data recorded for all consecutive ARF patients
- Identified those fitting criteria for NIV
 - Hypercapnic ARF ($\text{pH} < 7.35$, $\text{PaCO}_2 > 6.0\text{kPa}$)
 - No contra-indication

Results

HDU ARF patients n=20;

10 did not meet criteria

- 7 Type I failure
- 3 Type II failure
 - UAO, over sedation, need for IPPV

10 met criteria



Demographics n=10

- Mean age 65 yrs (± 13)
- Male 5
- Procedures
 - Thoracotomy
 - Mini-thoracotomy
 - Laser ablation
 - Bronchial Stent
 - VATS
 - Cervical Mediastinoscopy
 - Non-operated empyema

Results continued

- 6 patients managed with CPAP
 - 3 resolved
 - 3 admitted to ITU
- 4 continued with current management
 - 3 resolved
 - 1 admitted to ITU

ITU admissions

- In total 4 patients admitted to ITU
 - 8.5% of the total thoracic surgery admissions to ITU (total admissions 47)
- Mean (SD) ITU LOS : 8 days (± 6.6)

Post NIV study period

- NIV service established 2006/7
 - Respironics Vision
 - Training
- 7 month data collection 2008
- Re-evaluation of thoracic surgery HDU ARF patients admitted to ITU

Demographics n=7

- Hypercapnic ARF HDU patients treated with NIV
- Mean age 56 yrs (± 11)
- Male 6
- Procedures
 - Thoracotomy
 - Chest wall resection
 - Mini-thoracotomy
 - VATS
 - Bilateral VATS, LVRS
 - Non operated pleural effusion, chest infection

Results

- 6 patients reversed with NIV
- 1 admitted to ITU with sepsis and multi organ failure
 - RIP (LOS 1day)
- 4.1% total thoracic surgery admissions to ITU (total n=24)

Comparison of admissions to ITU

- ARF HDU patients admitted to ITU
 - 14.2% 2008 Vs 40% in 2005
- Calculation:
 - Mean LOS ITU 6.6 days
 - Cost saving of £16,632* during second study period

* ITU day priced at £1400

Conclusion

- Safely implemented service
- Reduction in need for ventilation and ITU admission in ARF thoracic surgery patients
- Cost savings demonstrated

Anecdotal points

- Vision machine necessary – mean FiO_2 .8
- Treatment failure
 - Early recognition of non responders
 - Lefebvre et al, 2008
- No guidelines – local protocol needed

Any Questions?



Cost analysis calculation

- Post NIV 14.2% (n=1) of HDU respiratory failure patients admitted to ITU compared to 40% (n=4)
- 40% of patients in post NIV period = 2.8
- Minus 1 subject admitted to ITU = 1.8
- Mean LOS ITU = 6.6 days
- Calculation: $1.8 \times 6.6 \times \text{£}1400$ (ITU bed day price)
- Cost saving of £16,632