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Who should not receive noninvasive positive pressure ventilation

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Keywords

Noninvasive Positive Pressure Ventilation, Respiratory Failure, Acute Respiratory Distress Syndrome (ARDS), Pneumonia

Context

Noninvasive positive pressure ventilation (NPPV) uses a device, often a sealed mask, to increase gas exchange in the lungs. It has been shown to reduce the incidence of intubation in hypercarbic respiratory failure due to COPD and Cardiogenic Pulmonary Edema, thus reducing the complications of intubation as well (such as ventilator associated pneumonia and sepsis). This study attempts to clarify which patients will be more successful when given NPPV in hypoxic respiratory failure so as to avoid excessive intubation and its complications.

Significant findings

Of the 5,847 patients admitted, 354 met criteria for the study. 824 patients were excluded due to acute COPD exacerbation. A majority (246 or 70%) of patients did not go on to intubation. Of the patients requiring intubation (30%), reasons included: inability to correct hypoxia (62%), inability to manage secretions (13%), mask intolerance (9%), inability to correct dyspnea (5%), and hemodynamic instability (11%). Predictive factors of intubation included: age greater than 40 years, SAPSII score >35, PaO₂:FIO₂ <146, ARDS, and pneumonia. The etiology of respiratory failure in the intubated patients included: ARDS (>51% requiring intubation), community acquired pneumonia (50% requiring intubation), cardiogenic pulmonary edema (10% requiring intubation), and pulmonary contusion (18% requiring intubation). Of the patients who required intubation 59% died in the ICU, and 5% of those avoiding intubation died. Complications associated with intubation included: longer ICU stay, higher rate of sepsis, and ventilator associated pneumonia. NPPV had complications including: facial skin necrosis, conjunctivitis, and gastric distension.

Comments

The study answered the question of who is most likely to fail NPPV: age greater than 40 years, SAPSII score >35, PaO₂:FIO₂ <146, ARDS, and pneumonia. This evidence suggests that in these patients, an aggressive strategy towards intubation may be warranted. Also the study affirms evidence that patients with cardiogenic pulmonary edema and pulmonary contusion often do well with NPPV. The methods of the study assumed that all patients with the diagnosis of respiratory failure would be intubated. Unfortunately, patients were not randomized to NPPV or intubation based on this criteria, and thus it is difficult to discern if NPPV has less complications than intubation in the 70% of patients who did not require intubation. It is also difficult to discern if using NPPV to delay intubation will delay complications of the intubated patient, or worsen them. The study also points out that NPPV requires meticulous care in positioning the device and coaching the patient in its use. It was also interesting to find that secretion management and mask intolerance were key factors in failing NPPV.

Methods

Hypoxic Respiratory Failure was defined as RR>30, PaO₂: FiO₂<200 on Venturi mask, and accessory use of respiratory muscles or paradoxical abdominal motion. Exclusions included those requiring emergent intubation for CPR, respiratory arrest, hemodynamic instability, altered mental status and neurological dysfunction, acute COPD exacerbation, status asthmaticus, two or more new organ failures, or ICU stay for monitoring purposes. Selected patients were monitored and arterial blood gasses (ABG) were initially obtained at 1hr, then every 4hrs. Successful NPPV included maintaining PaO₂:FiO₂>200, or increasing the ratio by 100 from baseline.

References

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