

Reference Article: Goodacre, Steve, Ph.D. et al. "Prehospital noninvasive Ventilation for Acute Respiratory Failure: Systematic Review, Network Meta-analysis, and Individual Patient Data Meta-analysis. *J. of Academic Emergency Medicine*, 9/2014.

Clinical Question: How effective is the use of non-invasive ventilation (NIV), either CPAP or BiPAP in the pre-hospital setting for acute respiratory failure?

Background: Acute respiratory failure is a common complaint that elicits a call to EMS. Previously, the treatment for this has included a variety of treatment modalities that are considered standard of care. However, as NIV becomes increasingly useful in a hospital setting as a treatment for ARF, it has now become an area of interest to attempt to expand the utility of NIV to the pre-hospital setting.

Methods: Fourteen differing databases and research registers were searched for randomized or quasi-randomized controlled trials that reported the use of pre-hospital CPAP or BiPAP and also that reported either intubation and/or mortality rate. These were compared to similar patients with ARF. A network meta-analysis was then done using both patient level data and aggregate data to assess treatment effect modifiers. The primary outcome for this study was identified as mortality, while the secondary outcome was intubation.

Results: Of the 2,284 citations identified, 8 randomized and 2 quasi-randomized studies were chosen. The power of these studies ranged from 23-207. Additionally, 7 of the 10 studies provided individual patient information for comparison meta-analysis.

Ultimately, CPAP was more effective than standard of care at decreasing mortality and intubation rate. BiPAP however, did not have a statistically significant improvement on either mortality or intubation. When individual patient data was explored, gender appeared to be a modifier of the effect of CPAP on mortality. BiPAP did not share this gender modifier.

Discussion: Interestingly, but perhaps not surprisingly given the success of NIV in the in-patient setting, CPAP was found to have positive effects both on intubation rates and mortality when compared with standard of care treatment of acute respiratory failure in the pre-hospital setting. What is curious is that BiPAP was not shown to afford similar positive outcomes. It would certainly be interesting to know if this is true in the in-patient setting as well.

Additionally, although this study certainly is an interesting and pertinent topic, it failed to discuss specifically what their definition of standard of care was. This could potentially change outcomes independent of NIV interventions and submit the study to significant bias.

Certainly this topic warrants more study and could benefit from additional randomized controlled trials that assessed the both the effects of the NIV on mortality and intubation as well as how operator variability changes outcomes.

Conclusion: NIV appears to have a role in pre-hospital treatment of acute respiratory failure but additional study is needed to define how broad that role should be.

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