

## **Paramedic – Evidence Based Practice Program (P-EBP)**

**Title:** CPAP vs. BiPAP on patient outcomes

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**Clinical Scenario:** You are called to the residence of a 78 year old male patient in severe respiratory distress. The patient suffers from congestive heart failure after suffering many MI's in the past. Over the past 12 hours, patient has been progressively becoming more short of breath. Oxygen saturations on room air are 74%, respiratory rate 36. Upon auscultation, coarse crackles are heard in all fields. CPAP is applied to patient which improves oxygen saturations to 94% and decreased respiratory rate to 24.

**PICO (Population – Intervention – Comparison – Outcome) Question:** In respiratory distress patients requiring non-invasive positive pressure ventilation, is there a difference when using BiPAP vs. CPAP in hospital stay and mortality rates?

**Search Strategy:** (((SOB or "pulmonary edema" or "respiratory distress" or "shortness of breath" or CHF or "congestive heart failure" or "breathing problems" or "ARDS" or "acute respiratory distress syndrome"))) AND (CPAP or "continuous positive airway pressure" or "positive pressure ventilation")) AND (BiPAP or "bilevel positive airway pressure")

**Search Outcome:** 86 results

## Relevant Papers:

AUTHOR/ DATE	POPULATION: SAMPLE CHARACTERISTICS	DESIGN (LOE)	OUTCOMES	RESULTS	STRENGTHS/ WEAKNESSES
Liesching et al. 2013/08/15	36 patients enrolled who presented to ED with acute pulmonary edema (>18 years of age)	Randomized control trial  Level of evidence: Level 1	Decreased dyspnea  Increased ventilation  Improved acidemia	14 CPAP 13 BiPAP at 30 minutes: BiPAP had higher PaO2 BiPAP - (283 vs. 132, $p < 0.05$ ) CPAP - (283 vs. 189, $p < 0.05$ ) Dyspnea lower with BiPAP ( $p = 0.05$ ) Fewer BiPAP patients required ICU (38% vs. 92%, $p < 0.05$ )  Both treatments improved patients symptoms	Great randomization  Patients presented the same prior to treatment  Small sample size
Hui Li MM et al. 2013/05	Hospital patients with acute cardiogenic pulmonary edema (ACPO)	Retrospective randomized control trial  Level of evidence: Level 1	Hospital length of stay  Mortality rates  Endotracheal intubation	1433 patients enrolled  Hospital mortality - (relative risk [RR], 0.86; 95% CI, 0.65-1.14; $P = .46$ ; $I^2 = 0\%$ ) *no significant difference between CPAP and BiPAP  Need for intubation - (RR, 0.89; 95% CI, 0.57-1.38; $P = .64$ ; $I^2 = 0\%$ ) *No significant difference between CPAP and BiPAP  Hospital stay - (RR, 1.01; 95% CI, -0.40 to 2.41; $P = .98$ ; $I^2 = 0\%$ ) *No significant difference between CPAP and BiPAP  Both treatments improved patients symptoms	High level of evidence  Large number of patients enrolled
Fabrizio Moritz et al. 2007/06	Hospital patients with acute respiratory failure caused by acute cardiogenic pulmonary edema	Prospective randomized study  Level of evidence: Level 1	Endotracheal intubation  Mortality rates  Acute myocardial infarction	Combined criterion of intubation, death and acute MI: (5% versus 12%, respectively; odds ratio [OR] 0.4; 95% confidence interval [CI] 0.0 to 1.9) *No significant difference between CPAP and BiPAP  Severe complications - (9% versus 6%; OR 1.5; 95% CI 0.3 to 9.9)  Duration of ventilation - (median for both groups 2 hours; interquartile range [IQR] 1.2 to 3.0 hours) *No significant difference  Hospital stay - (CPAP 8.5 [IQR 6 to 14] days; BiPAP 10 [IQR 7 to 16] days) *No significant difference  In hospital mortality - (8% versus 14%; OR 1.8 [IQR 0.4 to 8.8])	Older study (2007)  Slightly more patients received CPAP as opposed to BiPAP because some patients did not consent to taking part in the study

**Consider:** In looking back at my original question, I was able to find studies comparing the two devices which looked for similar outcomes as I. While one study showed an improvement on patient outcomes when comparing BiPAP vs. CPAP, the other two larger studies did not. Both treatments proved to be very effective for patients requiring non-invasive positive pressure ventilation. At this time with the evidence available, I see no reason to change current pulmonary edema protocols. Either BiPAP or CPAP should be used in patients with pulmonary edema.

**Clinical Bottom Line:** Although one small study provided data to show that BiPAP was superior to CPAP, there is not enough evidence that this is the case. The larger studies demonstrated no significant difference between the two. No changes to patient care should be made at this time for those requiring positive pressure ventilation.

**References:**

Timothy Liesching., David L. Nelson., Karen L. Cormier., Andrew Sucov., Kathy Short., Rod Warburton., Nicholas S. Hill., (2013) Randomized Trial of Bilevel Versus Continuous Positive Airway Pressure for Acute Pulmonary Edema

Fabienne Moritz., Benoit Brousse., Bruno Gellee., Abdesslam Chajara., Erwan L'Her., Marie-France Hellot., Jacques Benichou., (2007) Continuous Positive Airway Pressure Versus Bilevel Noninvasive Ventilation in Acute Cardiogenic Pulmonary Edema: A Randomized Multicenter Trial

Hui Li MM., Chunlin Hu., Jinming Xia., Hongyan Wei., Xiaoyun Zeng., Xiaoli Jing., (2013) A Comparison of Bilevel and Continuous Positive Airway Pressure Noninvasive Ventilation in Acute Cardiogenic Pulmonary Edema