

Paramedic - Evidence Based Medicine (P-EBP) Program

Paramedic CAT (Critically Appraised Topic) Worksheet

Title: CPAP vs Usual care for out of hospital severe Respiratory Distress Patients

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2nd Party Appraiser: (this will be one of your instructors)

Clinical Scenario: Paramedics are met at the door of a very well kept home by the patient's wife, who contacted EMS for her husband. As the paramedics walk in they find a 40 year old male who is sitting at the kitchen table. The patient is visibly in respiratory distress. He is tripodding at the table with a slight audible wheeze heard. He is able to speak in only one-to-two word sentences. Upon examination the paramedics find the patient's air entry to be extremely diminished with wheezing in all fields. Patient's vitals are SpO₂ 89% HR 138 RR 34 rapid and shallow. Following assessment should paramedics use CPAP or stick with usual care (BVM, O₂, meds)?

PICO (Population – Intervention – Comparison – Outcome) Question:

- P-** Out of Hospital Acute respiratory distress patients
- I -** Continuous Positive Airway Pressure (CPAP)
- C-** Usual care (BVM, Oxygen, Meds etc)
- O-** Need for in hospital tracheal intubation

Search Strategy:

(Pre Hospital OR out of hospital OR paramedic OR Emergency Medical Services OR emerg*) AND (CPAP OR Continuous Positive Airway Pressure) AND (respiratory distress OR Severe Respiratory Distress OR Status Asthmatics OR respiratory insufficiency)

Search Outcome: 224 results



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Relevant Papers:

AUTHOR, DATE	POPULATION: SAMPLE CHARACTERISTICS	DESIGN (LOE)	OUTCOMES	RESULTS	STRENGTHS/ WEAKNESSES
J,Thompson MD,FRCPC September 2008	71 Pre hospital patients in severe respiratory distress	Prospective With Control group LOE 1	<ul style="list-style-type: none"> - The primary outcome was the need for tracheal intubation during the out of hospital/hospital episode of care - Secondary outcomes were mortality and length of stay 	<ul style="list-style-type: none"> - Usual care group 17 out of 34 (50%) patients were intubated vs 7 out of 35 (20%) in the CPAP group P 0.25 CI 95% - Mortality was 12 out of 34 (35.3%) in the usual care group versus 5 out of 35 (14.3%) in the CPAP group P 0.3 CI 96% -1 Patient in each group lost to f/u after refusing full consent 	<ul style="list-style-type: none"> - <i>Unblinded study</i> + <i>Good randomization .</i> - <i>No validation severity of respiratory distress score was used, left to paramedic judgement</i> - <i>potential of paramedic bias</i> + <i>decision to leave a degree of judgment in intubation to paramedic/ physician depicts actual working conditions</i> + <i>paramedics received training and lecture on research ethics</i> - <i>Small trial</i>

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<p>S,Aguilar, MD 18th January 2013</p>	<p>385 Patients. All patients with a chief complaint of severe respiratory distress. All 235 patients in Pre-hospital setting received CPAP, while 235 were historical controls receiving usual care</p>	<p>Protective trial with retrospective control group LOE 2</p>	<ul style="list-style-type: none"> - Primary outcome was physiologic variables - Secondary outcome included endotracheal intubation rate, hospital mortality, and overall hospital length of stay 	<ul style="list-style-type: none"> - Median Scene to hospital time was different favouring the post-CPAP patients over the controls (29mins vs 23 mins P0.001 - Prehospital intubations similar between two groups with control rate of 1.7% and post-CPAP of 2.28% P0.05 - Length of hospital stay similar with both groups control 4 days vs post-CPAP group 3 P0.342 	<ul style="list-style-type: none"> - no randomization + large sample size + Good protocol for CPAP - lacking statistical differences between control group and CPAP group - Retrospective control group - Patients transported to 3 different hospitals where continued treatment would have varied
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<p>G. Scott Warner, MD,FACP, FCCP</p> <p>1 July 2009</p>	<p>195 total patients enrolled in study All patients chief complaint of respiratory distress. All patients in pre-hospital setting 89 pre CPAP 106 post CPAP</p>	<p>Prospective observational with retrospective control group</p> <p>LOE 2</p>	<ul style="list-style-type: none"> - Primary outcome was need for intubation either in the prehospital setting or in the ED - Second outcome was admissions to hospital with length of stay 	<ul style="list-style-type: none"> - 7 (7.9%) Non CPAP patients and 0 (0%) CPAP patients where intubated with 48hrs - 3 patients (3.4%) intubated prehospital - 80 non CPAP Patients (72.2%) required admittance to ICU with average stay of 8 days - 14 (17%) of CPAP patients continued on CPAP in the hospital with an average ICU stay of 3.0 days - Discharge rate from ED with prehospital CPAP patients was 15% with no untoward effects 	<ul style="list-style-type: none"> - Non blinded study - Not randomized - Retrospective control group + Decisions on CPAP was based on set criteria
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<p>V.Nielsen 10 October 2016</p>	<p>910 total patients enrolled in study. All patients chief complaint of severe respiratory distress. All patients in the prehospital setting 171 patients treated with CPAP 739 treated with usual methods</p>	<p>Protective observational with a retrospective control group receiving standard care LOE 2</p>	<p>- Primary outcome was evaluated by changes in peripheral oxygen saturation and respiratory rate during EMS transport - Secondary outcome was to measure adverse events, discontinuation of treatment, ICU admissions, and mortality</p>	<p>- From arrival on scene to hospital CPAP patients had a larger increase in SpO₂ than non CPAP patients (87 to 96% vs 92 to 96%) p0.01 - decrease in respiratory rate for CPAP Patients (32 to 25 breaths/min vs 28 to 24 breaths/min) p0.01 - 1 CPAP patient was intubated (0.6%) and 8. Non CPAP patients where intubated (1.1%)(all prehospital setting)</p>	<p>+ Large Sample size - uneven ratio of patients treated with CPAP vs Usual treatment - No randomization + Section criteria close to actual field delivery + Control group from EMS data base removing paramedic bias - some patients lost on f/u - Retrospective control group</p>
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- Comments:**
- Most patients in the CPAP group of all of the studies received usual care along side CPAP
 - All of the studies used paramedic judgement when discontinuing CPAP protocol for adverse effects or change in patient presentation
 - All studies had paramedics train with CPAP uses prior to use in field
 - All studies done in an Urban EMS system
 - Most patients received additional treatment from ED following application of prehospital CPAP



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Consider: Although the data suggests that application of CPAP in the prehospital setting has positive outcomes for patients experiencing severe respiratory distress, it will require proper paramedic training as well as recognizing when to use CPAP. The potential of mistreating a patient with CPAP is high due to a poor assessment or lack of understanding on the providers' part. CPAP will require Paramedics to keep their knowledge current as it will not be used on every call.

Clinical Bottom Line: In all of these studies data shows that prehospital application of CPAP with proper Paramedic assessment in conjunction with usual care (BVM, Oxygen, medication, etc) have a positive outcome in patient care. The data suggests that early application of CPAP in the prehospital setting shows a reduction in tracheal intubation, decreases patient time spent in hospital and decreases risk of patient mortality

References:

- James Thompson MD, FRCPC., David A. Petrie MD, FRCPC., Stacy Ackroyd-Stolarz PhD. Darrel J. Bardua ACP. (September 2008) Out-Of-Hospital Continuous Positive Air Pressure Ventilation Versus Usual Care in Acute Respiratory Failure: A Randomized Controlled Trial
- Steve A. Aguilar, MD., Jonathon Lee, MD., Edward Castillo, PhD, MPH., Bryan Lam, BS., Jennifer Choy, BS. Ekta Patel, BE. John Pringle, and John Serra, MD. (18 January 2013) Assessment of The Addition of Prehospital Continuous Positive Airway Pressure (CPAP) to an Urban Emergency Medical Services (EMS) System in Persons with Severe Respiratory Distress
- G.Scott Warner, MD, FACO, FCCP. (1 July 2009) Evaluation of the Effect of Prehospital Application of Continuous Positive Airway Pressure Therapy in Acute Respiratory Distress
- Vibe Maria Laden Nielsen, Jacob Madsen, Anette Aasen, Anne Pernille Toft-Petersen, Kenneth Lubcke, Bodil Steen Rasmussen, and Erika Frischknecht Christensen (10 October 2016) Prehospital treatment with continuous positive airway pressure in patients with acute respiratory failure: a regional observational study

