

Paramedic – Evidence Based Medicine (P-EBP) Program
Paramedic CAT (Critically Appraised Topic)

Title: Continuous compressions and positive resuscitation outcomes

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Clinical Scenario: A 58 year old man is found lying supine, apneic and pulseless on the floor of his house. When paramedics arrive, his brother is compressing at a rate of 30-2 at approximately 100 bpm. He stops every 30 compressions to provide the patient with two breaths. When the paramedics take over, they insert a King LT airway and treat the patient with continuous compressions. The patient experiences a ROSC after 2 analyses. Do continuous compressions contribute to a greater likelihood of a patient experiencing a ROSC, or is the traditional 30-2 First Aid CPR still the preferred method?

PICO: In cardiac arrest patients, do patients receiving continuous compressions compared to patients who receive the 30-2 model, result in a higher likelihood of a ROSC (return of spontaneous circulation, and positive neurological outcomes resulting in patient discharge)?

Search Strategy: ((continuous compressions OR CCC) AND (CPR OR cardiopulmonary resuscitation) AND (ROSC OR Return of spontaneous circulation) OR (neurological outcome OR patient discharge))

Search Outcome: 39 titles on Pubmed (www.ncbi.nlm.nih.gov), 716 on PubMed Central (www.ncbi.nlm.nih.gov)

Relevant Papers: 2 were chosen as relevant for this CAT.

Title	Design/LOE	Population	Intervention /comparison	Outcomes measured	Results
Trial of Continuous or Interrupted Chest Compressions during CPR. 2015. Graham Nichol, M.D., M.P.H., Brian Leroux, Ph.D., Henry Wang, et al.	Cluster-randomized control trial LOE 1b	Using 114 emergency medical services, adults with non-traumatic cardiac arrests were assigned to receive either continuous compressions (intervention group) or interrupted chest compressions (control group) The intervention group consisted of 12 613 patients, while the control group consisted of 11 035 patients.	All subjects experienced a medical cardiac arrest that was not witnessed by EMS, who did not have previous CPR interventions started by non-EMS workers, did not have a DNR, nor were a protected population.	The rate of survival to hospital discharge was measured, as well as the modified Rankin scale score to measure neurological function. CPR was also measured to assess compliance.	Patients who received out-of-hospital continuous compressions during CPR did not result in considerably higher levels of survival in comparison to the patients who received interrupted chest compressions. Of the 12 613 patients in the intervention group, 1129 patients (9.0%) survived until discharge, whereas 1072 of the 11 035 (9.7%) in the control group survived until discharge.
Continuous mechanical chest compression during in-hospital	Cohort study, LOE 2a	28 patients with PEA who arrested in one of three European	All subjects had a PEA rhythm. It was caused by	Measured ROSC in patients, survival of patients, and	27 out of 28 patients who received continuous compressions on a

cardiopulmonary resuscitation of patients with pulseless electrical activity. 2007. Hendrik Bonnemeier, Gregor Simonis, Göran Olivecrona, et al.		hospitals: Lübeck and Dresden, Germany, and Lund, Sweden.	various 14 patients had a pulmonary embolism; 9 had cardiogenic shock/acute myocardial infarction; 2 had severe hyperkalemia; 3 had sustained ventricular arrhythmias/electrical storm.	neurological deficit in survivors.	LUCAS device experienced a ROSC. 10 patients died within the first hour, while three patients died within 24 hours after CPR. 14 patients survived and were discharged. Patients in cardiac arrest due to complications with a PE could benefit from continuous chest compression. It is believed that continuous compressions can lead to thrombus fragmentation and increased pulmonary artery blood flow.
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Comments: One of these studies is done in the hospital setting, and may not be directly related to the EMS setting. This study also looked at continuous mechanical compressions in comparison to manual CPR. This study was designed to look at the LUCAS device, and its effectiveness with continuous compressions during patient extrication, transport and patient hand off. Therefore, its results may be more favourable in comparison to manual CPR where inevitable pauses exist during the course of treatment. It is important to keep these variances in mind when considering conclusions.

Clinical Bottom Line: There is no significant difference between long-term patient outcome and discharge. Continuous compressions do not contribute to a worse patient outcome; in fact, they are marginally correlated to positive patient outcome, especially within the first 24 hours after ROSC. It may be especially beneficial in patients who suffer from a pulmonary embolism, as it may help to break up the thrombus.

References:

Bonnemeier, H., Simonis, G., Olivecrona, G., & Weidtamm, B. (2012, May 23). Cardiopulmonary resuscitation for cardiac arrest: The importance of uninterrupted chest compressions in cardiac arrest resuscitation. Retrieved March 23, 2019, from <https://www.sciencedirect.com/science/article/pii/S0735675712000964>

Ferluga, E. D. (n.d.). Table 5, Levels of evidence (adapted from Sackett) used in Snider review Interventions for Feeding and Nutrition in Cerebral Palsy - NCBI Bookshelf. Retrieved March 22, 2019, from <https://www.ncbi.nlm.nih.gov/books/NBK132444/table/methods.t4/>

Nichol, G., Leroux, B., Wang, H., Callaway, C. W., Sopko, G., Weisfeldt, M., . . . Ornato, J. P. (2015). Trial of Continuous or Interrupted Chest Compressions during CPR. *New England Journal of Medicine*, 373(23), 2203-2214. doi:10.1056/nejmoa1509139