

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

## Paramedic CAT (Critically Appraised Topic) Worksheet

**Title: Manual CPR Vs. Mechanical CPR**

**Report By: Meghan Beals**

**2<sup>nd</sup> Party Appraiser:**

### **Clinical Scenario:**

You are called to the home of a 65 year old female in cardiac arrest, no signs of trauma. The female has been down for 10 minutes; you start manual CPR on the patient. As you're doing chest compressions the thought of mechanical CPR crosses your mind... Would mechanical CPR be more effective for this patient?

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

P- Out of hospital cardiac arrest I- Mechanical CPR C- Standard manual CPR O- Survival to discharge.

### **Question:**

For adults suffering out of hospital cardiac arrest does mechanical CPR versus standard manual CPR increase survival to discharge?

### **Search Strategy:**

((("Auto pulse" OR "mechanical CPR" OR Lucas OR "Lucas CPR" OR "Lucas pre-hospital care" OR "Lucas prehospital care" OR "Lucas Cardiopulmonary Resuscitation")) AND (CPR OR "Cardiopulmonary Resuscitation" OR "manual chest compressions")) AND (Discharge OR Survival OR "Quality of life" OR "Return to job" OR "hospital discharge")) AND (Ambulance OR "Out of hospital" OR Prehospital OR Pre-hospital OR EMT OR EMS OR "Emergency Care" OR Paramedics OR Paramedic OR Paramedicine)

### **Search Outcome:**

16

# *Paramedic - Evidence Based Medicine (P-EBP) Program*

## Relevant Papers:

AUTHOR, DATE	POPULATION: SAMPLE CHARACTERISTICS	DESIGN (LOE)	OUTCOMES	RESULTS	STRENGTHS/ WEAKNESSES
Brooks, SC 2011  Study 1	Out of hospital cardiac arrest, in hospital cardiac arrest	LOE- 1 Systematic review of prospective randomized control	1* Survival to hospital discharge with good neurological outcome  2* ROSC	Three studies included: One study reported (n=767) reported survival to discharge showed decreased survival with mechanical CPR compared to manual (RR: 0.41 95% CI 0.21-0.79).  Two studies of n=51 with pooled results showed an increase of ROSC with mechanical CPR. ( RR: 2.81 95% CI 0.96 to 8.22)  The largest randomized trial showed possibility of harm with using the mechanical CPR.	Strengths: Cochrane Library Systematic Review  Weaknesses: There is not a lot of statistical data available to be reviewed. Also the outcomes of each study within the systemic review are different. Not all contained survival to discharge outcome with good neurological outcome. Also the type of mechanical devices from study to study differ.

## *Paramedic - Evidence Based Medicine (P-EBP) Program*

<p>Rubertsson, S 2013</p> <p>Study 2</p>	<p>Unexpected out of hospital cardiac arrest, adults</p>	<p>LOE- 1 LINC Randomized clinical trial</p>	<p>1* 4 hour survival in out of hospital cardiac arrest</p> <p>2* survival up to 6 months with good neurological outcome using CPC score 1 to 2.</p>	<p>RCT using LUCAS n=2589 Received mechanical compressions: n=1300. Received manual compressions: n=1289. Primary outcome results: 4 hr survival: Mechanical compressions 307/1300 = 23.65. Manual compressions 305/1289= 23.7%.  Secondary outcome results: 99% in mechanical CPR and 94% in manual CPR.  Adverse reactions: 23 device related reported. 8 cases device malfunction, 15 were device</p>	<p>Strengths:  RCT  A large randomized control population.  Post resuscitation care is similar in both groups.  Both groups are using the same mechanical CPR device.  Weaknesses:  Only one RCT being reviewed. Only one device being compared to manual CPR.</p>

## *Paramedic - Evidence Based Medicine (P-EBP) Program*

				repositioned or minor technical issues. 7 serious reported such as; airway bleeding, spleen rupture, pneumothorax, thoracic vertebra fracture.	

**Comments:**

With evidence and advice from the systematic review it is determined one should not change practice. As seen from the LINC randomized trial and the systematic review there is a lack of data to suggest mechanical CPR is more beneficial than manual CPR. In the LINC randomized trial it stated mechanical CPR devices can be used without complications but did not show improved outcomes. In the largest randomized clinical trial in the systematic review demonstrated there is no increase in hospital survival to discharge with mechanical CPR and a possible increase of harm to the patient with the use of mechanical CPR.

It was also noted in the systematic review that attention should be paid to the delay in chest compressions and defibrillation, as it can be timely setting up the mechanical CPR.

**Clinical Bottom Line:**

There is not sufficient evidence that mechanical CPR compared to manual CPR leads to increased survival to discharge. There has also been evidence of possible harm, therefore this not suggested for pre-hospital use to improve patient outcomes.

# *Paramedic - Evidence Based Medicine (P-EBP) Program*

## **References:**

Brooks, S. C., Bigham, B. L., & Morrison, L. J. (2011). Mechanical versus manual chest compressions for cardiac arrest. *The Cochrane Database of Systematic Reviews*, (1):CD007260. doi(1), CD007260. doi:10.1002/14651858.CD007260.pub2; 10.1002/14651858.CD007260.pub2

Rubertsson, S., Lindgren, E., Smekal, D., Ostlund, O., Silfverstolpe, J., Lichtveld, R. A., . . . Karlsten, R. (2013). Mechanical chest compressions and simultaneous defibrillation vs conventional cardiopulmonary resuscitation in out-of-hospital cardiac arrest: The LINC randomized trial. *JAMA : The Journal of the American Medical Association*, doi:10.1001/jama.2013.282538; 10.1001/jama.2013.282538