Paramedic – Evidence Based Medicine (P-EBP) Program

Paramedic CAT (Critically Appraised Topic) Worksheet

Title: *Manual Vs Mechanical CPR and survivability Pre-Hospital*

Report By: *Steven Spinney*

2nd Party Appraiser: *Jennifer Greene*

Clinical Scenario:
You arrive on scene to 5 minute after receive a call for a man down. On arrival you quickly determine that the patient is VSA, so immediately start compressions while your partner throws a mechanical compression device on the patient allowing you to preform other life safe tasks, such as defibrillation, drug administration, and packaging of the patient for possible transport.

PICO (Population – Intervention – Comparison – Outcome) Question:
In adult Cardiac Arrest, does the use of an Automated Compression Device have a better Outcome than Manual CPR in Pre-Hospital settings

Search Strategy:
(((((OOH OR prehospital OR field OR EMS OR EMT OR paramed* OR home)) AND (rosc OR "post cardiac arrest" OR VF OR VT OR ventricular fibrillation OR ventricular tachycardia OR "return of spontaneous circulation")) AND (CPR OR cardio pulmonary resuscitation)) AND (automated compression devices OR lucas OR autopulse)) AND neurological outcomes

Search Outcome:
15 hits

Relevant Papers:

AUTHOR, DATE	POPULATION: SAMPLE CHARACTERISTICS	DESIGN (LOE)	OUTCOMES	RESULTS	STRENGTHS/ WEAKNESSES
Crit Care Med. 2013	Cardiac Arrests: 6,538 with 1,824 ROSC	This is a Meta Analysis, with Prospective and Retrospective Studies.	In 5 out of 8 Studies reviewed, ROSC was achieved 1.6 times more often with Mechanical CPR Vs. Manual CPR. 3 out of 8 studies were statistically indeterminant.	Mechanical Vs Manual CPR rate of ROSC (odds ratio, 1.62 [95% CI, 1.36, 1.92], p < 0.001).	Strengths: 1.6 times ROSC rate with mechanical CPR Vs. Manual CPR. All cases were real cardiac arrests. Weaknesses: No way to determine if CPR was to standard throughout studies. No determination if pts with ROSC ever left hospital. Included Retrospective studies.
Rubertsson S. 2013, Sweden	Cardiac Arrests: 2589	This was a Prospective Study, with a control group. This is an LOE level 1	Study was looking for 6 month survivability with positive neurological outcomes. Manual CPR:98(7.6%) Mechanical CPR: 110(8.5%)	110 (8.5%) vs 98 (7.6%) (risk difference, 0.86%; 95% CI, –1.2% to 3.0%) at 6 months with mechanical CPR and manual CPR, respectively.	Strengths: Randomized study, Control Group present with approximately equal numbers Weaknesses: Any patient that was misplace or unable to be followed was automatically given a bad outcome.

Comments:
Additional information found within the articles was that a piston driven CPR devices had less favorable outcomes then normal CPR.

Consider:
Based on the findings found in the meta analysis monetary reasons would be the only reason not to switch to a mechanical CPR devise. Most research was inconclusive however, so further research would likely be needed to convince services to change.

Clinical Bottom Line:
More research is needed into these devices, using tighter controls and with more focus on the results especially at the 6 month survival mark.

References:
1-Mechanical Versus Manual Chest Compressions in Out-of-Hospital Cardiac Arrest: A Meta-Analysis, Crit Care Med, 2013
2-Mechanical Chest Compressions and Simultaneous Defibrillation vs Conventional Cardiopulmonary Resuscitation in Out-of-Hospital Cardiac Arrest, Rubertsson S. 2013, Sweden