Paramedic – Evidence Based Medicine (P-EBP) Program

Paramedic CAT (Critically Appraised Topic) Worksheet

Title: Mechanical vs Manual compressions.
Report By: Group Lucas
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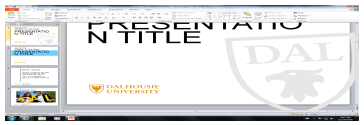
Clinical Scenario:
You are dispatched to a 65 y/o male patient in cardiac arrest. As you arrive on scene, your patient is found lying on the floor not breathing with no present pulse. In order to give the patient a better chance of survival, you must decide: do you put the mechanical CPR device on the patient or do you commence manual CPR?

PICO (Population – Intervention – Comparison – Outcome) Question:
Do patients in prehospital non-traumatic cardiac arrest have an increased rate of survivability and higher likelihood of being neurologically intact when using a mechanical CPR device compared to manual cardiopulmonary resuscitation?

Search Strategy:
Emergency Medical Services OR Emergency medical technicians OR emergency medical technician OR prehospital OR "out of hospital" OR Responder OR ambulance AND cardiopulmonary resuscitation AND mechanical chest compression AND Manual chest compression

Search Outcome:
24



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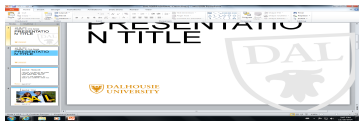
Relevant Papers:

AUTHOR, DATE	POPULATION: SAMPLE CHARACTERISTICS	DESIGN (LOE)	OUTCOMES	RESULTS	STRENGTHS/ WEAKNESSES
Perkins et al, 2015	4471 atraumatic cardiac arrests (out of hospital) .	Prospective study with randomized control groups. With level 1 Evidence.	-Survival at 30 days -ROSC -favorable neurological outcome	-104/1652 (6%)-Lucas vs 193/2819 (7%)- Non device had survival at 30 days (OR 0.86) -522/1652 (32%) lucas vs 885/2819 (31%)- NON. Interval of 0.86-1.14. ROSC - 77/1652 (5%)- lucas vs 168/2819 (6%)- Non had favorable Neuro outcomes. Interval 0.76-0.99	**strengths** : -Number met power calculation -Over extended period of time -RCT with good methodology **Weakness**: -Only used in 4 services in the UK -Training limitations- not all medics were able to fully master.



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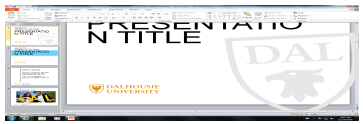
Zhu et al, 2019	15 Studies (9 randomized controlled and 6 cohort studies)	A Meta Analysis with level 1 Evidence	-Evaluate the effects of mechanical and manual CPR in out of hospital patients in terms of ROSC rate, rate of survival to hospital admission, hospital discharge and neurological function	OHCA patients (**ROSC**: RCT: OR = 1.12, 95% CI (0.90, 1.39), P = 0.31; cohort study: OR = 1.08, 95% CI (0.85, 1.36), P = 0.54; **survival to hospital admission:** RCT: OR = 0.95, 95% CI (0.75, 1.20), P = 0.64; cohort study: OR = 0.98 95% CI (0.79, 1.20), P = 0.82; **survival to hospital discharge**: RCT: OR = 0.87, 95% CI (0.68, 1.10), P = 0.24; cohort study: OR = 0.78, 95% CI (0.53, 1.16), P = 0.22; **Cerebral Performance Category** (CPC) score: RCT: OR = 0.88, 95% CI (0.64, 1.20), P = 0.41; cohort study: OR = 0.68, 95% CI (0.34, 1.37), P = 0.28).	**Strengths**: -Examined a large number of studies. -excluded studies that did not have a control group **Weakness**: -geographical limitations due to most studies being done in the USA or Europe



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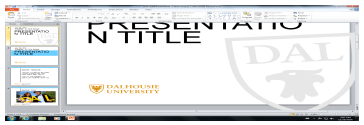
Comments:
In the Perkins et al (2015) study "the subgroup analysis by initial rhythm showed a difference in treatment effect between patients with a shockable initial rhythm and those with PEA or asystole; survival was lower in the LUCAS-2 group in those with shockable initial rhythms than in the control group."

Consider:
We would not change clinical practice based on these articles because there was no significant data found to show that mechanical CPR has better outcomes in terms of ROSC, survivability and neurological outcome than manual CPR.

Clinical Bottom Line:
Based on the articles and the results found- there was no significant difference in terms of patient outcome when comparing mechanical vs manual CPR.



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References:

Perkins GD, Lall R, Quinn T, Deakin CD, Cooke MW, Horton J, Lamb SE, Slowther AM, Woollard M, Carson A, Smyth M, Whitfield R, Williams A, Pocock H, Black JJ, Wright J, Han K, Gates S; PARAMEDIC trial collaborators. Mechanical versus manual chest compression for out-of-hospital cardiac arrest (PARAMEDIC): a pragmatic, cluster randomised controlled trial. Lancet. 2015 Mar 14;385(9972):947-55. doi: 10.1016/S0140-6736(14)61886-9. Epub 2014 Nov 16. PMID: 25467566.

Zhu N, Chen Q, Jiang Z, Liao F, Kou B, Tang H, Zhou M. A meta-analysis of the resuscitative effects of mechanical and manual chest compression in out-of-hospital cardiac arrest patients. Crit Care. 2019 Mar 27;23(1):100. doi: 10.1186/s13054-019-2389-6. PMID: 30917840; PMCID: PMC6437862.