

Paramedic CAT (Critically Appraised Topic)

Title: Mechanical CPR Vs. Manual CPR Pre-Hospital

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PICO:

In prehospital paramedic care, does mechanical CPR compared to paramedic CPR lead to a higher survival rates in cardiac arrest patients.

Search Strategy:

((ems OR emt OR emergency medical services OR paramedic OR ambulance driver) AND (CPR OR cardiopulmonary resuscitation OR human CPR OR paramedic CPR OR prehospital CPR) AND (mechanical CPR OR mechanical CPR device OR lucas OR lucas device) AND (effectiveness OR positive outcome OR survival rate OR survival))

Search Outcome: 70 titles



Tuesday, March 21, 2017 8:45:39 PM

#	Query	Limiters/Expanders	Last Run Via	Results
S5	S1 AND S2 AND S3 AND S4	Expanders - Apply related words Search modes - Find all my search terms	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - MEDLINE;Health Source: Nursing/Academic Edition	70
S4	effectiveness OR positive outcome OR survival rate OR survival	Expanders - Apply related words Search modes - Find all my search terms	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - MEDLINE;Health Source: Nursing/Academic Edition	1,555,392
S3	mechanical CPR OR mechanical CPR device OR lucas OR lucas device	Expanders - Apply related words Search modes - Find all my search terms	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - MEDLINE;Health Source: Nursing/Academic Edition	24,783
S2	CPR OR cardiopulmonary resuscitation OR human CPR OR paramedic CPR OR prehospital CPR	Expanders - Apply related words Search modes - Find all my search terms	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - MEDLINE;Health Source: Nursing/Academic Edition	26,777
S1	Search Strategy: ((ems OR emt OR emergency medical services OR paramedic OR ambulance driver	Expanders - Apply related words Search modes - Find all my search terms	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - MEDLINE;Health Source: Nursing/Academic Edition	104,881

Relevant Papers: 2 relevant papers were chosen for this CAT

Title	Design/LOE	Population	Intervention/ Comparison	Outcomes Measured	Results	Strengths/ Weaknesses
Perkins, 2015	Cluster, randomised open label trial. (LOE IV)	4471 non-traumatic cardiac arrest patients were enrolled in the study.	This study compared survival status of cardiac arrest patients, when mechanical CPR was used over high quality paramedic CPR.	ROSC, 30-day survival rate, 3-month survival rate, 12-month survival rate, 12-month survival with favourable neurological outcome.	Lucas -2 survival 30 days: (6% of 1652 patients) Lucas -2 ROSC (32% of 1652 is 522 patients) Lucas 2 survival to 3 months (6% of 1652 is 96 patients) Control survival: 30 days: 7% ROSC: 31% 3 months: 6% 1 year: 6%	Strengths: -big population size used - four different ambulance services in the UK were involved. Weaknesses: -couldn't always find follow up data about patients' outcome - didn't have enough Lucas -2 devices to evenly split the trial and control group. -it is hard to compare the time it took from the time of the heart attack until CPR was initiated and this could greatly influence the results
Zeiner, 2015	Three large post product placement studies. (LOE IV)	948 cardiac arrest patients	This study compared the neurological	The study measured the results by	-73.4% of the 30-day survivors reached a CPC 1/2	Strengths: -Study was not funded

			<p>outcome after three months in patients who survived and received manual vs mechanical CPR measured.</p>	<p>comparing the neurological outcome of the ROSC patients both of manual and mechanical CPR. These results would be gathered from hospital records and discharge letters. From time to time the attending physician was called over the phone.</p>	<p>within the manual cc subgroup -only 56.8% of the patients within the mechanical cc subgroup had good neurological outcome -this study shows that mechanical CPR is actually worse than manual CPR. -A lot of the patients that received mechanical CPR were even younger and bystander witnessed arrests which I found very interesting.</p>	<p>by paramedics - Large number of subjects</p> <p>Weakness: -More manual CPR data was collected, this could potentially influence the data. -It's impossible to measure how long the time of the arrest to the initial shock and CPR.</p>
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Comments:

This is a very hard topic to compare because there are many different variables to consider. Most of the time in both of these studies it was documented weather the arrest was witnessed, if CPR was started by a bystander, how long it took paramedics to arrive on scene, how old/sick the patient is and even what caused the arrest. If all of these variables were controlled these results would have a much bigger impact om changing the way paramedics conduct a cardiac arrest. There is a slight delay in CPR when applying a mechanical device and it is unknown weather that has an impact on patient outcome.

Clinical Bottom Line:

Based on these two studies I wouldn't want to change the way paramedics conduct CPR. In the Perkins trial, mechanical CPR turned out to have worse neurological results after 30 days of recovery. While in the Zeiner trial the opposite turned out to be true and manual CPR showed worse neurological results after 30 days. Based on this alone I cannot conclude that mechanical

CPR is better than manual CPR. If the standards are going to be changed and mechanical CPR is put into our BLS standards a lot more evidence and trials will be needed.

References:

Perkins GD, Lall R, Quinn T, et al. Mechanical versus manual chest compression for out-of-hospital cardiac arrest (PARAMEDIC): a pragmatic, cluster-randomised controlled trial. *Lancet* 2015;385:947–55.

Zeiner, S., Sulzgruber, P., Datler, P., Keferböck, M., Poppe, M., Lobmeyr, E., & ... Sterz, F. (2015). Mechanical chest compression does not seem to improve outcome after out-of hospital cardiac arrest. A single center observational trial. *Resuscitation*, 96220-225. doi:10.1016/j.resuscitation.2015.07.051