

Paramedic CAT (Critically Appraised Topic)

Title: Mechanical CPR Devices Versus Manual CPR

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Clinical Scenario:

A paramedic crew is dispatched to the 10th floor of a local apartment building for an unresponsive male patient. Upon arrival the paramedic crew discovers a 60 year-old male patient who is VSA in his bedroom. Dispatch notifies the paramedics that no additional resources are available at this time. The paramedics decide that using a mechanical CPR device would be most effective in this situation.

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

Among cardiac arrests patients in the pre-hospital environment, does the use of mechanical CPR versus manual CPR result in decreased mortality?

Search Strategy:

(prehospital OR ambulance OR paramedic OR EMS) AND (((cardiac AND arrest)) OR VSA) AND (death OR ROSC OR mortality) AND (((mechanical AND cpr)) OR ((manual AND cpr))) Limit: Publication date 2010-2017

Search Outcome: 35

Relevant Papers: 3

Author, Date	Population	Design (LOE)	Outcomes	Results
Lafuente-Lafuente, C. 2013	Out-of-hospital trials: 4162 patients	Systematic Review LOE 1	1. Immediate mortality 2. Mortality at hospital discharge	No differences between active compression-decompression cardiopulmonary resuscitation (ACDR) CPR and Standard (STR) for mortality either immediately (RR 0.98, 95% confidence interval (CI) 0.94 to 1.03) or at hospital discharge (RR 0.99, 95% CI 0.98 to 1.01).

Ong, M. 2012	Out-of-hospital trials: 2516 adult patients	Systematic Review LOE 1	ROSC	Insufficient evidence to support or refute the use of mechanical CPR devices in settings of out-of-hospital cardiac arrest and during ambulance transport.
Wik, L. 2014	4231 adult patients	Randomized Circulation Improving Resuscitation Care (CIRC) Sequential Trial LOE 2	<ol style="list-style-type: none"> 1. Sustained ROSC (emergency department admittance) 2. 24h survival 3. Hospital discharge 	2099 (49.6%) received integrated automated load distributing band CPR (iA-CPR) and 2132 (50.4%) manual CPR (M-CPR). Sustained ROSC, 24 h survival and hospital discharge for iA-CPR compared to M-CPR were 600 (28.6%) vs. 689 (32.3%), 456 (21.8%) vs. 532 (25.0%), 196 (9.4%) vs. 233 (11.0%) patients, respectively.

Comments:

These studies reinforce the importance of consistent high quality and continuous CPR.

Clinical Bottom Line:

While the literature indicates mechanical CPR can improve consistency and reduce interruptions while performing CPR in the pre-hospital environment, the evidence suggests that there is no evidence that mechanical CPR can decrease mortality and improve survival rates among cardiac arrest patients compared to manual CPR.

References:

Lafuente-Lafuente, C., & Melero-Bascones, M. (2013). Active chest compression decompression for cardiopulmonary resuscitation. *The Cochrane Database Of Systematic Reviews*, (9), CD002751. doi:10.1002/14651858.CD002751.pub3

Ong, M. H., Mackey, K. E., Zhang, Z. C., Tanaka, H., Ma, M. H., Swor, R., & Shin, S. D. (2012). Mechanical CPR devices compared to manual CPR during out-of hospital cardiac arrest and ambulance transport: a systematic review.

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Wik, L., Olsen, J., Persse, D., Sterz, F., Lozano, M. J., Brouwer, M. A., & ... Lerner, E. B.
(2014). Manual vs. integrated automatic load-distributing band CPR with
equal survival after out of hospital cardiac arrest. The randomized CIRC trial.
Resuscitation, 85(6), 741-748. doi:10.1016/j.resuscitation.2014.03.005