Paramedic – Evidence Based Medicine (P-EBP) Program

Paramedic CAT (Critically Appraised Topic) Worksheet

Title: Determining the correct initial intervention: The relationship between early defibrillation and prolonged downtime for out-of-hospital cardiac arrest (CA) patients.

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Clinical Scenario: Paramedics responded to a call for a 50 year old male patient in cardiac arrest. There is no CPR being done upon their arrival and the patient has been in cardiac arrest for approximately 6 minutes. The initial rhythm on the heart monitor is ventricular fibrillation (VF).

PICO (Population – Intervention – Comparison – Outcome) Question: In patients suffering from out-of-hospital CA with a prolonged downtime, would withholding chest compressions in favor of early defibrillation result in an improved rate of survival to discharge?

Search Strategy: (out-of-hospital OR OOHCA OR pre-hospital OR Prehospital OR EMS OR paramedic) AND (cardiac arrest OR early defibrillation OR defibrillation first OR shock first OR early shock OR downtime OR prolonged arrest OR delayed defibrillation) AND (chest compressions OR CPR OR 2 minutes OR two minutes) AND (ROSC OR survival OR neurologically intact OR discharge OR discharged) AND (CPR first OR CPR-first OR chest compressions first)

Search Outcome: 55 results

Relevant Papers:

AUTHOR, DATE	POPULATION: SAMPLE CHARACTERISTICS	DESIGN (LOE)	OUTCOMES	RESULTS	STRENGTHS/ WEAKNESSES
Koike S. 2011 Japan Prehospital Emergency Care	6, 674 OOHCA adult patients in VF or pulseless VT whose arrests was of cardiac origin and witnessed but not by paramedics.	Retrospective observational study LOE 2	One month survival rate (primary) CPC 1 and 2 after 1 month (secondary)	For pts with an EMS response time >5 min. results not statistically significant whether pts received CPR first or defibrillation first	-Quality of CPR not measured -Grouping of patients not described -Method of measuring timing of intervention not described
Bradley SM 2009 ROC	1638 OOHCA adult patients in VF or pulseless VT whose arrests was of cardiac	Prospective multi-center observational cohort study	Survival to hospital discharge (primary)	For pts with an EMS response time >5 min.	+size of cohort +multiple sites +promotion of good quality CPR by study

	origin and excluding EMS witnessed arrests	LOE 2		Results demonstrated an improved survival rate when they had received up to 195 sec of EMS CPR before defibrillation	sites -CPR quality not measured -Duration of CPR estimated by EMS
Meier P. 2010 USA BMC	OOHCA adult patients in VF or pulseless VT. Non-trauma, non EMS-witnessed	Meta-analysis of four randomized, controlled clinical trials LOE 1	1-ROSC 2-Survival to hospital discharge 3-Favorable neuro outcome at discharge 4-Survival at 1 year	Non-significant results favor a defib-first approach for longer EMS response times (>5 min)	-Three of the four studies used "stacked" shocks -Quality of CPR not measured -Lack of individual patient data +4 randomized controlled trials

Comments:

No statistically-significant improvement was observed when a period of CPR was provided before defibrillation for patients where response time was delayed (approx. >5min).

Consider: *Why would you NOT change practice, based on this article?*

Our current protocol demanding the provision of two minutes of CPR to patients that have been in cardiac arrest ≥ 4 minutes is partly supported by the results of these studies. The use of CPR feedback devices may increase the effectiveness of providing two minutes of CPR for these patients and further research is required to demonstrate if it would statistically benefitting to the patient.

Clinical Bottom Line:

While being aware that the quality of chest compressions during the majority of pre-hospital cardiac arrests are not measured, papers reviewed could not guarantee that the CPR provided by EMS personnel was of good quality during the studies, and therefore, beneficial to the patient. A well-choreographed approach that would have the first EMS provider perform a period of good quality, uninterrupted chest compressions with the aid of a feedback device, while the second EMS attendant prepares the defibrillator for defibrillation (and deliver a shock when necessary), could possibly be the best approach for any EMS agency whether there was bystander CPR present or not and regardless of downtime.

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References:

Soichi Koike, Seizan Tanabe, Toshio Ogawa, Manabu Akahane, Hideo Yasunaga, Hiromasa Horiguchi, Shinya Matsumoto, Tomoaki Imamura. Immediate defibrillation or defibrillation after cardiopulmonary resuscitation, *Prehospital Emergency Care*, 2011; 15:393-400

Steven M. Bradley, Erin E. Gabriel, Tom P. Aufderheide. Roxy Barnes, Jim Christenson, Daniel P. Davis, Ian G. Stiell, Graham Nichol, the Resuscitation Outcomes Consortium Investigators, Survival increase with CPR by emergency medical services before defibrillation of out-of-hospital ventricular fibrillation or ventricular tachycardia: Observations from the Resuscitation Outcomes Consortium, *Resuscitation*, 2010 (81)

Pascal Meier, Paul Baker, Daniel Jost, Ian Jacobs, Bettina Henzi, Guido Knapp, Comilla Sasson, Chest compressions before defibrillation for out-of-hospital cardiac arrest: A meta-analysis of randomized controlled clinical trials, *BMC Med.* 2010; 8: 52.