

Paramedic CAT (Critically Appraised Topic)

22/11/2011

Title: Outcomes of prehospital resuscitation of traumatic vs. medical cardiac arrest patients

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2nd Party Appraiser:

Clinical Scenario:

Paramedics arrive on scene of a MVC to find bystanders providing CPR to a 35yr o male. The pt has suffered some blunt trauma to the chest as well as some visible extremity injuries. Should the paramedics continue CPR and initiate their Cardiac Arrest Protocol as they would for a medical cardiac arrest?

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

In out of hospital cardiac arrest, does resuscitation of non-traumatic (medical) cardiac arrest patients vs. traumatic cardiac arrest patients result in a better outcome?

Search Strategy:

(pre-hospital OR out of hospital OR emergency medical services OR paramedic) AND (cardiac arrest OR heart arrest OR resuscitate* OR return of spontaneous circulation) AND (traumatic cardiac arrest OR non-cardiac origin)

Limits: last 10 years, humans, English, German

Search Outcome: 147 results

Relevant Papers:

Author, Date	Population: Sample Characteristics	Design (LOE)	Outcomes	Results	Strengths/Weaknesses
Mollberg et al (2011)	294 Adult Traumatic Cardiac Arrest Pts (TCAP) transported by EMS to Level I Trauma Centre in Chicago, all of whom met the criteria for the withholding/termination of resuscitation according to NAEMSP/ACS-COT guidelines	Retrospective analysis, LOE 3	<ul style="list-style-type: none"> - survival - neurological outcome - hospital charges 	<ul style="list-style-type: none"> - 274 pts (93.2%) died in ER - 1 pt (0.3%) discharged to long-term care facility, GCS 6 - Total of \$3,852,446.65 in hospital charges for study cohort 	<p><u>Weaknesses:</u> retrospective design, no comparison to medical cardiac arrest pts</p> <p><u>Strengths:</u> Prehospital care and pt physiology (Cardiac rhythm, papillary response etc) included</p>

Author, Date	Population: Sample Characteristics	Design (LOE)	Outcomes	Results	Strengths/Weaknesses
Huber-Wagner et al (2007)	757 pts from the Trauma Registry of the German Trauma Society who received CPR after trauma and were transported to hospital in Germany, Austria and Switzerland	Retrospective analysis, LOE 3	<ul style="list-style-type: none"> - survival to discharge - Glasgow Outcome Scale (GOS) - predictive factors for mortality 	<ul style="list-style-type: none"> - Overall survival rate 17.2% - 9.7% achieved good recovery or moderate disability (GOS ≥ 4) - age >55, on-scene BP 0 = greatest prehospital predictors of non-survival 	<p><u>Weaknesses:</u></p> <ul style="list-style-type: none"> Retrospective design, no comparison to medical cardiac arrest, not comparable to our system -German ERP on scene, 45.2% of pts transported via helicopter, Initial cardiac rhythms not included, predominantly blunt trauma pts (94.3%), no data on duration of prehospital CPR <p><u>Strength:</u></p> <ul style="list-style-type: none"> Prehospital (no CPR in trauma Rm) and hospital survival differentiated (Overall prehospital survival: 19.5%, survival of pts with BP 0, GCS 3, HR 0, RR 0 on scene – 7.7%)

Author, Date	Population: Sample Characteristics	Design (LOE)	Outcomes	Results	Strengths/Weaknesses
Deasy et al (2011)	Out of hospital traumatic cardiac arrest in pts aged ≥16 as identified by the Victorian Ambulance Cardiac Arrest Registry in Melbourne, Australia	Retrospective analysis LOE3	- survival - trauma vs. cardiac OHCA profile of patients, cardiac arrests and outcome	- survival of 5.1% - survival Traumatic VF (11.8%), PEA (5.1%) and asystole (2.4%) - traumatic VF/Vtach vs. cardiac VF/Vtach pt discharge 10.8% vs. 19.4% - traumatic OHCA pts younger, more likely to be male, less likely to be in VF/Vtach, less likely to receive bystander CPR, less likely to be resuscitated by EMS	<u>Weaknesses:</u> Retrospective design, Quality of survival only indicated for 55% of survivors <u>Strengths:</u> Results compared to other studies (when study cohort adjusted to Hubner-Wagner et al, 2007, 23.8% survival vs. 7.7%) Witnessed vs non-witnessed arrest, bystander CPR vs. no bystander CPR, Compared to out of hospital 'presumed cardiac' arrest pts, 1-year GOS given

Comments:

Difficulties with this PICO question include the absence of prospective traumatic OHCA studies or studies with matched control groups with non-traumatic OHCA. The studies found were all of retrospective design with varying sample populations which combine traumatic OHCA with in-hospital traumatic cardiac arrests, giving us a wide range of survival rates (ranging from 0.3% to 17.2% as per studies above). Deasy et al's (2007) study was the only one focusing on traumatic OHCA and comparing them to presumed cardiac OHCA. The authors report a survival to discharge rate of 5.1% which is comparable to the North American survival to discharge rate of non-traumatic OHCA of 6% (Berdowski et al 2010). However, Deasy et al's (2007) sample is comprised of Australian patients, whose country has a survival of discharge rate for non-traumatic OHCA of 11% (Berdowski et al 2010). The survival rates reported in Hubner-Wagner et al's (2007) study cannot be translated into our system due to the presence of emergency physicians on scene. Mollberg et al's (2011) results suggest that the current prehospital guidelines in place are justified as their survival rate was lowest at 0.3%. This study's EMS system appears to be closest to Nova Scotia's Emergency Health Services.

It is difficult to find a North American study focused on prehospital traumatic resuscitation as EMS systems often have guidelines in place for withholding or termination of traumatic OHCA. From the above mentioned results it appears that traumatic cardiac arrest resuscitation may be futile, however, with some of the literature in recent years reporting survival rates equal or higher than those resuscitated from non-traumatic cardiac arrest further research is needed.

Arguments against traumatic cardiac arrest resuscitation include the financial and emotional burden of patients resuscitated to a neurological devastating state, as emphasized by Mollberg et al (2011) and echoed in the neurological outcome of patients in Huber-Wagner et al (2007) and Deasy et al's (2011) surviving patients. Comparison studies of neurological outcomes of non-traumatic cardiac arrest survivors vs. traumatic cardiac arrest survivors are just one step in determining the usefulness of traumatic resuscitation.

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

As already mentioned above, well-designed research studies regarding the topic of traumatic OHCA are sparse and thus the question of comparing outcomes in both traumatic and non-traumatic OHCA cannot be addressed. The data does suggest that traumatic OHCA may benefit from resuscitation in certain circumstances (i.e. patients presenting in VF/Vtach, patients with initial pupillary response, measurable BP, respirations and palpable pulses on scene) but more research is required to change current practices.

Clinical Bottom Line:

Paramedics should adhere to the guidelines set out by their medical director regarding traumatic cardiac arrest patients as there is no concrete evidence indicating resuscitation to be beneficial for these patients at the present. If unique circumstances are present, such as patients presenting in a shockable rhythm, close proximity to hospital or a mechanism of injury which indicates a salvageable patient, OLMC should be contacted as resuscitation may be warranted.

References:

Deasy C., Bray J., Smith K., Harriss L., Morrison C., Bernard S., Cameron P. (2011). Traumatic out-of-hospital cardiac arrests in Melbourne, Australia. *Resuscitation*; [Epub ahead of print]

Mollberg N.M., Wise S.R., Berman K., Chowdhry S., Holevar M., Sullivan R., Vafa A. (2011). The consequences of non-compliance with guidelines for withholding or terminating resuscitation in traumatic cardiac arrest patients. *J Trauma*; 71(4): 997-1002.

Huber-Wagner S., Lefering R., Qvick M., Kay M.V., Paffrath T., Mutschler W., Kanz K.G. (2007). Working Group on Polytrauma of the German Trauma Society (DGU). Outcome in 757 severely injured patients with traumatic cardiorespiratory arrest. *Resuscitation*; 75(2): 276-85.

Berdowski J., Berg R.A., Tijssen J.G., Koster R.W. (2010) Global incidences of out-of-hospital cardiac arrest and survival rates: Systematic Review of 67 prospective studies. *Resuscitation*; 81(11): 1479-87.