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Disclosures

• The presenters have no relevant conflicts of interest

Emergency department bypass for ST-segment-elevation myocardial infarction

The development of evidence-based prehospital guidelines using a GRADE Association of prehospital advanced airway management in patients with cardiac arrest
Effect of prehospital induction of mild hypothermia among adults with cardiac arrest
Mechanical chest compression and simultaneous defibrillation vs conventional CPR
Risk factors for apnea in pediatric patients transported for out-of-hospital seizure
An evidence-based guideline for pediatric prehospital seizure management using GRADE
Goal-directed resuscitation in the prehospital setting: a propensity-adjusted analysis
An evidence-based prehospital guideline for external hemorrhage control
Validation of prehospital trauma triage criteria for motor vehicle collisions
Withholding and termination of resuscitation of cardiopulmonary arrest secondary to trauma
An evidence-based guideline for the air medical transportation of prehospital trauma patients
EMS providers are able to perform 12 leads to diagnose STEMI, and prenotify PCI capable centers.

EMS can reduce D2B time by identifying STEMI patients and prenotifying the hospital.

EMS may reduce time to revascularization by bypassing the ED and going directly to PCI.

Background

- EMS providers are able to perform 12 leads to diagnose STEMI, and prenotify PCI capable centers.
- EMS can reduce D2B time by identifying STEMI patients and prenotifying the hospital.
- EMS may reduce time to revascularization by bypassing the ED and going directly to PCI.

Methods

- National Cardiovascular Data Registry (NCDR) Acute Coronary Treatment and Intervention Outcomes Network Registry–Get With The Guidelines (ACTION Registry–GWTG).
- Patients with a Prehospital ECG diagnosis of STEMI were reviewed.
- The study dichotomized cases to ED Bypass or Not and looked at differences in patient characteristics, times and outcomes.
Cases

- July 1, 2008, to March 31, 2011
- 12,581 ST-segment–elevation myocardial infarction patients identified with a prehospital ECG treated
- 371 PCI hospitals in the US

Results

<table>
<thead>
<tr>
<th>Variable</th>
<th>OR (95% CI)</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Admission scoring meeting for week</td>
<td>0.96 (0.93)</td>
<td>&lt;0.0001</td>
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<tr>
<td>Final medical record to hospital</td>
<td>1.16 (1.08)</td>
<td>&lt;0.0001</td>
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<tr>
<td>Initial time delay (in hours)</td>
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<tr>
<td>Age: ~60 yrs (per 5 yr increase)</td>
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<tr>
<td>Diabetes: ~60 yrs (per 5 yr increase)</td>
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</tr>
<tr>
<td>Prior CABG</td>
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<tr>
<td>Hypertension</td>
<td>2.0 (0.95)</td>
<td>0.03</td>
</tr>
<tr>
<td>Congestive heart failure</td>
<td>1.0 (1.00)</td>
<td>0.05</td>
</tr>
</tbody>
</table>

![Bar chart](chart.png)
Results

- In-hospital mortality
  - Unadjusted mortality was lower among ED bypass patients (2.7% vs. 4.1%; P=0.01)
  - Adjusted mortality was similar (OR 0.69; 95% confidence interval, 0.45–1.03; P=0.07).
  - Adjusted was similar with heart failure, shock and non-system delays excluded (OR 0.66; 95% confidence interval, 0.33–1.31; P=0.24).

Take Home Points

In this data set, ED bypass for patients with STEMI was associated with:
- Longer prehospital times
- Shorter time to balloon (reperfusion)
- No change is adjusted mortality
Emergency department bypass for ST-segment-elevation myocardial infarction

The development of evidence-based prehospital guidelines using a GRADE methodology

What does GRADE stand for?
- Grading
- Recommendations
- Assessment
- Development
- Evaluation

The Development of Evidence-based Prehospital Guidelines Using GRADE-based Methodology


Original Contributions

The Development of Evidence-based Prehospital Guidelines Using a GRADE-based Methodology

Validation of prehospital trauma triage criteria for motor vehicle collisions.

Withholding and termination of resuscitation of cardiopulmonary arrest secondary to trauma

An evidence-based guideline for external hemorrhage control

An evidence-based guideline for pediatric prehospital seizure management using GRADE

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What does GRADE stand for?
The Development of Evidence-based Prehospital Guidelines Using GRADE-based Methodology

Objective – Describe the process of development of three prehospital EBGs using the National Prehospital Evidence-based Guideline Model Process.

Methods – Conducted 3 iterations of the EBG development tool using a 6 step process:

• Objective
• Methods
• Results
• Conclusions

Results – Created 3 separate prehospital evidence-based guidelines with levels of evidence and graded recommendations assigned to each decision point:

• Pediatric seizure
• Pain management in trauma patients
• Helicopter transportation of trauma patients

Conclusions – Can be used to create credible, transparent, and usable prehospital evidence-based guidelines.

The Development of Evidence-based Prehospital Guidelines Using GRADE-based Methodology

Step 1: Assembling the expert panel and GRADE training

• Rationale – Assembled an expert panel for each EBG project and then trained on the GRADE tool because it allows the consideration of factors other than study design when determining the strength of recommendations. GRADE separates the process of defining the quality from the process of developing recommendations based on the evidence.

• Methods – Panel made up of subject matter experts – clinicians, GRADE methodologists, medical librarian, clinical practice guideline methodologists, EMS medical director, EMS provider; panel members were trained on the GRADE tool.

• Lessons learned – Panel members need more training on the use of the GRADE framework, it takes a significant time commitment from each panel member; let panelists partner on projects.

• Potential solutions – Need team members with GRADE tool experience; partner 2 or more panel members on each PICO question; due to intense time commitment, this process will need to be completed at a national level.

The Development of Evidence-based Prehospital Guidelines Using GRADE-based Methodology

Step 2: Defining the EBG content area and establishing the specific clinical questions that need to be addressed

• Rationale – Employed the PICO format to formulate clinical questions that are focused, clearly explicit, and consistently structured.

• Methods – Develop the list of PICO questions addressing the needs of the frontline providers and EMS medical directors, while placing particular emphasis on what would be deemed important outcomes at the patient level.

• Lessons learned – The development and refining of clinical questions is difficult and this skill must be honed early on in the process as the time to research each one is extensive; need to select and prioritize outcomes within each PICO question prior to analysis of literature.

• Potential solutions – Focus resources on only the most important questions that will populate the final algorithm, work in tandem on PICO questions.
The Development of Evidence-based Prehospital Guidelines Using GRADE-based Methodology

• Step 3: Literature searches and prioritization of outcomes
  • Rationale – Conducting a systematic literature search to evaluate the quality of evidence in addressing the outcomes defined in the PICO questions
  • Methods – Consider the various outcomes pertaining to each PICO question and categorize these as being critical, important, or otherwise from the perspective of the patient, provider, and health system
  • Lessons learned – Using consistent literature search and appraisal methodology with health information specialist support is time consuming, but necessary. There is a paucity of literature regarding studies that have taken place in the prehospital setting, so need to include studies from the ED, inpatient setting, etc.
  • Potential solutions – Outcome measures should be prioritized and agreed upon prior to the conduct of the literature search. Ensure there is adequate time (months) and resources (medical librarian) for the literature searches which include locations in addition to the prehospital setting.

• Step 4: Creation of evidence profiles (GRADE tables) for each PICO question and presentations summarizing the completed work and draft recommendations
  • Rationale – Need to develop formatted evidence profiles (EPs) to organize, summarize, and communicate quality of evidence, the effect size for each outcome, and the overall grading of the evidence. Recommendations are made based on the strength of the evidence, the importance of the outcomes addressed, and the values and preferences of patients, providers, and systems.
  • Methods – The initial level for the quality of evidence is determined by the study design (randomized trial = high quality, observational study = low quality, all others = very low), then can be adjusted up or down based on the magnitude of effect, limitations in study design, etc.
  • Lessons learned – A great amount of training is required by panelists to comprehensively understand all processes in order to produce more uniformity in EPs, estimates of effect, and grading.
  • Potential solutions – Intensive training of panelists and real-time guidance and consultation with a GRADE methodologist.

• Step 5: Vetting and endorsing GRADE evidence tables and draft recommendations
  • Rationale – An in-person meeting of the full panel to vet the work done by each individual panel or panelist teams, and to reach consensus on the draft recommendations
  • Methods – Each PICO question was presented along with the literature review, assessment of the quality of the evidence using GRADE criteria and presentation of the draft recommendations as well as supporting reasons and preference statements. Then consensus was obtained with modifications as needed.
  • Lessons learned – The in-person meeting is essential. Inclusion of EMS medical directors and field providers in the discussion was essential and influenced the decisions. An advantage of the GRADE methodology is the ability to utilize contextual EMS factors to influence the strengths of the recommendations.
  • Potential solutions – Have even more in-person meetings of the entire team starting earlier in the process.
Step 6: Synthesizing collective wisdom into an EMS protocol and visual algorithm

- **Rationale**: A primary goal was the creation of decision trees and algorithms for a usable product for EMS agencies.
- **Methods**: The recommendations were transformed into a visual algorithm by creating a visual diagram that was populated in real time during the in-person meetings. As the diagram was made comments and discussion took place and real time modifications were made.
- **Lessons learned**: The creation of the algorithm formatted “model protocol” was appreciated by the end-users. Performing this in real-time ensured there was consensus regarding the final GRADE recommendation. Since the development of the PICO questions and the literature searches occurred before the algorithm, there were PICO questions that were not needed for the final protocol resulting in wasted time.
- **Potential solutions**: Creating a draft algorithm prior to PICO question development will decrease the amount of time spent on literature searches and evaluation of evidence.

The Development of Evidence-based Prehospital Guidelines Using GRADE-based Methodology

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- **Association of prehospital advanced airway management in cardiac arrest**
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**References**

- **Association of Prehospital Advanced Airway Management with Neurologic Outcome and Survival in Patients with Out-Of-Hospital Cardiac Arrest**
  - JAMA 2013, Jan;309(3):257-66
Background

- Objective: To test the hypothesis that prehospital advanced airway management is associated with favorable outcome after adult OHCA.
- "Favorable" 1 month after OHCA, cerebral performance category 1 or 2.
- Prospective, nationwide study of 649,654 consecutive adult cardiac arrests in Japan.

Methods

- Japan
  - The All-Japan Utstein Registry of Fire and Disaster Management Agency.
  - Population based registry system for OHCA in adults and children.
  - Enrolled all adults 18 years old + with OHCA for whom resuscitation was attempted and transported to medical center.
- EMS in Japan:
  - Municipal government provides EMS through 802 fire stations.
  - Crew: usually 3 people, at least one authorized for IV, airway and use of semi-automatic defibrillator.
  - Medical control contacted for advanced airway.

Methods

- Prospective data collection.
  - Age, sex.
  - Etiology of arrest.
  - Bystander witness status.
  - First documented cardiac rhythm.
- End Points:
  - Primary: favorable neuro outcome 1 month after.
  - Glasgow-Pittsburgh cerebral performance category 1 or 2.
  - Secondary: ROSC before hospital arrival, 1 month survival.
- Presence and type of bystander CPR.
- Administration of epi by EMS.
- Technique of airway management.
Statistics

• Compared outcomes between BVM and any advanced airway
• Compared supraglottic airway to BVM and ETI to BVM
• Confounders chosen based on biologic plausibility and knowledge
  • Age, sex, cause of arrest, first rhythm, witnessed status, type of bystander CPR, use of public AED, epi administration, time intervals from receipt of call to CPR by EMS, time interval from receipt of call to hospital arrival
  • Propensity matching utilized

Results

• 698,829 OHCA documented during time period
  • 649,654 attempted resuscitation
  • 295 no airway documented excluded
  • 649,359 patients included in the study

• 367,837 (56.7%) – BVM
• 281,522 (43.4%) – Advanced Airway Placement
  • 239,550 (36.9%) – Supraglottic Airway
  • 41,972 (6.5%) – Endotracheal Intubation

• Findings
  • Mean age ~ 73 years, majority were male
  • ROSC ~ 6.5%
  • 1-month survival ~ 4.7%
  • Neurofavorable survival ~ 2.2%

• Findings
  • Neurologically favorable survival
    • ETI group ~ 1.0% (95% CI 0.9% - 1.0%)
    • Supraglottic airway group ~ 1.1% (95% CI 1.1% - 1.2%)
    • BVM group ~ 2.9% (95% CI 2.9% - 3.0%)
  • Unadjusted model using full cohort showed significant negative association with any advanced airway
  • In the adjusted model with selected and all variables, both advanced airway techniques were independent negative predictors of all 3 outcomes

• Results
  • Among adult patients with OHCA, any type of advanced airway management was independently associated with decreased odds of neurologically favorable survival compared with BVM
**Take Home Points**

- Sufficiently large study to demonstrate the association between advanced airway and neuro outcome
  - Unrecognized esophageal intubation, tube dislodgement, iatrogenic hypoxemia, bradycardia
  - ? Intermittent chest compressions for ETI
  - ? Increased thoracic pressure, ? Increased O2 after successful placement
- Limitations
  - Patients with ROSC before advanced airway attempt
  - Failed airway attempts were classified into BVM

**Take Home Points**

- Limitations
  - Patients with ROSC before advanced airway attempt
  - Failed airway attempts were classified into BVM
  - No standard post-airway monitoring (not mentioned in article)
- Conclusion
  - Findings contradict the assumption that aggressive airway intervention improves outcomes in adult OHCA

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Study Design

- Does post-arrest cooling with ice cold IV fluid improve survival from OHCA?
- All medical cardiac arrests were randomized to standard care or induction of hypothermia
- Primary outcome – survival / neuro status at hospital discharge
- Only patients with ROSC post OHCA were enrolled

5696 OHCA during study period
2377 had ROSC and were eligible

<table>
<thead>
<tr>
<th>Study Details</th>
<th>Control</th>
<th>Intervention</th>
<th>p-value</th>
<th>Odds Ratio</th>
<th>95% CI</th>
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<td>66.72</td>
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<td>Gender (male)</td>
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<td>Initial rhythms</td>
<td>VT</td>
<td>VT</td>
<td>0.0446</td>
<td>1.0324</td>
<td>1.0053-1.059</td>
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<tr>
<td>Vasopressor use</td>
<td>44.11%</td>
<td>45.75%</td>
<td>0.5518</td>
<td>1.0102</td>
<td>0.9927-1.028</td>
</tr>
<tr>
<td>Inotropic use</td>
<td>24.17%</td>
<td>25.28%</td>
<td>0.5720</td>
<td>1.0129</td>
<td>0.9912-1.035</td>
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<tr>
<td>Tranquilizer use</td>
<td>1.45%</td>
<td>1.57%</td>
<td>0.8147</td>
<td>1.0193</td>
<td>0.9399-1.099</td>
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<tr>
<td>Intubation on arrival</td>
<td>55.42%</td>
<td>56.56%</td>
<td>0.9644</td>
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<td>ROSC on arrival</td>
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<td>Initial rhythm</td>
<td>VT</td>
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<td>0.0446</td>
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<td>0.9383</td>
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Study arm cooled and quicker

Primary Outcome

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<td>Renal function tests</td>
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<td>Serum blood glucose</td>
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<tr>
<td>Blood pressure</td>
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<tr>
<td>Secondary Outcomes</td>
</tr>
<tr>
<td></td>
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<tr>
<td>Invasive procedures</td>
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<tr>
<td>Total length of stay</td>
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<td>Hospital stay</td>
</tr>
<tr>
<td>Mortality</td>
</tr>
<tr>
<td>Transfusion</td>
</tr>
<tr>
<td>Vascular access</td>
</tr>
<tr>
<td>Cardiac arrest</td>
</tr>
<tr>
<td>Secondary outcomes measures</td>
</tr>
</tbody>
</table>
Summary

- Patients were able to be cooled
  - Time to goal temperature significantly improved
- No difference in survival or neurologic outcome in VF or non-VF patients
- Signal of possible harm – more pulmonary edema, more rearrests
- No benefit to large volume cold IV fluid administration post-ROSC
BACKGROUND

Objective

To determine whether administering mechanical chest compressions with defibrillation during ongoing compressions (mechanical CPR), compared with manual cardiopulmonary resuscitation (manual CPR), according to guidelines, would improve 4-hour survival.

METHODS

Design, Setting, and Participants

Multicenter randomized clinical trial of 2589 patients with out-of-hospital cardiac arrest conducted between January 2008 and February 2013 in 4 Swedish, 1 British, and 1 Dutch ambulance services and their referring hospitals. Duration of follow-up was 6 months.

Interventions

Patient were randomized to receive either mechanical chest compressions (LUCAS) combined with defibrillation during ongoing compressions (n=1300) or to manual CPR according to guidelines (n=1289).
Mechanical Chest Compressions vs Conventional Cardiopulmonary Resuscitation

RESULTS

• Main Outcomes and Measures
  • Four-hour survival, with secondary end points of survival up to 6 months with good neurologic outcome (CPC 1-2).

• Conclusions and Relevance
  • Among adults with out-of-hospital cardiac arrest, there was no significant difference in 4-hour survival between patients treated with the mechanical CPR algorithm or those treated with guideline-adherent manual CPR. The vast majority of survivors in both groups had good neurologic outcomes by 6 months. In clinical practice, mechanical CPR using the presented algorithm did not result in improved effectiveness compared with manual CPR.

Mechanical Chest Compressions vs Conventional Cardiopulmonary Resuscitation

TAKE HOME POINTS

• There was no significant difference in survival between those undergoing manual chest compressions and those undergoing mechanical chest compressions.

• The main advantage to mechanical chest compressions seems to be the ease of administration during transport.

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Background

- 15% of pediatric EMS transports are for seizures
- Significant M&M from prolonged seizures
- Often treated with benzodiazepines
- Apnea is a known complication
- Goal: “To quantify the risk of apnea in children presenting with out-of-hospital seizure treated with midazolam by paramedics and to identify other risk factors associated with apnea in this population”

Methods

- Retrospective chart review (EMS/ED) - Regression model
- Inclusion:
  - < 15 years old
  - EMS diagnosis of sz and ED diagnosis of sz
- Outcome:
  - “apnea defined as bag-mask ventilation or intubation for apnea by paramedics or by pediatric ED staff within 30 minutes of arrival.”
Results

- Patients screened: 2403
- Patients included: 1584
- Field Midazolam: 214
- 2 independent risk factors for primary outcome:
  - Persistent sz on arrival (OR=15)
  - Administration of field midazolam (OR=4)
  - Fever OR=0.8

Take Home Points

- Pediatric seizure management is an important topic
- EMS and ED providers should closely monitor patient with persistent seizure or seizures requiring benzodiazepines
- Further research may be needed on causality to explain the correlation

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AN EVIDENCE-BASED GUIDELINE FOR PEDIATRIC PREHOSPITAL SEIZURE MANAGEMENT USING GRADE METHODOLOGY

Background

- Pediatric seizure is a high-incidence condition in the prehospital setting.
- Providers infrequently encounter children.
- High quality studies are not readily available for adult management, poor study quality for peds.
- Objective: “To recommend evidence-based practices for timely prehospital pediatric seizure cessation while avoiding respiratory depression and seizure recurrence.”

Methods

- Multidisciplinary panel assembled
  - EMS
  - Pediatrics
  - GRADE Methodology
- 2009 and 2012 searches
- Patient care algorithm to stakeholders
Results

- Recommendations:
  - Perform glucometry, capillary > venous
  - Treat glucose <60mg/dL with dextrose or glucagon
  - Hypoglycemics should be transported even after reversal
  - Post-ictal IV placement is not necessary for short transport times

Results

- Recommendations:
  - Prehospital management does not require IV
  - First line therapy should use non-IV route
  - IM/IN/buccal > PR diazepam
  - IV diazepam = midazalam = lorazepam

Take Home Points

- Pediatric seizure management may be difficult for EMS providers
- First line treatment should be IM/IN/buccal
- Most pediatric sz patients will not require IV
Background

- “The scope of prehospital interventions has expanded recently - not always with clear benefit.”
- Previous studies have questioned the benefit of administering IVF to patients without hypotension
- Hypotensive resuscitation had previously been shown to be beneficial in penetrating trauma
Methods

Data was collected prospectively from 7 hospitals over an 8 years (2003-2010)

Inclusion Criteria:
- Blunt Trauma
- EMS transport from the scene
- Injury Severity Score (ISS) >15
- Known volume of PH crystalloid
- Recorded EMS Blood Pressure

PH crystalloid volume cut offs: 500 mL

Methods

- Groups Dichotomized
  - Low Fluid Volume < 500 cc
  - High Fluids Volume > 500 cc

- Key outcomes
  - 30 day in hospital mortality
  - Acute traumatic Coagulopathy (INR >1.5)

Results
“These findings suggest PH crystalloid resuscitation should be goal directed based on the presence or absence of PH hypotension.”
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Methods

- A multidisciplinary expert panel was gathered by the American College of Surgeons Committee on Trauma's EMS Committee
- PICOTS (populations, interventions, comparators, outcomes, timing, and settings) Questions were created
- Systematic Review of the Literature was performed
- GRADE methodology was utilized
- Panel met for a in person meeting
**PICOTS Questions**

<table>
<thead>
<tr>
<th>Population</th>
<th>Individuals with Extremity Hemorrhage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interventions</td>
<td>Commercially Available Tourniquets &amp; Hemostatic Dressings</td>
</tr>
<tr>
<td>Comparators</td>
<td>External Wound Pressures &amp; other Non-Tourniquets, Non-Hemostatic Interventions</td>
</tr>
<tr>
<td>Outcomes</td>
<td>Limb Salvage, Hypovolemic Shock, Survival &amp; Adverse effects</td>
</tr>
<tr>
<td>Timing</td>
<td>Immediate and Long Term Outcomes</td>
</tr>
<tr>
<td>Settings</td>
<td>Prehospital Environment</td>
</tr>
</tbody>
</table>

**Studies**

**Tourniquets**

Recommendation 1:
“We recommend the use of tourniquets in the prehospital setting for the control of significant extremity hemorrhage if direct pressure is ineffective or impractical.”

<table>
<thead>
<tr>
<th>Strength of Recommendation</th>
<th>Quality of Evidence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strong</td>
<td>Moderate</td>
</tr>
</tbody>
</table>
### Recommendation 2:

“We suggest using commercially produced windlass, pneumatic, or ratcheting devices that have been demonstrated to occlude arterial flow.”

<table>
<thead>
<tr>
<th>Tourniquets</th>
<th>Strength of Recommendation</th>
<th>Quality of Evidence</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Weak</td>
<td>Low</td>
</tr>
</tbody>
</table>

### Recommendation 3:

“We suggest against the use of narrow, elastic, or bungee-type devices.”

<table>
<thead>
<tr>
<th>Tourniquets</th>
<th>Strength of Recommendation</th>
<th>Quality of Evidence</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Weak</td>
<td>Low</td>
</tr>
</tbody>
</table>

### Recommendation 4:

“We suggest that improvised tourniquets be applied only if no commercial device is available.”

<table>
<thead>
<tr>
<th>Tourniquets</th>
<th>Strength of Recommendation</th>
<th>Quality of Evidence</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Weak</td>
<td>Low</td>
</tr>
</tbody>
</table>
### Tourniquets

**Recommendation 5:**
“We suggest against releasing a tourniquet that has been properly applied in the prehospital setting until the patient has reached definitive care.”

<table>
<thead>
<tr>
<th>Strength of Recommendation</th>
<th>Quality of Evidence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weak</td>
<td>Low</td>
</tr>
</tbody>
</table>

### Junctional Hemorrhage Devices

“... did not find sufficient evidence to make recommendations at this time.”

<table>
<thead>
<tr>
<th>Strength of Recommendation</th>
<th>Quality of Evidence</th>
</tr>
</thead>
<tbody>
<tr>
<td>N/A</td>
<td>N/A</td>
</tr>
</tbody>
</table>

### Topical Hemostatic Agents

**Recommendation 1:**
“We suggest the use of topical hemostatic agents, in combination with direct pressure, for the control of significant hemorrhage in the prehospital setting in anatomic areas where tourniquets cannot be applied and where sustained direct pressure alone is ineffective or impractical.”

<table>
<thead>
<tr>
<th>Strength of Recommendation</th>
<th>Quality of Evidence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weak</td>
<td>Low</td>
</tr>
</tbody>
</table>
Recommendation 2: “We suggest that topical hemostatic agents be delivered in a gauze format that supports wound packing.”

Strength of Recommendation | Quality of Evidence
--- | ---
Weak | Low

Recommendation 3: “Only products determined effective and safe in a standardized laboratory injury model should be used.”

Strength of Recommendation | Quality of Evidence
--- | ---
Weak | Low
Take Home Points

- Based on the studies reviewed there is:
  - Moderate evidence to support tourniquets use
  - Weak evidence to support topical hemostatic agents use
  - Insufficient evidence to support junctional hemorrhage device use

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Clara B. Davidson, MD, MPH, Frederick E. Rock, MD, MPH, Christopher D. Mark, MS, Robert Keatings, Gregory J. Jurkovich, MD, and Eileen M. Boggs, MD, Event. Rodriguez

Validation of prehospital trauma triage criteria for motor vehicle collisions

BACKGROUND
• Since triage of an injured patient to an appropriate trauma center can have an impact on morbidity and mortality, the authors sought to validate the 2012 national field triage guidelines for motor vehicle crashes and to determine the likelihood of significant injury based on each step in the triage guidelines.
• Severe injury – ISS > 15
• Moderate injury – ISS > 8

METHODS
• Retrospective cross-sectional study using data from the National Automotive Sampling System Crashworthiness Data System over the period of 2003 to 2008
• Vehicle damage criteria proposed as prehospital triage guidelines were correlated with injury severity
  • Step 1 – Physiologic response (VS, GCS)
  • Step 2 – Specific anatomic injuries
  • Step 3 – Mechanism of injury and vehicular damage
  • Step 4 – Age, burns, and medical comorbidities
• Study population
  • 85,761 individuals representing 29,397,234 patients in car crashes
  • Mean age 33 years; 46% female

RESULTS
• Step 1 = 3.8% w/ a mean ISS of 9.1
  • IV for severe = 20.3%; IV for moderate = 26.1%
  • GCS ≤ 14, SBP ≤ 90, RR ≤ 10 or ≥ 29
• Step 2 = 0.43% w/ a mean ISS of 18.1
  • IV for severe = 48.5%; IV for moderate = 92.9%
  • Penetrating injury, flail chest, ≥ 2 long-bone fx, amputation, unstable pelvic fx, skull fx, paralysis
• Step 3 = 3.7% w/ a mean ISS of 5.1
  • IV for severe = 9.7%; IV for moderate = 23%
  • Injury ≥ 12 is at occupant’s site or ≥ 18 in anywhere, ejection, death in same passenger
• Steering wheel collapse had the highest PPV for severe injury
Validation of prehospital trauma triage criteria for motor vehicle collisions

TAKE HOME POINTS
- Injury mechanism criteria alone predict significant injury in a substantial proportion of patients who did not meet the physiologic or anatomic criteria. Vehicular crash data could improve the ability of EMS providers to triage injured occupants. Consideration of transport to a trauma center should be given for elderly patients meeting Step 3 criteria and drivers with steering wheel collapse.

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Withholding and termination of resuscitation of traumatic cardiopulmonary arrest
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Withholding and termination of resuscitation of adult cardiopulmonary arrest secondary to trauma: Resource document to the joint NAEMSP-ACSCOT position statements.

Michael G. Miller, MD, MBA, Samuel M. Cutler, MD, Paul S. Schecter, MD, MHA, and Allen M. Bulger, MD, on the Standards and Clinical Practice Committee of the National Association of EMS Physicians (NAEMSP) and the Subcommittee on Emergency Services (PediTrauma) of the American College of Surgeons (ACSCOT)
Overview

• Joint position statement from NAEMSP and the American College of Surgeons Committee on Trauma

• 2003 position was updated in 2012

Withholding Resuscitation Efforts

Withholding Resuscitation Efforts

• Injuries obviously incompatible with life
• Evidence of prolonged arrest – rigor, dependent lividity
• Blunt trauma – apneic, pulseless, no organized electrocardiographic activity
• Penetrating trauma – apneic, pulseless, no signs of life – movement, ecg, pupils
• When mechanism of injury does not match clinical condition, consider medical cause of arrest!
Termination of Resuscitation Efforts

- TOR when no signs of life and no ROSC despite appropriate field treatment
  - No pulse, no blood pressure, no respirations, and no ROSC
- Encourage local protocol and physician oversight
- Protocol should include an interval of CPR, suggest 15 minutes but note limited science to support
- Encourage local exceptions to this rule – hypothermic patients, lightning, etc.
- Encourage further research

Takeaways

- Withholding resuscitation and termination of resuscitation are reasonable in patients with traumatic injuries
- Medical directors should be actively engaged in developing these protocols and ensuring their compliance
- Initial care for low mechanism trauma is should be to suspect medical cause and start CPR
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**Background**

- Objective – Recommend a strategy for the selection of prehospital trauma patients who would benefit from aeromedical transportation
  - Which field triage criteria should be used to guide destination and ground vs. air?
  - When should online med direction be involved?
  - What are the criteria that necessitate air to improve patient outcomes?
Methods

• Multidisciplinary panel of experts in trauma, EBG development, EMS outcomes research
• Used Grading of Recommendations, Assessment, Development and Evaluation (GRADE) methodology
  – Core workgroup did a literature survey
  – A series of PICO questions were developed and each panel member answered evidence based clinical questions

Results

• Recommendation #1 – field triage criteria for all trauma patients should include anatomic, physiologic and situational components to guide decisions
  – Avoid undertriage, less emphasis on overtriage
  – Uses the CDC 2011 Guidelines for Field Triage of Injured Patients as the base

• Recommendation #2a – EMS should not be required to consult with OLMC before activating HEMS patients meeting criteria
• Recommendation #2b – for all other trauma patients, OLMC may be used if it does not result in significant delay
Results

- **Recommendation #3a** – HEMS should be used to transport patients meeting criteria to an appropriate trauma center if there will be significant time savings over ground EMS.
- **Recommendation #3b** – Ground EMS should transport all other patients to an appropriate hospital, as long as system factors do not preclude timely transport.

Take Home Points

- Expert panel reviewed the current literature and made a deeper dive.
  - Two strong three weak recommendations came from the process, all supported by low or very low quality evidence.
  - Special consideration was given to the need to adapt for local factors.
- Conclusion – systematic methodology to triage prehospital trauma patients.
- Additional research would further clarify how to best optimize triage while maximizing patient and personnel safety.