Cutting Edge EMS 2009: What's the latest & greatest?

Jeff Myers, D.O., Ed.M, NREMT-P, FAAEM
Department of Emergency Medicine
State University of New York at Buffalo
myersj@alum.rpi.edu
http://ems-ed.photoemsdoc.com/

Trauma Triage Guidelines:

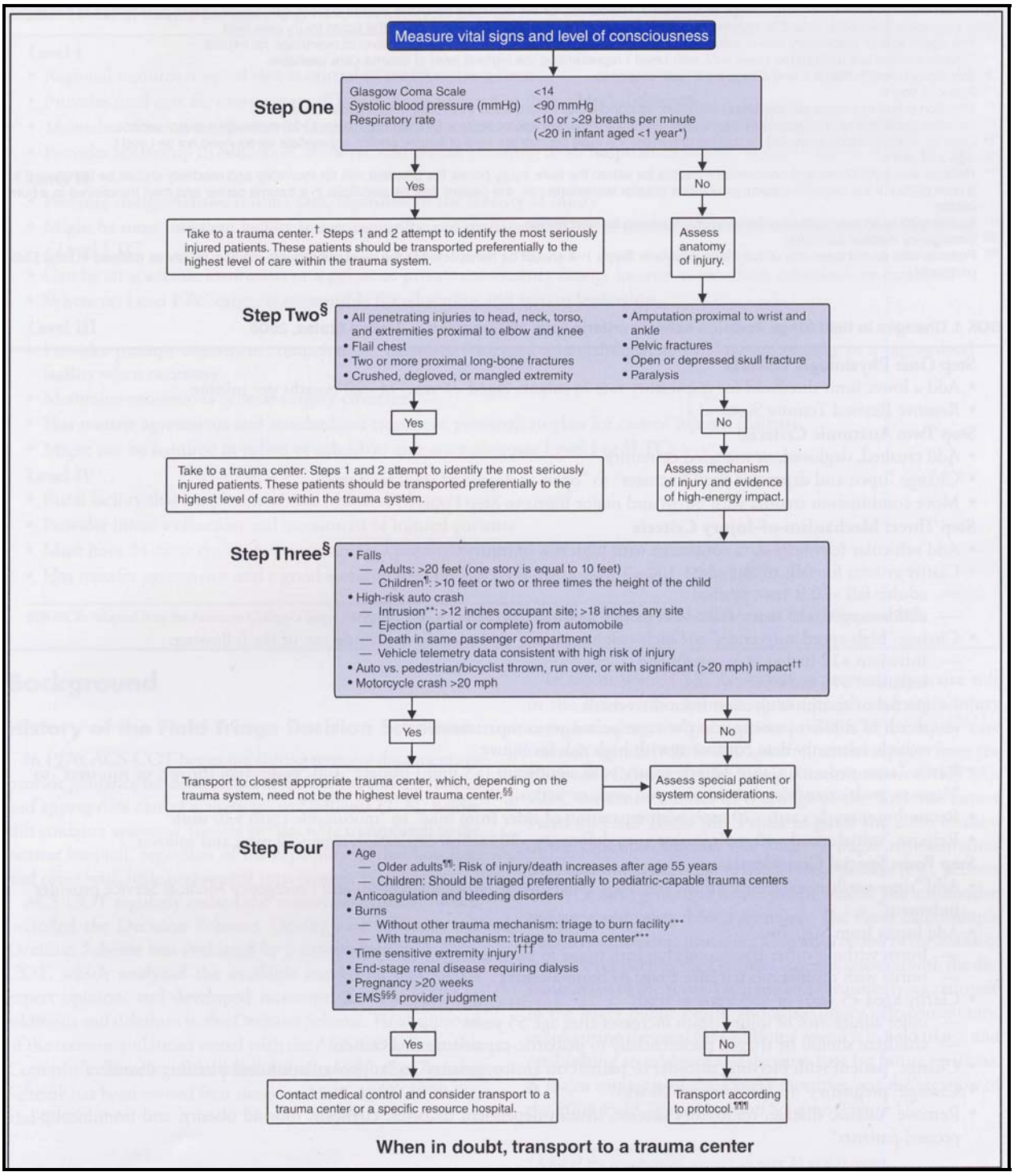
In 2006 the American College of Surgeons released a revision of the trauma triage guidelines they had previously issued in 1999. The 2006 guidelines focus more on physiologic criteria and less on the mechanism of injury criteria in deciding who should be transported to a trauma center. The 2006 guidelines also recognize that trauma care is a system and with different levels of care in the system that while an injured patient may meet the requirements for transport to a trauma center, it does not necessarily require transport to a Level I trauma center. Some patients can be transported to the nearest Level II or Level III center depending upon their injuries and the structure of the regional trauma system.

The algorithm and the supporting information was published in the 1/23/09 special issue of the Morbidity and Mortality Weekly Report, a weekly publication of the Centers for Disease control. A pdf copy of the document can be found at: http://www.cdc.gov/mmwr/PDF/rr/rr5801.pdf. Other resources, for example a poster and pocket cards, can be found at: http://www.cdc.gov/Features/FieldTriage/.

The 2006 trauma triage guideline follows a four step process. If you triage to a trauma center at any point, stop the processes and head towards the trauma center. The four steps include physiologic criteria (vital signs, GCS, etc), anatomic criteria (i.e. location of injury), mechanism of injury, and finally other considerations. This algorithm is reproduced on the next page of the handout for you to follow along. The table below summarizes the changes for each step.

	Added	Modified	Deleted
Step 1: Physiology	• RR < 20 in infants < 1 y/o		• RTS < 11
Step 2: Anatomic	• Crushed, degloved, mangled extremity	• Open or depressed skull fracture	• Major burns (moved lower)
Step 3: Mechanism	• Child (<15 y/o) fall > 10ft or 2 – 3 x height • Vehicle telemetry	• > 12" intrusion by pt or > 18" anywhere	• Rollover Extrication > 20 min

Step 4: Special	• Time sensitive extremity injury • ESRD on dialysis • Provider judgment	• Burns • Pregnancy > 20 weeks	• IDDM, CV, respiratory disease • Cirrhosis, immunosuppressed • Morbid obesity



Dispatch / Resource Management:

Several studies were presented on appropriate utilization of resources and response issues. Many services and dispatch centers use one of the several forms of emergency medical dispatch algorithms to determine the most appropriate resources to send to a given call. While the use of these algorithms has been shown to improve dispatch time and consistently classify the call when taken by different call takers (high inter-rater reliability), the literature is not as positive about matching the call determinants to the patient's true presenting problem or interventions used on scene.

One of the more interesting presentations was one from the City of Toronto, Ontario, Canada EMS. They recognized that there may be some variation in language and terminology used by citizens in calling in 9-1-1 calls that would affect resource utilization. In their system of ALS and BLS transporting units, it was important to correctly match the call with the resource as there was a definite shortage of resources. In observing their dispatch operations, they observed that the determinant was highly dependent on the caller's and call taker's interpretation of the queries and answers. With this, they undertook a project to link the call determinant with resource utilization.

As part of the study, Toronto EMS developed a 5 point rating scale that was based on the interventions performed by EMS and with 1 as minimal BLS interventions to 5 with maximal ALS interventions. They then linked specific calls with the interventions through a combination of their computer aided dispatch (CAD) software and electronic prehospital care report (ePCR) software. To insure the linkage between determinant and utilization did not occur by chance, they determined the cut off for a sufficient number of calls for a given determinant.

The determinants that had a sufficient number of calls were used to plot the frequency for each of the severity scores (1 through 5) across those determinants. A receiver operating characteristic (ROC) curve was plotted (for the geeks in the room, try the Wikipedia reference http://en.wikipedia.org/wiki/Receiver_operating_characteristic this is why I am fortunate to have a stats person in our department…..) and used to determine "cut point" where determinants above the cut point would receive an ALS response and determinants below the cut point would receive a BLS response. After instituting these changes, Toronto EMS found that they had better resource utilization in that ALS calls received ALS ambulances and BLS calls received BLS ambulances. Response time also improved because the appropriate units were better deployed

and more available for response. The one caveat that they point out is while the process can be replicated, the cut point may be different based on the local jargon and culture.

Turnaround times also received some attention recently. We are used to measuring response times, however with increased Emergency Department and EMS volumes, getting ambulances back on the road after dropping off a patient to a facility is becoming more important from a systems perspective.

The Level I trauma center in Halifax, Nova Scotia started looking at ambulance turnaround times after they had a gut feel that ambulances were waiting longer at the ED. They used the term Turnaround Time Interval (TATI) which was measured from the time the crew arrived at the ED to the time they were available for another call. The study tried to answer two questions. The first was to determine if TATI was in fact increasing. The second was to determine if there was an effect on ambulance availability due to an increased TATI. This study was performed from April 2002 – March 2008 and involved a total of 125, 364 transports.

In addition to measuring the TATI, the authors also measured what they called Crew Recovery Time 90% (CRT90%), which is the time in which 90% of the crews were available for the next EMS call. These times were measured in year-long increments. What they found during the study period was that over the six year study period, the TATI increased from 12:45 min to 36:42 min. The CRT90% increased from 24:37 min to 1:49:02 hr! Unfortunately, the authors were not able to identify the causes of the increase in these measurements. To editorialize, I am not sure how significant the CRT90% measure is in system performance. If it can be correlated to increased response times, then it may be a useful marker to alert system planners to system issues.

Another large Canadian city (Hamilton, Ontario, Canada) instituted a card swipe system in an attempt to accurately capture arrival and off load times. This city is served by a single provider and has four hospitals. In prior years they validated the methods of collecting times using this system. The call volume, ambulance response time and the percentage of time the Off Load Interval (OLI) was greater than 30 minutes were analyzed to determine their relationship.

During the six month study period, 40,600 calls were analyzed. The investigators found that response times increased approximately 16 seconds for each 10% increment in OLI (e.g. OLI=10% => 16 second increase; OLI=50% => 80 second average increase in response time). Response time also increased approximately 48 seconds for each additional 50 calls per day

above the average. These numbers are not statistically significant and they certainly are not clinically significant but the findings do suggest a trend that makes sense to most field providers: if it takes longer to get your patient off your stretcher, then response time is going to suffer. The investigators did say one confounding factor that limited their ability to show a link was the staffing and number of ambulances on the street increased during the study interval. With increased ambulances, one would expect more ambulances would ultimately be available which would hold the response time steady. It would be interesting to see what would happen with the data if this study was performed with constant staffing over a time period where the call volume fluctuates.

Finally, many of us feel like we're busier during the full moon. The authors of one dispatch study looked retrospectively (backwards in time) over a one year time period. Almanac data was also collected for the amount of precipitation and the lunar phase. Holidays were also recorded. These factors were all examined to identify links between these factors. None were found! I particularly enjoy the authors' concluding statement: "Contrary to popular myths, this study did not show fluctuating 9-1-1 call volumes related to full moons, holidays and daily precipitation."

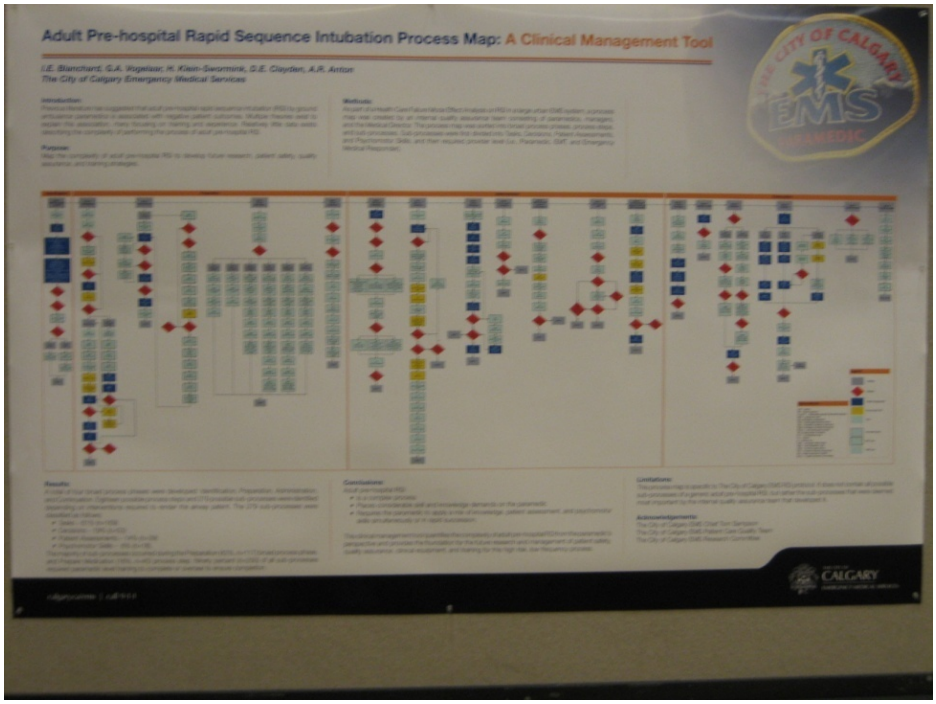
RSI Complexity

The procedures we perform in the field have varying levels of complexity. Rapid Sequence Intubation is used by some ground and aeromedical EMS agencies to secure an airway in combative or semiconscious patients. How complex can it be to add sedation and paralysis to the usual oral intubation procedure? Several individuals from Calgary EMS set to draw out a process map for the procedure with some surprising results.

In order to categorize the procedure, four broad phases were defined, which included Identification, Preparation, Administration, and Continuation. The group went ahead and listed out every single process and subprocess step required in the procedure. An example of a process step is "Draw up medications" while an example of a subprocess step is "Obtain correct syringe and needle". The subprocesses were categorized and color coded into Tasks, Decisions, Patient Assessments, and Psychomotor Skills. Additionally, the group assigned who would perform each step in the subprocess including both ALS and BLS providers.

Once the process map was developed and agreed upon by the consensus of the team, the map was analyzed (see below for the map presented on their poster). The group found 18

process steps with a total of 288 subprocess steps! The majority of the steps (41%) were in the preparation phase with 16% of the total involved in the "Prepare Medication" process step. 90% of the steps needed to be performed by a paramedic, which places a heavy burden for the procedure on the paramedic. While the purpose of this study was to detail the procedure of RSI, it allows further research into error analysis and other topics in a consistent manner.



The RSI process map from the poster presented at NAEMSP, January 2009.

Subspecialty Certification for EMS Physicians

Periodically over the last 15 years, there have been attempts at making an official subspecialty board certification for physicians who subspecialize in EMS. At the beginning of 2009, another application was made to the American Board of Emergency Medicine for support for a subspecialty. The difference this time, is the focus was made on the unique clinical care aspects of the subspecialty in an effort to demonstrate that there is more than the administrative component of the field. There is cautious optimism that the application will be successful for several reasons, including the increased frequency of published papers on EMS and the impact that EMS has on fields other than emergency medicine.

Medical Director Involvement

There is a saying that I have heard several people use, which is there are two different types of medical directors: Those that are involved in their agencies and those that just use their right (or left) hand to sign papers. Intuitively, it would seem that EMS agencies / systems where

a medical director was involved and engaged would have improved clinical quality. Two studies examine the effects of medical director involvement on EMS operations.

The first study examined the effect an EMS medical director had on the national EMS service of the Middle Eastern country of Qatar. In 2007, an EMS medical director was hired because of clinical concerns. The medical director undertook the task of significantly overhauling policies, procedures, training and scope of practice for the providers in the system. To measure the effectiveness of this change of involving a medical director, several clinical indicators were assessed and reviewed both before and after the dedicated medical director was placed.

This review found that after the medical director became involved in the service, remediation decreased, the rate of clinically acceptable charts improved, the rate of misplaced endotracheal tubes dropped, the rate of intravenous line placement for unstable patients increased, and a higher percentage of patients who had symptoms of acute coronary syndrome received aspirin. These were all statistically significant differences.

Another study performed in Rochester, NY evaluated physician oversight of the rapid sequence intubation program in that region in NY and included retrospective review of charts from January 2004 to July 2008. A new physician oversight program began in January of 2007 that was consistent with the NAEMSP position statement on rapid sequence intubation (Prehospital Emergency Care 2006 Apr-Jun 10(2):260; resource document Prehospital Emergency Care 2006 Apr-Jun 10(2):261-271) in that there is a limited number of providers credentialed to perform RSI, there is an immediate debriefing by one of the medical control physicians, a call review of all encounters, and a quarterly skills proficiency demonstration. During this time period, the protocol remained the same. The researchers found the frequency of use other means of airway control increased (BLS, CPAP, intubation without RSI), more sedatives and less paralytic was used and there was an improved documentation of indications for RSI. The researchers also found no difference in the number of intubation attempts or in the success rate, but that scene times did lengthen. The researchers concluded that while there was no effect on the success of the procedure, there was improved selection and management of patients requiring RSI.

References:

The studies and abstracts discussed in this talk can be found in the January 2009 issue of Prehospital Emergency Care (volume 13, issue 1, pages 90 – 150).