249 Out-of-Hospital Physiologic Predictors of Sepsis Outcomes

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Study Objectives: Severe sepsis and septic shock are common, expensive and often fatal medical problems. The care of the critically sick and injured often begins in the prehospital setting, there is limited data available related to predictors and interventions specific to sepsis in the prehospital arena. The objective of this study was to assess the predictive effect of physiologic elements commonly reported in the out-of-hospital setting in the outcomes of patients transported with sepsis.

Methods: This was a cross sectional descriptive study. Data from the year 2005 was collected. We included adult cases (>18 years) transported by emergency medical services to a major academic center with the diagnosis of sepsis as defined by ICD-9-CM diagnostic codes. Descriptive statistics and standard deviations were used to present group characteristics. Chi-square was used for statistical significance and Odds Ratio to assess strength of association. Statistical significance was set at the 0.05 level. Physiologic variables studied included, Shock Index (SI), Mean Arterial Pressure (MAP), Heart Rate (HR) and Respiratory Rate (RR).

Results: Sixty three (63) patients where included, out of which 43 (68.25%) were admitted to intensive care units. Physiologic variables included; mean ambulance MAP of 80.54 mm Hg (SD 18.6), mean ambulance respiratory rate of 21.88 (SD 7.6), and mean ambulance heart rate of 100.61 bpm (SD 21.93). Outcome variables included a mean hospital length of stay (HLOS) of 13.75 days (SD 9.97), mean ventilator days of 4.93 (SD 7.87), in-hospital mortality was 22 out of 63 (34.9%), and mean intensive care unit length-of-stay (ICU-LOS) of 7.02 days (SD 7.98). The Shock Index and respiratory rate were found to predict ICU admissions. [OR 5.96 (1.49-25.78) P=0.003 and OR 4.81 (1.16 to 21.01 P=0.0116)] respectively, but heart rate and the mean arterial pressures did not predict ICU admissions (P=0.639 and p=0.49 respectively). Whereas none of the studied variables were found to predict mortality (MAP <65 mmHg P=0.39; HR P=0.60; RR P=0.11; SI P=0.35).

Conclusions: This study demonstrated that the out-of-hospital shock index and respiratory rate have high predictability for ICU admission. Further studies should include the development of out-of-hospital sepsis score. Limitations include sample size and adequacy of the data.

250 Comparing Differences in the Triage Distribution of Emergency Department Patients Using Two Different 5-tier Triage Acuity Scales

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Study Objectives: Determine whether patients who require hospital admission or surgical intervention are triaged differently using the Canadian Triage and Acuity Scale (CTAS) versus the Emergency Severity Index (ESI).

Methods: On September 8, 2004 the Barnes-Jewish Hospital emergency department (ED) converted from the CTAS to the ESI system for triage determination of patient acuity. Patient demographics, triage acuity level, disposition, chief complaint, wait time, and diagnoses were extracted from the ED information system for all patients seen from approximately 15 months before until 15 months after the change. The acuity distribution was then determined for all ED patients and patients who went on to be directly admitted to the operating room (OR) or intensive care unit (ICU). To focus on the frequency of patients who truly require emergent attention being triaged below level 2, the five triage categories were grouped into emergent (levels 1 and 2) and non-emergent (levels 3, 4, and 5).

Results: The distributions between emergent and non-emergent triage categories are shown in Table 1. The ratio of the odds of being triaged as non-emergent under ESI over the odds of being triaged as non-emergent under CTAS are displayed. Mean wait times for each triage level are shown in Table 2.

Table 1: Likelihood of Triage as Non-emergent versus Emergent By Triage Scale

	All Patients		Admitted		OR/ICU	
	CTAS	ESI	CTAS	ESI	CTAS	ESI
Number of Patients	96918	98279	22519	23162	2381	2712
% Emergent	46%	23%	85%	55%	95%	77%
Odds Ratio (95% CI*)	2.80 (2.75 to 2.86)		4.64 (4.43 to 4.85)		5.57 (4.54 to 6.84)	

* CI = Confidence Interval

Table 2 - Mean Wait Time in Minutes by Acuity Level

		1	2	3	4	5	Overall
CTAS	Number of Patients	905	43924	41661	8980	1448	96918
	Wait time	NA	69	119	112	118	93
ESI	Number of Patients	991	22099	46205	25929	3055	98279
	Wait time*	NA	34	99	79	72	76

* Wait time = mean wait time to room placement in minutes

There was a significant shift of patients from higher to lower triage categories. This shift was also seen in the subset of admitted patients and the subset who went directly to the OR or ICU from the ED. The overall improvement in wait times after the transition to ESI is felt to be due to other interventions including some directed at decreasing boarding time. Wait time for triage level 3 was still about 30 minutes longer under ESI than for triage level 2 under CTAS.

Conclusions: The shift of patients from higher to lower triage categories with the transition from CTAS to ESI, despite some improvement in overall wait times, apparently resulted in longer wait times for some patients requiring time-sensitive care. These results suggest the need for further study to determine whether the ESI triage algorithms are sufficient to correctly identify patients requiring emergent and intensive care and whether these results are due to intrinsic properties of the ESI scale or relate to its implementation.

251 Impact of Intubation on Out-of-Hospital Cardiac Arrest Survival

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Introduction: There is a developing body of literature documenting adverse impact of out of hospital endotracheal intubation for critical multiple trauma and head injured patients.

Study Objective: To compare survival to hospital admission (Admit) and discharge (DC) of out-of-hospital cardiac arrest patients (OHCA) who receiving successful pre-hospital endotracheal intubation (intubated) to those not successfully intubated (not intubated).

Methods: We conducted a retrospective study from an ongoing database of OHCA patients brought to a large suburban tertiary care emergency department by paramedic services between 1995 and 2006. We dichotomized patients by whether they were successfully intubated or not prior to hospital arrival. Utstein style cardiac arrest variables were abstracted for all cases. All survivors to admission were reviewed to exclude those patients who had a successful first shock recovery of spontaneous circulation or other reason that intubation was not attempted. Sub-group comparisons were made based on cardiac arrest rhythm with cases being sorted to ventricular fibrillation (VF) and non-ventricular fibrillation (NVF) rhythms.

Results: During this study period, there were 1263 total cases with 13 early survivors excluded. Overall 83.8% were intubated, 258 (20.4%)survived to Admit and 96(7.6%) survive to DC. Intubated patients were more often EMS monitored arrests, but otherwise similar between groups. When compared by intubation status, there was no significant difference in survival to admission (21.0% vs 16.7%) or DC (7.0% vs 10.3%). However, when patients were dichotomized by initial cardiac rhythm, intubated VF patients trended toward a decreased survival to DC (12.0% vs 20.6%, p =0.06). Intubated Non-VF patients were more likely to survive to admission (13.2% vs 4.8%, p <0.03) but not discharge (2.0% vs 1.2%, p=0.60).

Conclusion: In this retrospective study out-of-hospital endotracheal intubation for cardiac arrest patients was not associated with improved survival to inpatient admission or discharge. However, intubated VF patients trended toward a decreased survival to discharge and intubated non VF patients had an increased rate of survival to admit (but not discharge), suggesting a potential difference in intubation effect based on initial cardiac rhythm. Future prospective studies are needed to further understand this association.

255 Effect of Changing Triage Acuity Scales on the Triage Distribution of Patients Presenting With Chest Pain

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Study Objectives: To determine if transition from the Canadian Triage and Acuity Scale (CTAS) to the Emergency Severity Index (ESI) resulted in any significant change in the appropriateness of triage in patients presenting to the emergency department (ED) with chest pain.

Methods: On September 8, 2004 the Barnes-Jewish Hospital (BJH) ED converted from the CTAS to the ESI system for determination of patient acuity at the time of triage. Patient demographics, triage acuity level, disposition, chief complaint, and diagnoses were extracted from the ED information system for all patients seen in the period starting 15 months before the change and ending 15 months after the change. The data were then analyzed for differences in the acuity distribution of all patients presenting with chest pain as well as subsets with criteria of age greater than 55, hospital admission (as a surrogate for physician suspicion of acute coronary syndrome), and ED diagnosis of myocardial infarction. To focus on the frequency of patients who truly require emergent attention being triaged below level 2, the five triage categories were grouped into emergent (levels 1 and 2) and non-emergent (levels 3, 4, and 5).

Results: The distributions between emergent and non-emergent triage categories are displayed in the Table. The ratio of the odds of being triaged as non-emergent under ESI over the odds of being triaged as non-emergent under CTAS are shown.

Table: Likelihood of Triage as Non-emergent versus Emergent By Triage Scale

	Chest Pain		Chest Pain and Admitted		Chest Pain <55yo and Admission		Myocardial Infarction	
	CTAS	ESI	CTAS	ESI	CTAS	ESI	CTAS	ESI
Number of Patients	7317	6970	2852	2722	1622	1535	191	166
% Emergent	79%	43%	96%	68%	98%	71%	93%	75%
Odds Ratio (95% CI*)	5.09 (4.73 to 5.48)		11.51 (9.39 to 14.12)		21.39 (14.66 to 31.21)		4.15 (2.17 to 7.39)	

*CI = Confidence Interval

Conclusions: After BJH ED switched from the CTAS to the ESI acuity scale, there was a significant increase in the proportion of patients presenting with chest pain who were triaged to non-emergent categories, including patients considered at significant risk for acute coronary syndrome and those with a final discharge diagnosis of myocardial infarction. The results suggest the need to study subsets of patients who undergo emergent reperfusion procedures to determine whether the time to reperfusion was affected. Implementations of the ESI system at other institutions should also be evaluated for similar trends.

256 Agreement on Trauma System Activation Among Transporting Paramedics and Emergency Physicians in an Urban Trauma Center

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Study Objectives: Criteria exist to guide paramedic classification of patients as a trauma, as well as emergency physician determination of when the hospital trauma system (HTS) should be activated. This study aimed to assess agreement between paramedic and emergency physician trauma classification, and factors associated with these decisions.

Methods: Prospective study of paramedics in an urban EMS system transporting patients to a level 1 adult trauma center in the summers of 2005/6. Level of HTS was recorded (none, Category 1 [CatI], Category II [CatII]), and level of EMS trauma classification (Trauma Alert [TA]) or Trauma Transport [TT]). Self-report surveys assessed paramedic reasoning for EMS classification and EP reasoning for HTS activation. Kappa values (k) were calculated to assess agreement between EMS and emergency physician classifications. Associations are presented as odds ratios(OR) with 95% Confidence Intervals (CI).

Results: 232 consecutive patient transports were analyzed. Mean patient age was 38 yrs, 68% were male, 78% had a GCS of 15, and 47% were admitted (22% to ICU). Blunt injury was noted in 84%, penetrating in 13%, burn in 3%. Paramedics requested TA in 77 (33%) patients and TT in 152 (66%). Agreement for TA and CatI was moderate (k=.55). HTS was activated in 86% of TA cases, with 71% classified as CatI and 29% as CatII. Agreement was poor for CatII and TT (k=0). HTS was activated in 34% of TT cases and upgraded to CatI in 28%. HTS activation was more likely when EMS trauma was based on anatomic/physiologic reasons (OR=4.0 [95% CI: 2.3-6.9]); HTS activation was less likely when EMS trauma was based solely on non-anatomic reasons/paramedic judgment (OR=0.3 [95% CI: .2-.5]).

Conclusion: There is moderate agreement between paramedics and emergency physicians in determining trauma classification when decisions are based on anatomic/physiologic factors. EMS trauma classification based on mechanism of injury or judgment is associated with not activating HTS. EMS systems should review current trauma triage guidelines to allow for improved trauma system utilization.

257 Utilization of Emergency Lights and Sirens by Urban Paramedics: Analysis of Indications for Their Use

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Study Objectives: Most EMS systems utilize emergency lights and sirens (L&S) during response to an incident and for many patient transports to the hospital. Yet, current data suggests that timesavings associated with of L&S use is small and risk of accident or injury is large. This study aimed to describe the prevalence and type of emergency procedures performed on arrival.

Methods: Prospective study of paramedics in an urban EMS system transporting patients to a level 1 adult trauma center in summer 2006. A self-report survey of paramedics assessed use of L&S during transport and type of prehospital patient interventions administered. Medical record review was used to describe emergency interventions within 15 minutes of arrival to the emergency department. Associations are reported as odds ratios (OR) with 95% Confidence Intervals (CI).

Results: 245 consecutive L&S EMS transports assessed. The mean patient age was 51± 20 yrs, 50% were male, 73% were Black, and 5% were trauma. 77% of patients received a prehospital intervention by EMS, including oxygen administration (55%), IV access (37%) and cardiac monitoring (35%). 1% received CPR and 1% were intubated by paramedics. Only 14% of patients received an ED intervention within 15 minutes of arrival. These included: CPR (2%), intubation (2%), central line placement (2%), rapid CT Scan of brain (2%), cardiac defibrillation (1%), EKG (1%), nitroglycerin administration (1%), tube thoracostomy (<1%), and restraints (<1%). 54% of patients were ultimately admitted (5% ICU level of care); 4 (2%) were DOA. Receiving an early ED intervention was unrelated to receiving a prehospital intervention and patient disposition.

Conclusion: The majority of patients arriving to the emergency department do not require any emergency interventions or procedures within 15 minutes of arrival. EMS Systems should critically analyze L&S utilization to determine which patients will benefit from this transport modality.

258 Out-of-Hospital Placement of Adult Intraosseous Access Using the EZ-IO Device

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Study Objectives: Although intraosseous access has been standard for pediatric emergency access, it has recently become an alternative for adult intravascular access. The goal was to describe successful placement and complication rate of intraosseous access by paramedics (EMT-Ps) for out-of-hospital resuscitation of critically ill adults using the EZ-IO device.

Methods: This was a retrospective chart review of all out-of-hospital patients transported by EMT-Ps who had EZ-IO access placed between 11/01/05 - 11/30/06. Indications for use were critically ill patients age≥ 21 years, with difficult, unlikely or failed attempts at intravenous (IV) access. The primary outcome was the success rate of placement of the EZ-IO. Secondary outcomes included clinical indication, adherence to protocol guidelines, immediate complication rates and clinical status at hospital delivery. Analysis was descriptive statistics with 95% CIs.

Results: Fifty-three patients had IO access attempted. Three were excluded due to age <21 years old. Fifty patients met inclusion criteria; mean age 56.2 years, 52% were male. Overall success rate of EZ-IO access was 46/50 (92.0%; 95% CI: 84.5%, 99.5%), with 43/48 (89.6%; 95% CI: 80.9%, 98.2%) successful on the first attempt. There was 1/46 (2.2%; 95% CI: 0.0%, 6.4%) immediate complication, dislodgement. A peripheral IV was attempted in 26/51 (51%) patients. Clinical indications for EZ-IO were cardiac arrest 68.0%, decreased level of consciousness