What is sepsis?

The Third International Consensus Definitions for Sepsis and Septic Shock (Sepsis-3)

“Sepsis is defined as life-threatening organ dysfunction caused by a dysregulated host response to infection”

EMS transports many of these patients

Opportunities for Emergency Medical Services care of sepsis²

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Background: Field treatment of sepsis could prevent or reverse organ dysfunction.

- Nearly half of patients with severe infection in ED transported by EMS  
- Majority of severe cases, and patients that ultimately die
Study Questions

What is the burden of disease in EMS? Which patients paramedics should suspect infection?

Study Population/Methods

• ALL AHS EMS transports from April 1, 2015 – March 31, 2016
• 131,745 Adult Patients
• Included operational and patient characteristics
• Linked to ED and inpatient databases
• Descriptive analysis

Sepsis Case Definition

Clinical Organ Dysfunction (Partial SOFA Score)

<table>
<thead>
<tr>
<th>SOFA Variable</th>
<th>Points Assigned</th>
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<tbody>
<tr>
<td>PaO2/FiO2</td>
<td>1 Point – SpO2 &lt; 90%</td>
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<td>2 Points – SpO2 &lt; 80%</td>
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<tr>
<td>Glasgow Coma Scale</td>
<td>1 Point – 13-14</td>
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<tr>
<td></td>
<td>2 Points – 10-12</td>
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<td></td>
<td>3 Points – 6-9</td>
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<td>4 Points – &lt; 6</td>
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<tr>
<td>Mean Arterial Pressure</td>
<td>1 Point – &lt;70 mmHg</td>
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Clinical Organ Dysfunction (≥2 SOFA points) OR Organ Dysfunction Code

Infection

Adult patients transported by EMS

Sepsis-causing pathogen or sepsis code

No Infection

Admitted or Died in ED

Sepsis
Results - Incidence

• Incidence of infections: 9.7%
  • 66% required admission
• Incidence of sepsis: 2.1%
  • 9 patients per day
  • 1 per 50 transports
• In-hospital mortality 28.2%

Paramedics see patients earlier, and for longer

- Median 41 min (33-51)
- Median 44 min (16-96)
- Longer than non-septic patients
  (median 37 min p<0.001, SMD = 0.15)

Results – Paramedic Recognition

• Incidence of infections: 9.7%
  • 11% documented by paramedics
• Incidence of sepsis: 2.1%
  • 9% documented by paramedics
• How do we improve this?
### Infection in AHS EMS Patients

#### Dispatch Characteristics
- Majority of patients are
  - Card 26 - Sick Person (28.8%)
  - Card 6 - Breathing Problems (17.0%)
  - Card 33 – Transfer/Interfacility/Palliative Care (16.0%)

*Prevalence = 18%*

#### Patient Characteristics
- Majority had a chief complaint of
  - Shortness of breath (16.3%)
  - Not feeling well / sickness not yet diagnosed (11.4%)
  - Abdominal pain (7.6%)
  - General weakness (6.0%)

*Prevalence = 14.7%*

#### Patient Characteristics
- Most common symptoms were
  - Dyspnea (8.5%)
  - General malaise/unwell (6.7%)
  - Weakness (5.4%)
  - Abdominal pain (3.3%)
  - Nausea/vomiting (2.2%)

*Prevalence = 15.3%*
Infection in AHS EMS Patients

Temperature

Temperature is the best measure

Limitations

• Descriptive study
  • Minimal adjustment of risk estimates
  • Impact: potential for bias if estimates are only a surrogate for another patient factor
• Misclassification of cases due to administrative data
  • Impact: underestimation of risk estimates
Conclusions

• Patients with sepsis are a frequent, and ill population among EMS transports
  • Despite this severity, paramedics spend longer with these patients out of hospital

• Select subpopulations and temperature measurement can be used to identify patients with a higher prevalence of infections

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  • Gerald Lazarenko
  • David Mroszczak
• AHS EMS staff
Infection in AHS EMS Patients

<table>
<thead>
<tr>
<th>What types of infections?</th>
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</thead>
<tbody>
<tr>
<td>• 39% were urinary tract infections</td>
</tr>
<tr>
<td>• 36% were respiratory infections</td>
</tr>
<tr>
<td>• 11% skin, soft tissue and joint</td>
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<tr>
<td>• 3% were cardiovascular</td>
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<tr>
<td>• 11% other/not yet diagnosed in ED</td>
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