"Suspicion of Infection" and sepsis in the prehospital setting

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What is sepsis?

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

Mervyn Singer, MD, FRCP, Clifford S. Deutschman, MD, MS, Christopher Warren Seymour, MD, MSc, Manu Shankar-Hari, MSc, MD, FRCP, Djillali Annane, MD, PhD, Michael Bauer, MC, Rinaldo Bellomo, MC, Gordon R. Bernard, MD, Jean-Daniel Chiche, MD, PhD, Craig M. Coopersmith, MD, Richard S. Hotchkiss, MD, Mitchell M. Levy, MD, John C. Marshall, MD, Greg S. Martin, MD, MSc, Steven M. Opal, MD, Gordon D. Rubenfeld, MD, MSc, Tom van der Poll, MD, PhD, Jean-Louis Vincent, MD, PhD, Derek C. Angus, MD, MPH

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

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EMS transports many of these patients

Opportunities for Emergency Medical Services care of sepsis☆

Henry E. Wang[a,*], Matthew D. Weaver[b], Nathan I. Shapiro[c], Donald M. Yealy[b]

Resuscitation 81 (2010) 190–197

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

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Study Questions

What is the burden of disease in EMS?

Which patients paramedics should suspect infection?

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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

Adult patients transported by EMS

Sepsis-causing pathogen or sepsis code

No Infection

Infection

Admitted or Died in ED

Clinical Organ Dysfunction (≥2 SOFA points) OR Organ Dysfunction Code

Sepsis

Clinical Organ Dysfunction (Partial SOFA Score)	
SOFA Variable	**Point(s) Assigned**
PaO2/FiO2	1 Point – SpO2 < 90% 2 Points – SpO2 < 75%
Glasgow Coma Scale	1 Point – 13-14 2 Points – 10-12 3 Points – 6-9 4 Points - < 6
Mean Arterial Pressure	1 Point - <70 mmHg

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%

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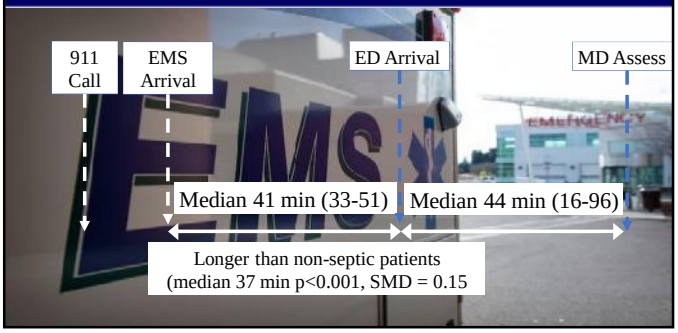
Paramedics see patients earlier, and for longer



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?

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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%

Infection in AHS EMS Patients

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%

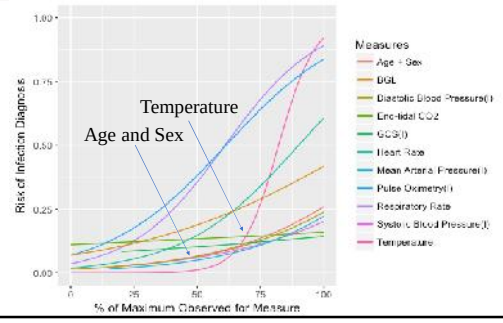
Infection in AHS EMS Patients

Patient Characteristics

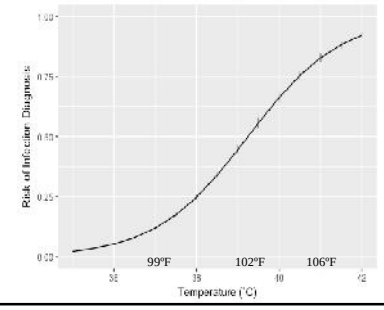
- Most common symptoms were
  - Dyspnea (8.5%)
  - General malaise/unwell (6.7%)
  - Weakness (5.4%)
  - Abdominal pain (3.3%)
  - Nausea/vomiting (2.2%)

Prevalence = 15.3%

Infection in AHS EMS Patients



Temperature is the best measure



Temperature
- Adjusted for Age+Sex

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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Infection in AHS EMS Patients

What types of infections?

- 39% were urinary tract infections
- 36% were respiratory infections
- 11% skin, soft tissue and joint
- 3% were cardiovascular
- 11% other/not yet diagnosed in ED