

A Critical Analysis of the Literature on Time-to-Antibiotics in Suspected Sepsis

Jeremy Weinberger,^{1,2} Chanu Rhee,^{1,2} and Michael Klompas^{1,2,3}

¹Department of Population Medicine, Harvard Medical School and Harvard Pilgrim Health Care Institute, Boston, Massachusetts, USA, ²Department of Medicine, Brigham and Women's Hospital, Boston, Massachusetts, USA

1. Strong relationship between each hour until antibiotics and mortality for **septic shock** but a less pronounced relationship for sepsis without shock
2. Up to 90 mins until antibiotics for patients with **sepsis without shock make little difference**
3. Intervals of ≥ 5 hours are clearly and consistently associated with higher mortality rates.

		EAGLES Survey	North Texas Survey
Survey Questions	No. of Respondents	29	43
Have a specific sepsis protocol		68.9%	97.7%
Activate a sepsis alert		58.6%	81.4%
Sepsis team activated at receiving hospital		17.0%	N/A
Parameters used to assess sepsis			
Tachycardia		N/A	100%
Temperature		79.3%	69.8%
EtCO2		58.6%	69.8%
Tachypnea		34.5%	74.4%
Blood Pressure		44.8%	83.7%
Lactate		6.9%	4.7%
Administered antibiotics in the field		13.8%	16.3%

2019 - North
Central Texas
Trauma Regional
Advisory Council
(NCTTRAC)
surveyed
regional EMS
systems

Promising Practices

1. Early assessment and activation of “sepsis alert”
2. Priority on starting IV and initiating IVF bolus if no contraindications
3. Antibiotics for sepsis with shock, unclear benefit for sepsis without shock

The NCTTRAC Regional Adult Sepsis Alert Criteria was developed by the NCTTRAC Emergency Operations Committee to provide pre-hospital providers with a regional sepsis activation template for the purpose of expediting the care and treatment of sepsis patients. This criteria should be implemented only with the support and approval of an agency's EMS Medical Director.

NCTTRAC Regional Adult Sepsis Alert Criteria

STEP 1 - BOTH OF THESE:

- Age ≥ 16
- An identified or suspected source of infection:
 - Cough and/or Dyspnea
 - UTI symptoms
 - NVD
 - Fatigue and/or Malaise
 - Wound Infection (with or without drainage)
 - Hx of Immunosuppressive condition (e.g. cancer, leukemia, chemo, HIV, post-transplant)
 - Fever and/or chills
 - Resident of a Skilled Nursing Facility

STEP 2 - AND AT LEAST ONE OF THESE:

- SBP < 100 and/or MAP < 65
- ETCO₂ < 25 mmHg
- Two or more of the following criteria:
 - Temp $> 100.4^{\circ}$ F (38° C) or $< 96.8^{\circ}$ F (36° C)
 - HR > 90
 - RR > 20
 - AMS from baseline
 - New onset oxygen dependence to maintain SpO₂ $\geq 90\%$

If a check is present in BOTH BOXES of STEP 1 *and* AT LEAST ONE BOX of STEP 2 (Age at least 16 yr, identified or suspected infection, and one or more physiologic criteria are met) activate a **SEPSIS ALERT** at the receiving facility.

BROWARD SEPSIS ALERT

Date: _____ Unit #: _____ Age: _____ Sex: Male Female

Patient's Name: _____ Incident Number: _____

Documentation of SEPSIS (2 Criteria Required)								
1. SIRS								
(Systemic Inflammatory Response Syndrome)								
Does the patient have 2 or more of the following SIRS criteria?								
<input type="checkbox"/> YES	<input type="checkbox"/> NO	<table style="width: 100%; border-collapse: collapse;"> <tr> <td style="border-bottom: 1px solid black; width: 80%;"></td> <td style="border-bottom: 1px solid black; width: 20%; text-align: right;">≥ 100.4 or ≤ 96.8 F</td> </tr> <tr> <td style="border-bottom: 1px solid black;"></td> <td style="border-bottom: 1px solid black; text-align: right;">≥ 90</td> </tr> <tr> <td style="border-bottom: 1px solid black;"></td> <td style="border-bottom: 1px solid black; text-align: right;">> 20</td> </tr> </table>		≥ 100.4 or ≤ 96.8 F		≥ 90		> 20
	≥ 100.4 or ≤ 96.8 F							
	≥ 90							
	> 20							
If "YES" proceed to next section								
2. INFECTION								
Does the patient have any of the listed infections, high risk criteria or symptoms?								
<input type="checkbox"/> YES	<input type="checkbox"/> NO	<p>Documented Infections: Pneumonia/UTI/Sepsis/Wounds/Skin Infections/Decubitus ulcers</p> <p>High Risk Criteria: Nursing home resident/Recent surgery/Immunosuppressed/Indwelling device</p> <p>Symptoms: Cough/Increased work of breathing/Stiff neck/ALOC/Urinary pain or frequency Inflamed joint/Abdominal pain, distension or firmness/Infected wound</p>						
If both boxes are checked "YES" this patient is a SEPSIS ALERT								

Pre-Hospital Treatment Determination (Severe Sepsis Only)		
Does the patient meet one or more of the following criteria?		
<input type="checkbox"/> YES	<input type="checkbox"/> NO	Cardiovascular: MAP < 65 (see display on monitor) Neurological: Acute Change in Mental Status Metabolic: Lactate ≥ 4 (If available) ETCO ₂ < 25 (correlates to lactate of ≥ 4)
If the box above is "YES" administer Normal Saline 30 cc/kg bolus		
<i>Titrate Fluids to Goal MAP > 70. Consider pressors after 1L NS infused. Max of 2 L NS</i>		

EMS Script: This is Rescue __ coming in with a Sepsis Alert. The patient is a __ year old (male/female) with suspected sepsis. The patient is positive for SIRS criteria and a suspected infection. Vital signs are as follows (state VS), with a MAP of __. The patient (does/does not) qualify for a 30 cc/kg bolus based on criteria for severe sepsis. We (are/are not) requesting further orders. ETA is __ minutes.

Table 1: Polk County Fire Rescue Sepsis Alert checklist for adults > 18 years old

Check "Yes" or "No" for the following (if any of the below is "No," the patient is not a septic alert)		
<input type="checkbox"/> YES	<input type="checkbox"/> NO	Blood pressure: SBP < 90 mmHg or DBP < 60 mmHg OR Respiratory rate: < 10 or > 20 breaths per min. OR Pulse rate: < 60 or > 90 beats per min. OR Temperature: < 97.8 or > 99.1 degrees F
<input type="checkbox"/> YES	<input type="checkbox"/> NO	The patient has 2 or more of the following SIRS variables: ____: Temperature of > 38°C (100.4°F) or < 36°C (96.8°F) ____: Heart rate > 90 beats per min. ____: Respiratory rate > 20 breaths per min. ____: There's a documented infection (e.g., pneumonia, urinary tract infection, MRSA), or is patient high risk (e.g., nursing home, cancer patient, indwelling catheters, immune-compromised, etc.)
<input type="checkbox"/> YES	<input type="checkbox"/> NO	The patient has a shock index (SI) of > 1 SI = Heart rate/systolic blood pressure OR The patient has a modified shock index (MSI) of < 0.7 or > 1.3 MSI = Heart rate/MAP