Variability in Emergency Physician Care for Severe Sepsis: How do we Measure up?

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(Alberta Physician Learning Program)

No Conflict of Interest to Disclose

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Outline

- Background
- Objective of the Study
- Methods
- Results
- Limitations
- Conclusions

Background

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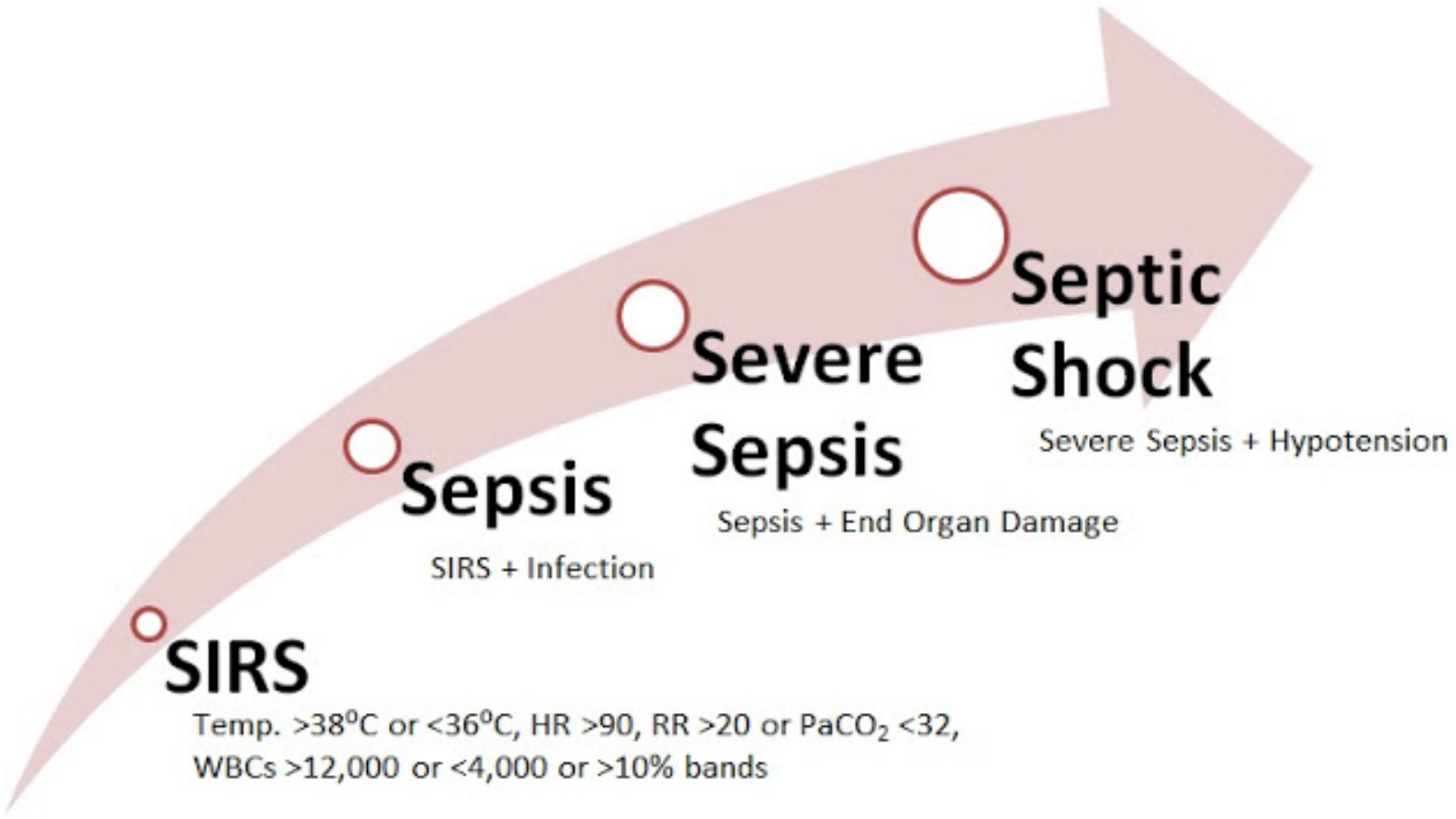
Severe Sepsis

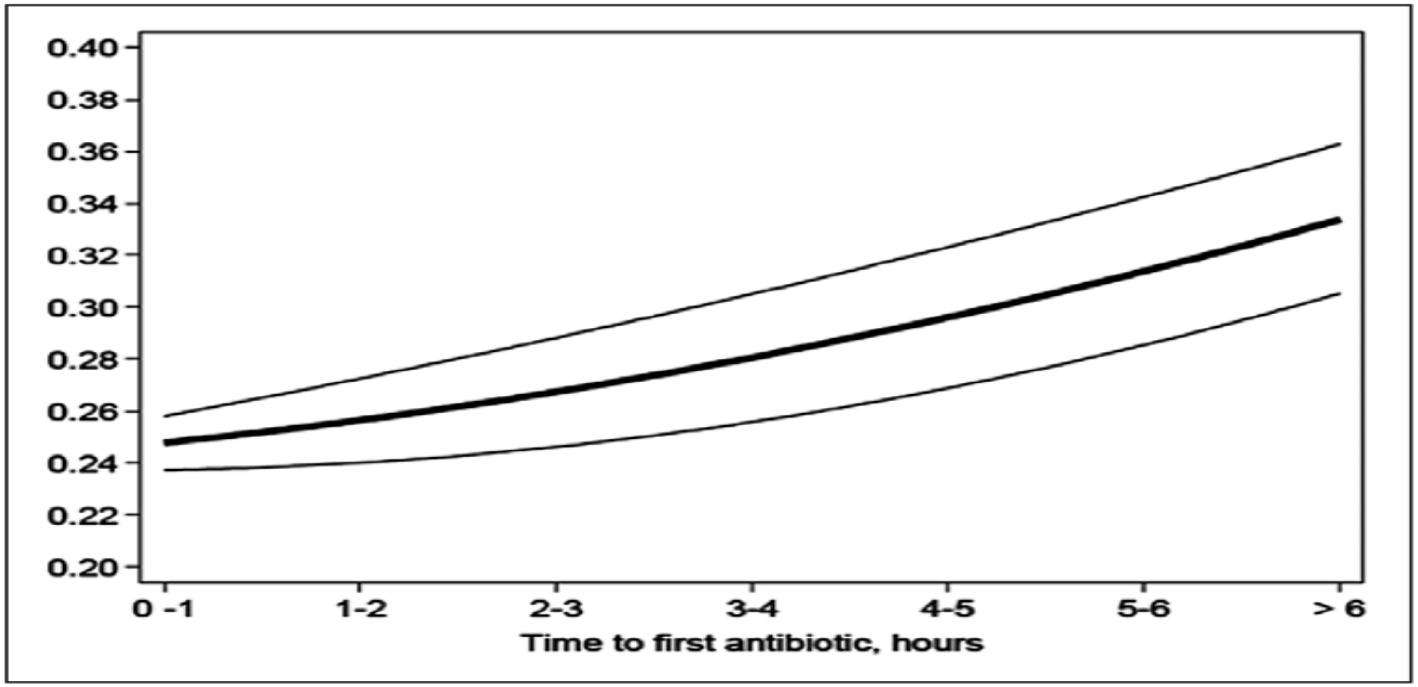


Time - Dependent

Surviving Sepsis Campaign Guidelines 2013

"Administration of effective intravenous antimicrobials within the first hour of recognition of septic shock (grade 1B) and severe sepsis without septic shock (grade 1C) as the goal of therapy"

Mortality with delays



Predicted hospital mortality and 95% CI's for time to first antibiotic administration in severe sepsis and septic shock

Ferrer et al Critical Care Med 2014 Aug;42(8)

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Objectives

Objective

To explore emergency physician variation on key performance metrics in sepsis care using administrative data as a prelude to generating aggregate and individual physician-specific reports

Methods

Identification of Severe Sepsis

- All the patient visits included in the study cohort were selected based on the below criteria:
  1) Patient age >18yo
  2) Had a lactate ordered in the ED and the initial result was ≥ 2.0 mmol/L
  3) Had an infection-related primary admitting ICD-10 code
  4) Had antibiotics ordered while in the ED

Data Retrieval

Sources

- REDIS (Emergency Department Information System)
- SCM (Sunrise Clinical Manager)

Time Period

- 36 months total
- January 1 - December 31
  - 2011
  - 2012
  - 2013

Facilities Included

- FMC
- PLC
- RGH
- SHC (1-year data only)

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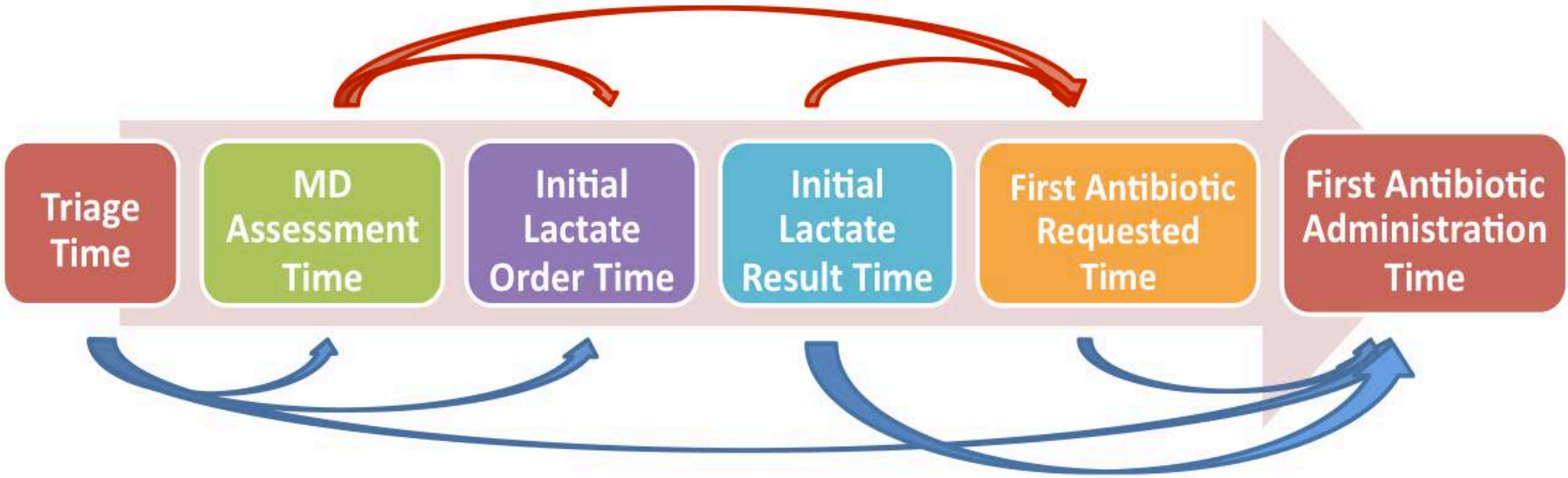
Time Points



Statistics

- Simple descriptive statistics
- Median times were used for all time points
  - Non-normally distributed data
  - Avoid the impact of outliers
- Interquartile range (IQR) was used to demonstrate statistical dispersion

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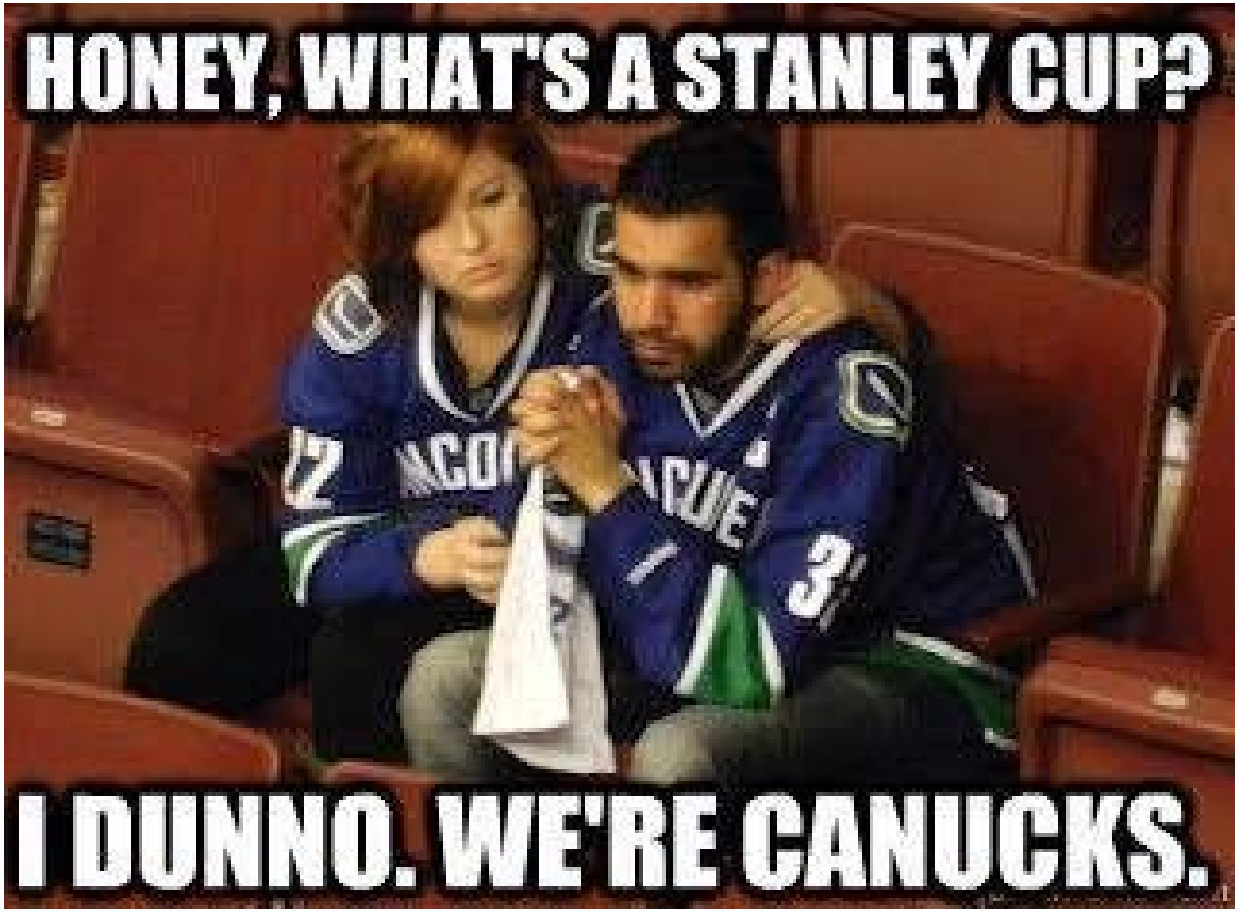
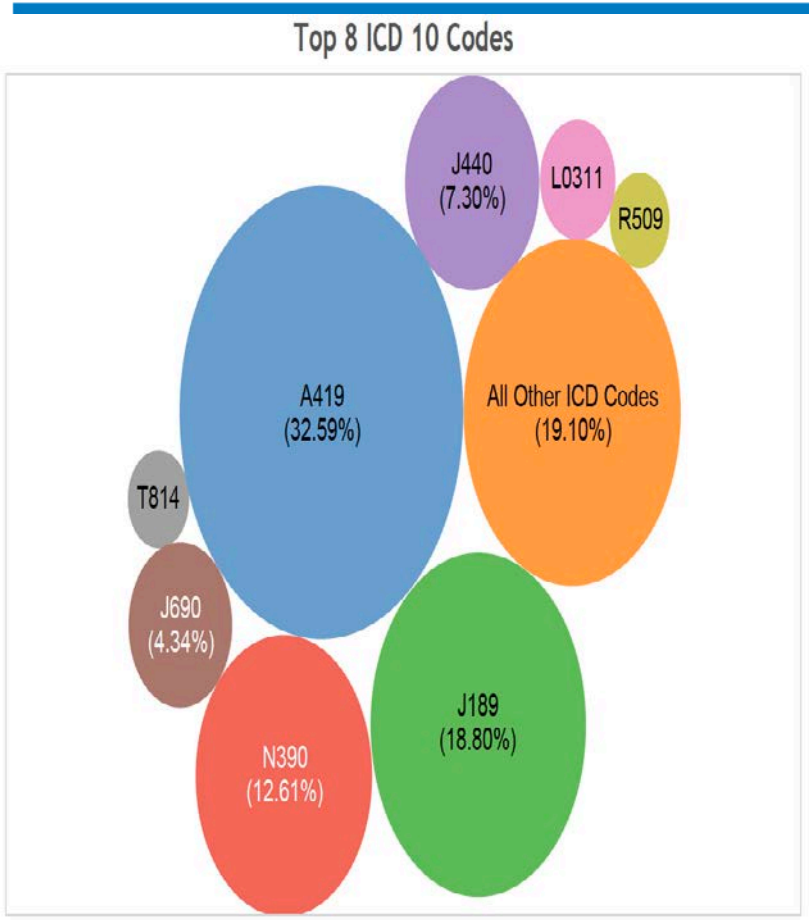


Results

Aggregate Report

- 2197 severe sepsis patient visits
- Care provided by 146 different emergency physicians

Source of Sepsis



Description

A419 Sepsis, unspecified

J189 Pneumonia unspecified

N390 Urinary tract infection, unspecified

J440 COPD with acute lower respiratory infection

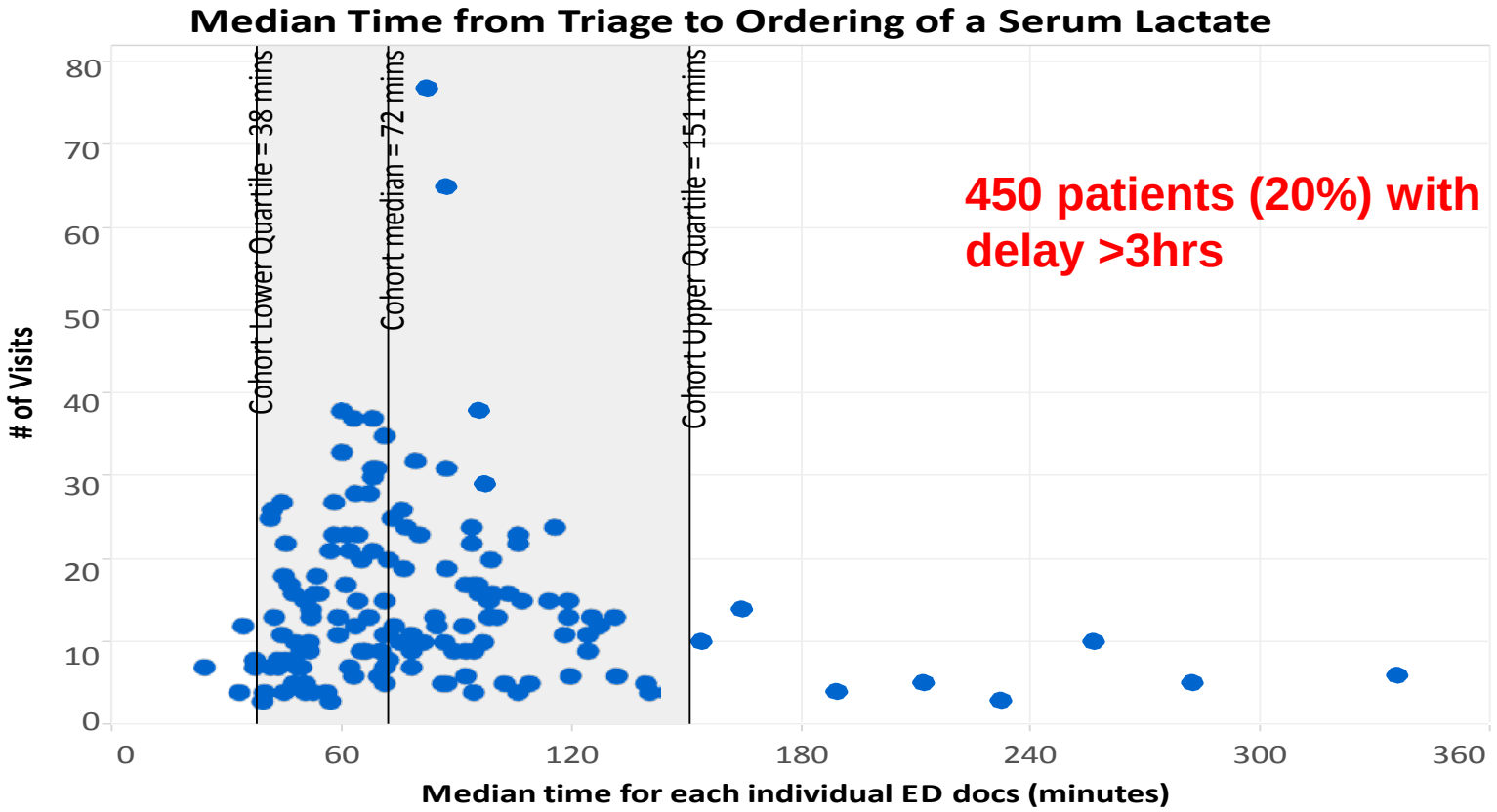
J690 Pneumonitis due to food or vomit

L0311 Cellulitis of lower limb

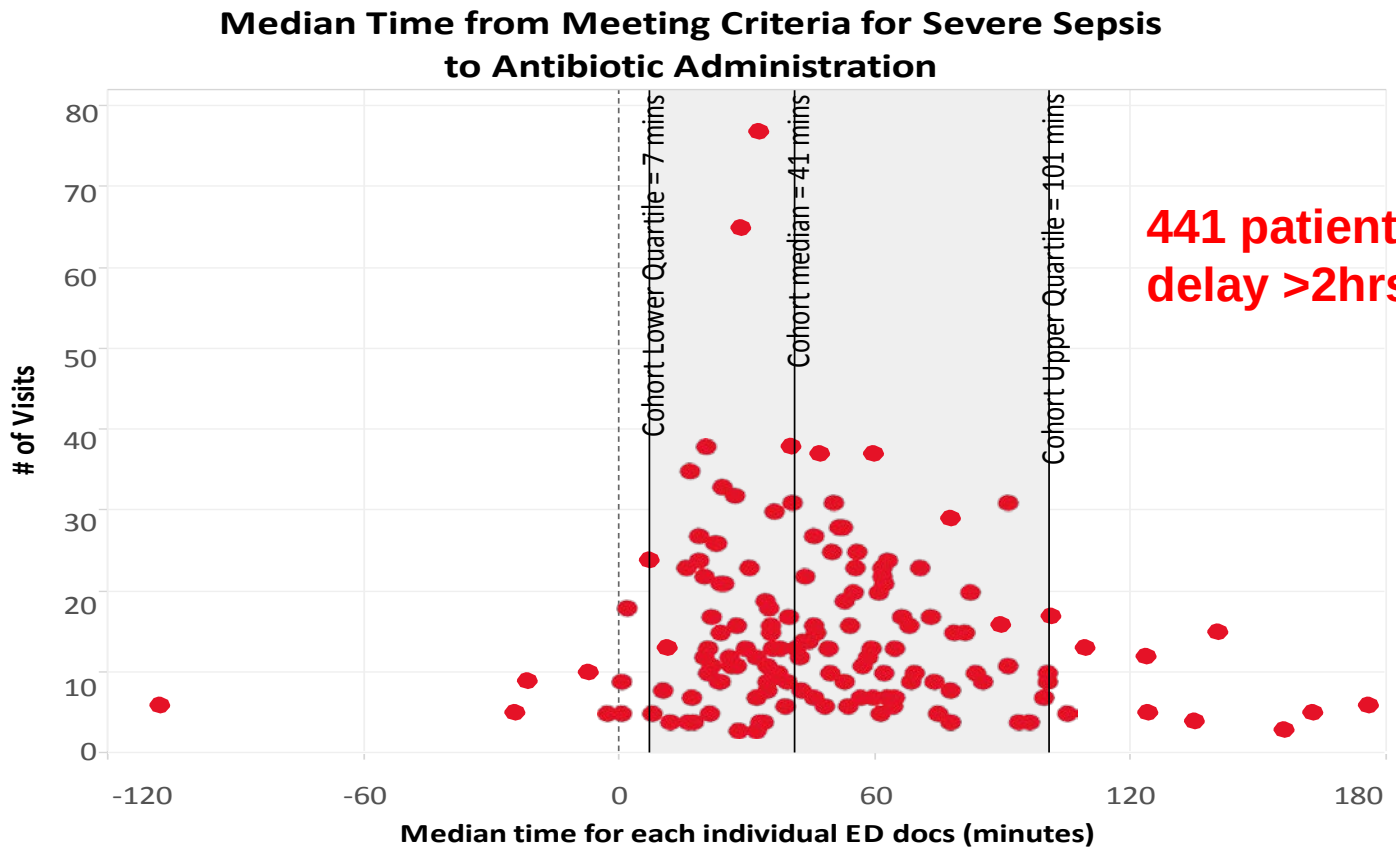
T814 Infection following a procedure

R509 Fever unspecified

Time From Triage to Ordering of Serum Lactate

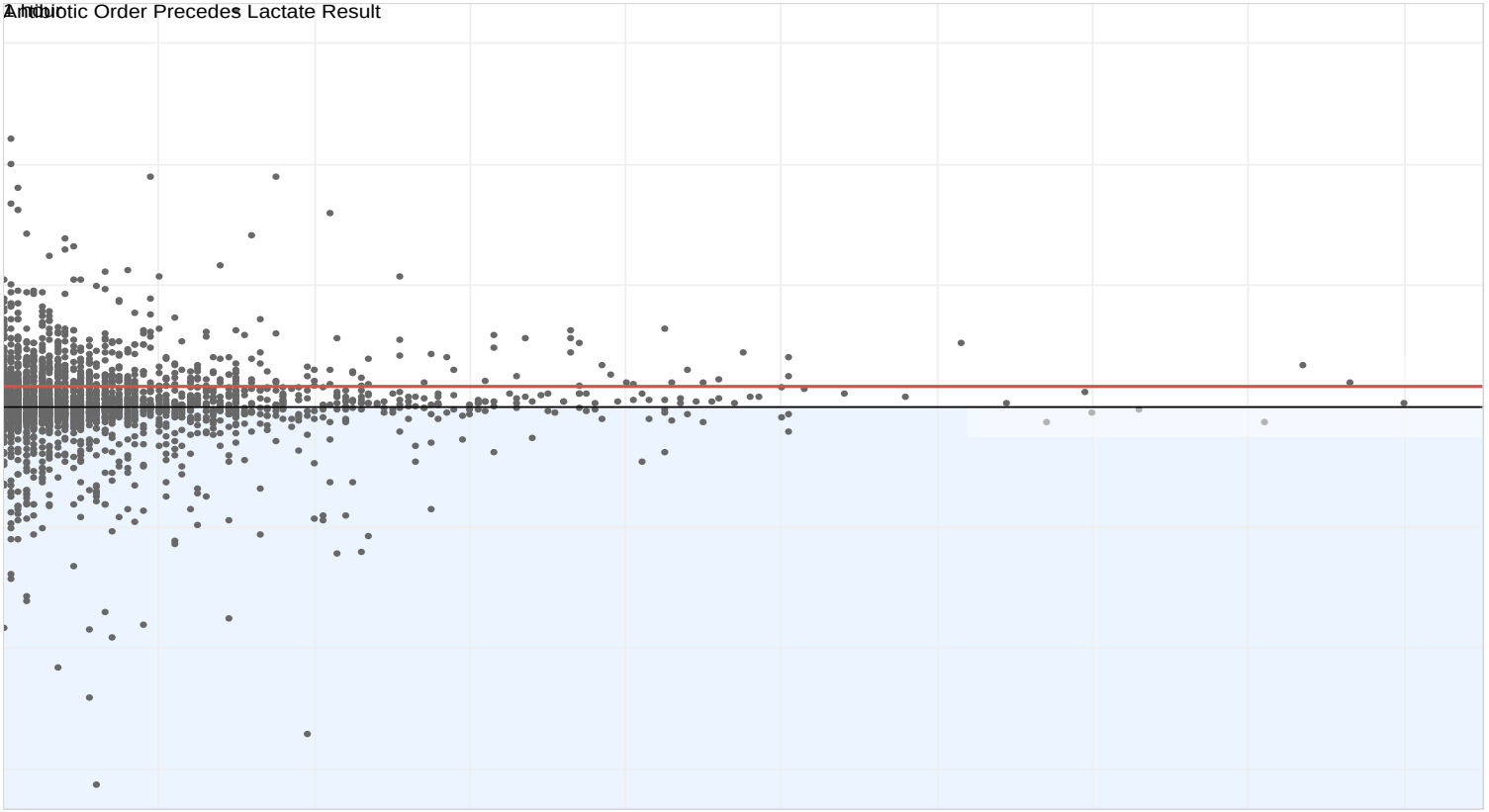


Median Time from Meeting Criteria for Severe Sepsis to Antibiotic Administration



441 patients (20%) with delay >2hrs

Time from Meeting Criteria for Severe Sepsis to First Antibiotics Requested (discrete visits)



Limitations

Limitations

- Our definition of severe sepsis could be called into question
- Unable to differentiate patients with severe sepsis from those with septic shock
- No way of assessing appropriateness of antibiotic therapy
- Did not assess patient outcome or mortality

Conclusions

Conclusions

- ED Physicians demonstrate significant variation in practice of severe sepsis management in the ED
- This variation has the potential to affect patient care
- Time to antibiotics and other markers of quality sepsis care can be defined by administrative data and reported back to physicians

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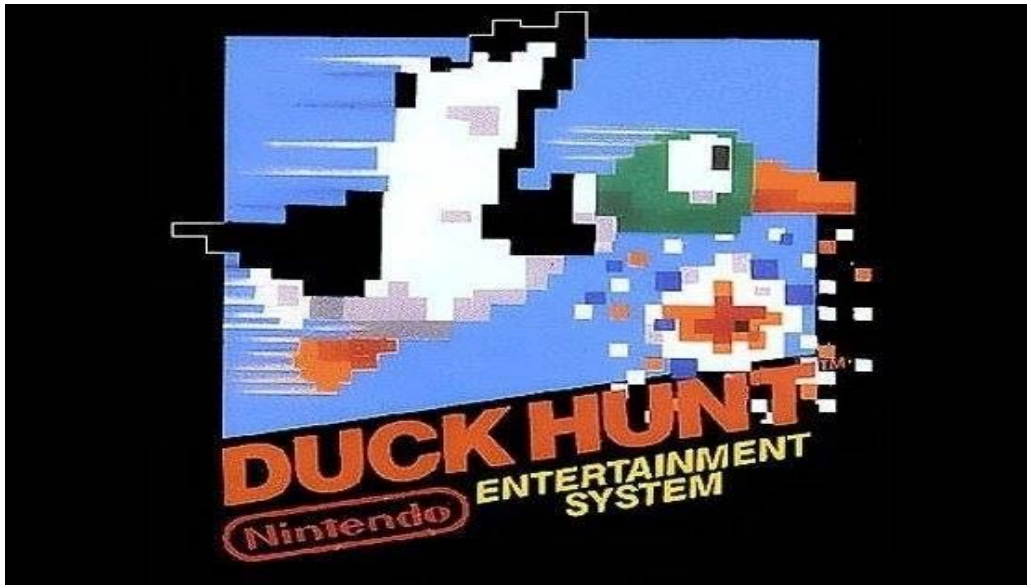
Questions?



FLAMES VS DUCKS

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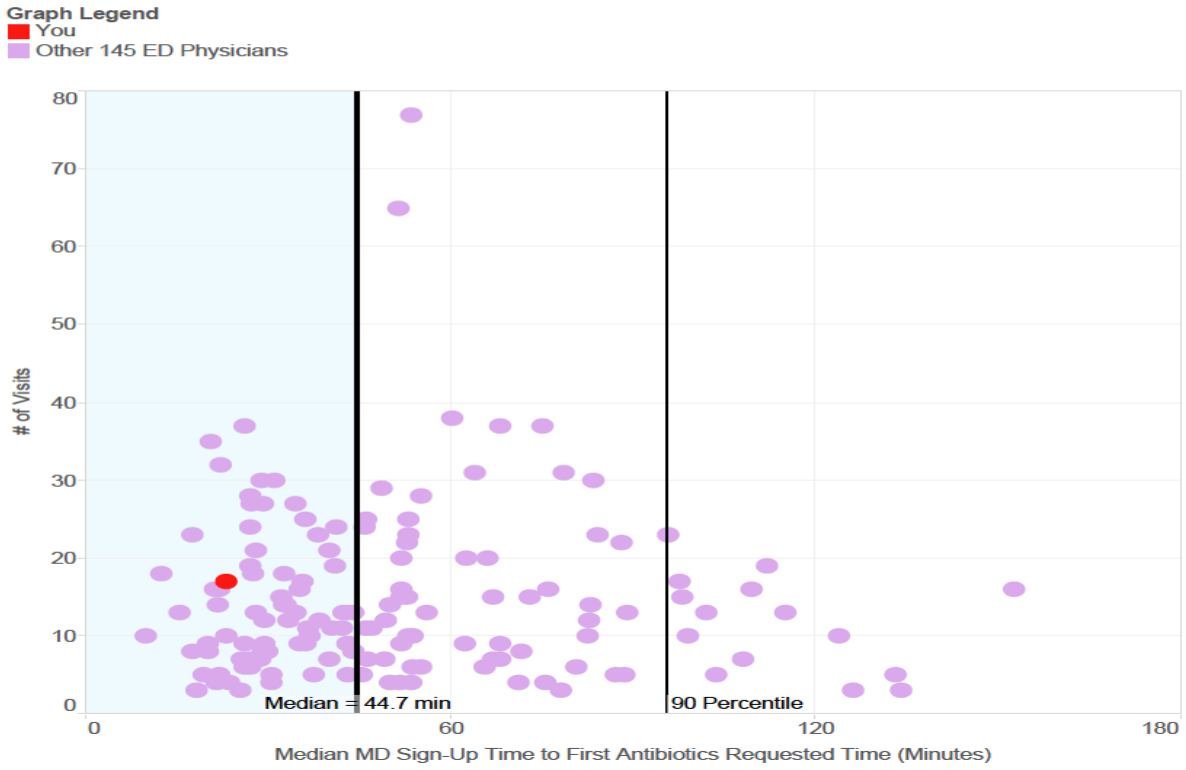
Extra Slides

8.1 Median MD Sign-Up Time to First Antibiotics Requested Time

	Median # of Visits	Median Performance
You	17	23.00 min
Other 145 ED Physicians	13	45.40 min



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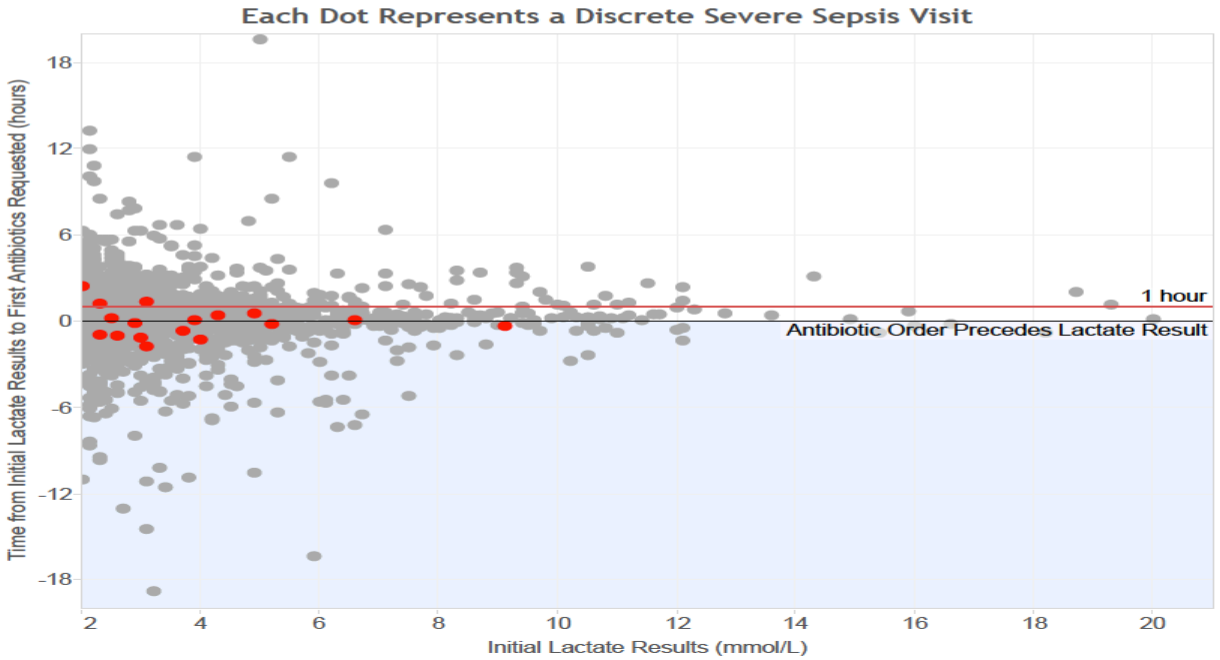
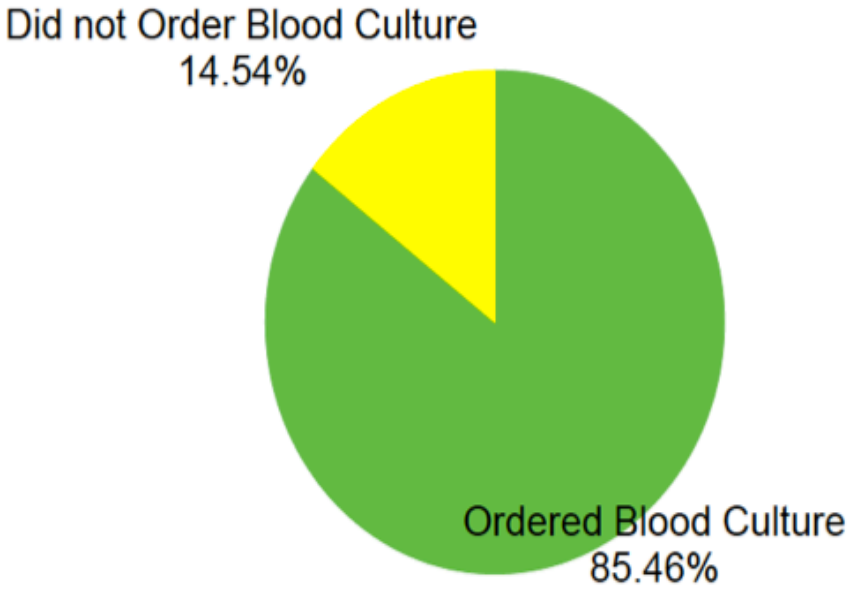
8.3.2 Time from Initial Lactate Result to First Antibiotics Requested by Discrete Visits

	Median # of Visits	Median Performance
You	17	-6.00 min
Other 145 ED Physicians	12	10.69 min

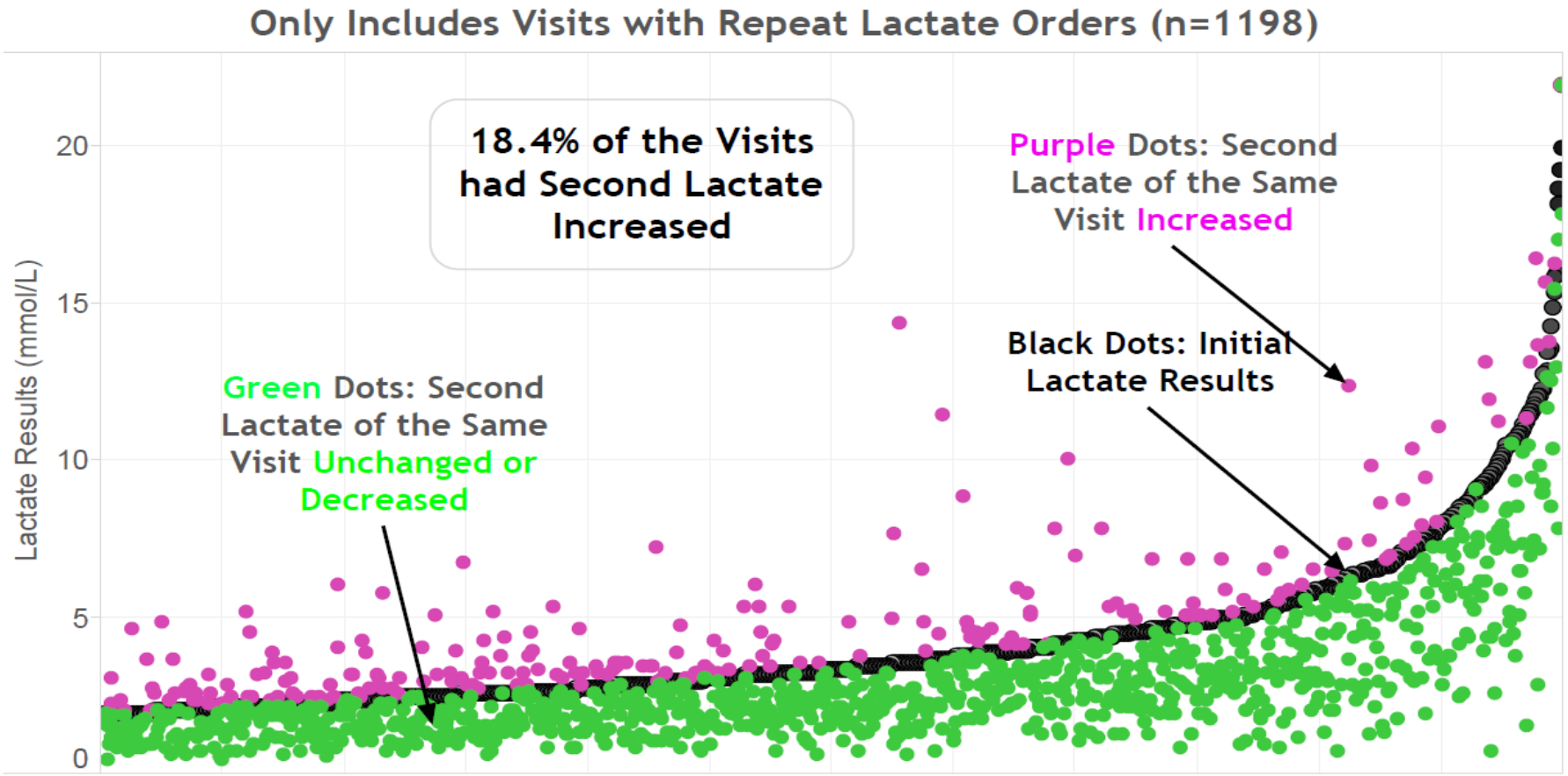
Graph Legend
Your Visits
Visits by Other 145 ED Physicians



Blood Cultures Ordered



Serial Lactate Assessments



Surviving Sepsis Campaign Update 2015

- To be completed within 3hrs of time of presentation
  - Measure serum lactate
  - Obtain blood cultures prior to antibiotics
  - Administer broad spectrum antibiotics
  - Administer 30ml/kg crystalloid for hypotension or lactate ≥4mmol/L
- To be completed within 6hrs of time of presentation
  - Vasopressors for persistent hypotension
  - Re-measure lactate if initial was elevated

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Why Lactate?

SEVERE SEPSIS: SEPSIS-INDUCED TISSUE HYPOPERFUSION OR ORGAN DYSFUNCTION (ANY OF THE FOLLOWING THOUGHT TO BE DUE TO INFECTION)

Sepsis-induced hypotension

Lactate level above upper limits of laboratory normal levels

Urine output <0.5 mL/kg per hour for more than 2 h despite adequate fluid resuscitation

Acute lung injury with PaO_2/FiO_2 <250 in the absence of pneumonia as infection source

Acute lung injury with PaO_2/FiO_2 <200 in the presence of pneumonia as infection source

Creatinine level >2.0 mg/dL

Bilirubin level >2 mg/dL

Platelet count <100,000 μL

Coagulopathy (INR >1.5)

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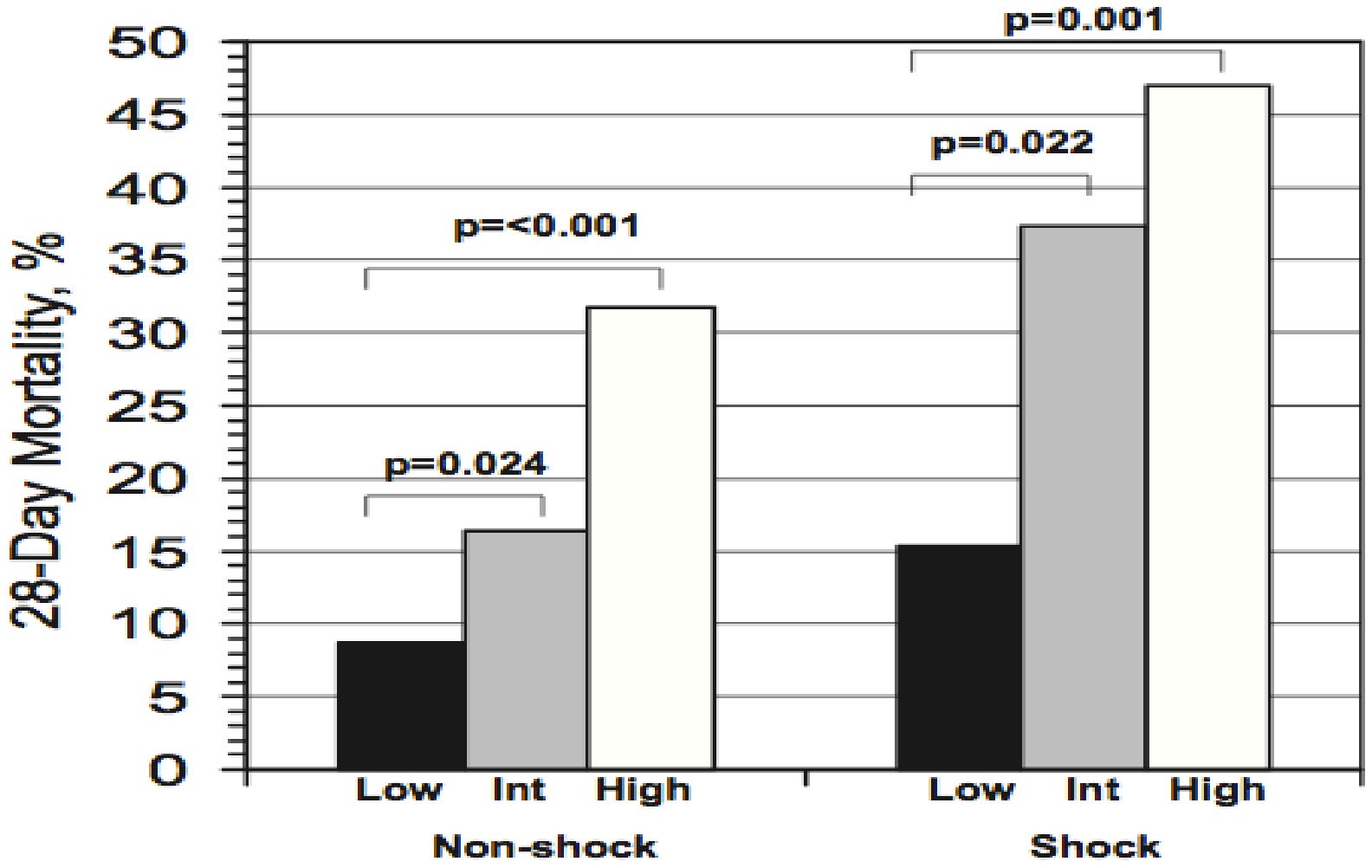
Serum lactate is associated with mortality in severe sepsis independent of organ failure and shock*

Mark E. Mikkelsen, MD, MS; Andrea N. Miltiades, BA; David F. Gaieski, MD; Munish Goyal, MD; Barry D. Fuchs, MD; Chirag V. Shah, MD, MS; Scarlett L. Bellamy, ScD; Jason D. Christie, MD, MS

- Single centre cohort study
- N = 830 adults with severe sepsis in the ED
- Tested for association between initial serum lactate level and mortality
    - Low (<2mmol/L)
    - Intermediate (2-4mmol/L)
    - High (>4mmol/L)

Crit Care Med 2009 Vol. 37, No. 5


28-Day Mortality, %
50
45
40
35
30
25
20
15
10
5
0
p=0.001
p=0.022
p=<0.001
p=0.024
Low
Int
High
Low
Int
High
Non-shock
Shock