Objectives

- Sepsis definitions and epidemiology
- Early Goal Directed Therapy – special considerations for the ESRD patient
- Review sepsis incidence and mortality rates for the ESRD patient population
- Identify sepsis early recognition and prompt interventions
- Discuss sepsis screening tools for outpatient dialysis facilities and lessons learned
- Review HAI/Sepsis data collection, tracking, and reporting
Speakers

Stephen L. Jones, M.D., M.S.H.I.,
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Sepsis: An Equal Opportunity Killer
End Stage Renal Disease Network of Texas
Alliant Quality Kidney Collaborative

Disclaimer

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Objectives

- Outcomes Data HMH 2008 – Q1 2015
- Introduction
- Epidemiology
- Pathophysiology
- Clinical Presentation
- Early Goal Directed Therapy

HMH 2008-2015 Sepsis Mortality – Trend

What Can We do About Sepsis?

“...”

Sydney Harris, ©1970, The American Scientist
What is SERRI?

**Sepsis Early Recognition and Response Initiative**

SERRI is a bedside nurse driven sepsis screening protocol that focuses on:
- vital signs
- white blood cell count
- mental status changes

The values of these parameters are entered into a rigorously validated algorithm that derives a score of the likelihood that a patient has sepsis.

If the score is high enough, it triggers an evaluation by second level responders with advanced training in the recognition of sepsis.

**Spanning the continuum of care**

- **Acute Care**
  - St. Joseph Regional Health Center
  - HCA Bayshore & East Medical
  - HCA Rio Grande Regional/Hospital
  - Houston Methodist Sugar Land Hospital
  - Houston Methodist San Jacinto Hospital
  - Houston Methodist Hospital
  - Houston Methodist Willowbrook Hospital
- **Long Term Acute Care**
  - Kindred Hospital/Medical Center
  - Kindred Hospital/Bay Area
  - Select Specialty Medical Center
  - St. Joseph Manor
  - Burleson St. Joseph Manor
- **Skilled Nursing**
  - Houston Methodist West Hospital
  - Houston Methodist Willowbrook Hospital

Addition sites participating in the Sepsis Screening:
- Houston Methodist Sienna Emergency Center

**Valuation of a Screening Tool for the Early Identification of Sepsis**

Lucas J. Moore, MD, Stephen E. Jones, MD, Louis A. Kuznetz, MD, brass H. Kilby, FNP, Joseph E. Sack, MD, A. Eric Todd, MD, Kevin L. Turner, MD, Aliza Volkin, RN, and Frederick A. Mann, MD

[Graph showing severe sepsis/shock mortality by ICU]
B. Screening for Sepsis and Performance Improvement

1. We recommend routine screening of potentially infected seriously ill patients for severe sepsis to increase the early identification of sepsis and allow implementation of early sepsis therapy (grade 1C).

Rationale. The early identification of sepsis and implementation of early evidence-based therapies has been documented to improve outcomes and decrease sepsis-related mortality (15). Reducing the time to diagnosis of severe sepsis is thought to be a critical component of reducing mortality from sepsis-related multiple organ dysfunction (35). Lack of early recognition is a major obstacle to sepsis bundle initiation. Sepsis screening tools have been developed to monitor ICU patients (37–41), and their implementation has been associated with decreased sepsis-related mortality (15).

SERRI: Sepsis Early Recognition And Response Initiative

Conclusion: This meta-analysis, covering 1001 patients, across 9 studies, found that applying an early quantitative resuscitation strategy to patients with sepsis imparts a significant reduction in mortality.

The effect of a quantitative resuscitation strategy on mortality in patients with sepsis: A meta-analysis

Alan E. Jones, MD, Michael D. Brown, MD, MSc, Stephen Trzcinski, MD, MPH, Nathan I. Shapiro, MD, MPH, John S. Garrett, MD, Alan C. Heffner, MD, and Jeffrey A. Kline, MD [on behalf of on behalf of the Emergency Medicine Shock Research Network investigators]

From the Department of Emergency Medicine (AEJ, JSG, ACH, JAK), Carolinas Medical Center, Charlotte, NC; Grand Rapids MERC/Michigan State University Program in Emergency Medicine (MOB), Grand Rapids, MI; Department of Emergency Medicine (NIS), Beth Israel Deaconess Medical Center, Boston, MA; and Departments of Emergency Medicine and Medicine, Division of Critical Care Medicine (ST), UMDNJ-Robert Wood Johnson Medical School at Camden, Cooper University Hospital, Camden, NJ.

Sepsis: ProCESS Trial

A Randomized Trial of Protocol-Based Care for Early Septic Shock

The ProCESS Investigators

1. This RCT was for patients in early septic shock.

2. Majority of the centers participating in this trial were large academic tertiary care referral centers.

3. This study does not address the extent to which any of these strategies offer advantages where septic shock has not developed.

4. No one can say for sure what care these patients had prior to the recognition of septic shock. This is going to be a huge source of variability.

A 18% aggregate mortality rate.

Conclusions: Protocol-based resuscitation of patients in whom septic shock was diagnosed in the ED did not improve outcomes between the 3 arms of the study. The conclusions found no benefit between the 3 different arms of the RCT for patients already in septic shock when they were identified in the ED.
1. This RCT was for patients in early septic shock.
2. Conducted in 51 tertiary and non-tertiary care metropolitan and rural hospitals (most in Australia or New Zealand, with 6 centers in Finland, Hong Kong and Ireland).
3. Study centers did not have sepsis resuscitation protocols in place at time of site selection.
4. Eligibility criteria included refractory hypotension (sBP < 90, MAP < 65 after 1L bolus).

5. The initiation of the first dose of antibiotics was mandated before randomization.
6. Primary outcome was death from any cause within 90 days after randomization.

19% aggregate mortality rate.

Conclusion: EGDT vs. “Usual Care” did not reduce 90-day mortality, nor 28-day in-house mortality in patients that presented to the ED in early septic shock.

* Same inclusion criteria as ARIZE.

Randomization occurred *after* 1L fluid bolus and *after* administration of antimicrobial drugs.

Conclusion: On average, EGDT increased costs, and the probability that it was cost effective was below 20%.
ProCESS, ProMISe & ARISE:

- Required monitoring of CVP and ScvO2 via a central venous line as part of EGDT does not confer survival benefit in all patients with septic shock in who have received timely antibiotics and fluid administration compared with controls.

Key Themes:
- Administration of appropriate antibiotics as soon as sepsis is suspected is *critical*
- Initial fluid challenge (30 ML/KG in one hour) is essential.

Sepsis is a BIG PROBLEM

- Sepsis is the leading cause of death in non coronary ICUs
- There were 1.1 million cases of sepsis in 2008 and this number is projected to increase.
- 11th leading cause of death in the United States overall
- Nearly 1 out of every 23 patients in the hospital has septicemia
Sepsis is a BIG PROBLEM

- Sepsis-related hospitalization has more than doubled from 2000 through 2008.

Sepsis is a BIG PROBLEM

- Sepsis was the 6th most common principal reason for hospitalization in the US in 2009.
- Sepsis was the most expensive reason for hospitalization in 2009 - totaling ~ $15.4 billion in aggregate hospital costs.
- Septic patients spent 75% more time in the hospital and were 8 times as likely to die in the hospital as patients with other diagnoses.
- Sepsis associated mortality rate of > 30%.

Sepsis in real life

- Currently, more Americans die from severe sepsis than from breast cancer, lung cancer and stroke combined.
- The number of sepsis associated deaths in the US is comparable to the number of Acute Myocardial Infarction associated deaths in the US.
- Sepsis mortality *has* decreased in the last 6-7 years.
Who gets sepsis?

Sepsis can affect anyone at any age

- Carol Decker, a 32 y/o pregnant mom, survived sepsis secondary to pneumonia. She subsequently lost her sight and is now a triple amputee. It took 12+ days for health professionals to realize she was septic.

- Mariana Bridi da Costa, a 20 y/o Brazilian model, died of sepsis secondary to a UTI. She had undergone amputations of both hands, had part of her stomach and both kidneys removed to stem the disease before she died.

- Jen Lukan, a graduate student, had sepsis due to a viral infection after presenting with flu-like symptoms. She was hospitalized for ~ 5½ months, survived after undergoing 20+ major surgeries, lost all of her fingers & had bilateral BKAs.

- 12 year old boy scrapes his arm playing basketball, ~132 hours later, he dies from septic shock (NYT, June 12, 2012)

- Jen Lukan, a graduate student, had sepsis due to a viral infection after presenting with flu-like symptoms. She was hospitalized for ~ 5½ months, survived after undergoing 20+ major surgeries, lost all of her fingers & had bilateral BKAs.

Epidemiology

- Incidence varies among racial groups, but appears highest among African-American males
- Incidence is greatest during the winter
  - Respiratory source
- Patients over the age of 65 years account for almost 60% of severe sepsis cases
- Severity is increasing
- Urinary tract is the most common source of nosocomial infection
- GI or pulmonary infections have the highest mortality rate
Which patients are at risk?

- A central line / PICC
- A Foley catheter
- A dialysis catheter
- Drains
- Pressure/diabetic ulcers
- Prosthetic devices/implants
- Recent surgeries/procedures
- Dialysis
- Heart valve replacement
- Extended hospitalization
- In/from a nursing home
- Malnourished
- ICU stay
- Chronic diseases
- History of sepsis
- Transplant
- Immunosuppression
- Radiation/chemotherapy

Which patients are at risk?

- Any implant or foreign body
- Any recent procedure (30 days)
- Any comorbidity (e.g. DM, HTN, ESRD)
- Immunocompromised for any reason (e.g. Age, Medications, etc.)

Sepsis in general surgery: a deadly complication

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Risk Factors for Developing Sepsis

- Age 60 years or older
- Need for Emergency Surgery
- Any Other health problems
  - e.g. Diabetes,
  - High blood pressure
ESRD and Sepsis:

There is very little published research focused on septic patients with ESRD!

- Patients with ESRD on HD or PD are at *significantly increased risk* for mortality from sepsis over the general population: 100 – 300X.
  (Sarnak, Jaber 2000)

- Over a 7 year study period, 11.7% of HD patients and 9.4% of PD patients had at least one episode of sepsis.
  (Powe, et. al. 1999)

- ESRD patients are *severely* under-resuscitated. (Dagher, et. al. 2015)

ESRD and Sepsis: The Bugs

- The most common sources of infection:
  - HD Catheters
  - Lower respiratory tract

- The most common bugs:
  - Eschericia coli
  - Staphylococcus coagulase negative

ESRD and Sepsis: The Mechanism of Susceptibility

- Polymorphonuclear (PMNL) cell function in dialysis patients is impaired.
  - Glycolysis in uremic patients is disturbed
  - This disturbance is intensified during dialysis with cuprophan (not observed with non-complement activating dialyzers)
  - Response is especially suppressed towards Staphylococcus Aureus.
  - Uremia impairs the PMNL
  - Dialyzer membrane bio(in)compatibility
  - Uremic anemia