

Urology Case

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- previous L. ureteral stent placement
- Hx of CAD, HTN
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- BP 105/43, P 117, R 22, T 39.1°, SpO₂ 87%
- Exam: left CVA tenderness, BPH



The most appropriate course of treatment for this patient, based on the available data is:

- A. Oral levofloxacin and DC to home
- B. Oral levofloxacin and admission to hospital
- C. IV levofloxacin, hospital admission for observation and 150 mL/hr NS
- D. IV levofloxacin, 2 L bolus of NS, transfer to ICU or to supporting hospital for ICU admission



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Urology Case

- Labs: WBC – 14.7, 33% bands
- Plt – 96,000
- BUN – 47, Cr. – 3.2
- D-dimer – 4.7, fibrinogen – 72, PTT – 39
- Lactate – 2.6
- UA – not available



Severe Sepsis: Why It's Still Important and What Has Changed

Steven Q. Simpson, MD

Professor of Medicine

Division of Pulmonary and Critical Care

University of Kansas



How many people in Kansas develop severe sepsis every year?

- A. 500
- B. 1500
- C. 5000
- D. > 10,000



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- C. 5000
- D. > 10,000

In fact, with compounding, 20,000



Severe Sepsis

- THE major cause of morbidity and mortality worldwide
 - Leading cause of death in noncoronary ICU (US)*
 - 11th leading cause of death overall (US) † §
- More than 750,000 cases of severe sepsis in US annually‡
- In the US, more than 500 patients die of severe sepsis daily‡

*Sands KE et al. *JAMA*. 1997;278:234-40;

§Murphy SL. National Vital Statistics Reports.

‡Angus DC et al. *Crit Care Med*. 2001;29:S109.



How many people in Kansas develop severe sepsis every year?

- A. 500
- B. 1500
- C. 5000
- D. > 10,000



The in-hospital mortality from severe sepsis is 300% higher than from acute MI.

- A. True
- B. False



The in-hospital mortality from severe sepsis is 300% higher than from acute MI.

A. True

B. False

Severe sepsis is fatal 30 – 50% of the time.

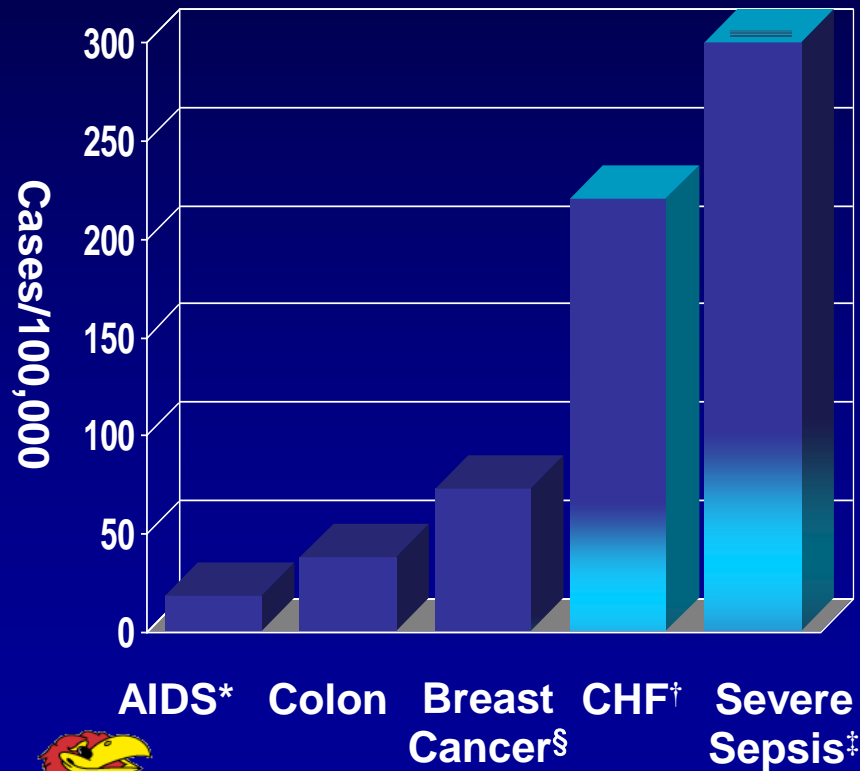
In-hospital mortality from acute MI is 14.5% without thrombolysis, 9% with thrombolysis, and 7.4% with PTCA.



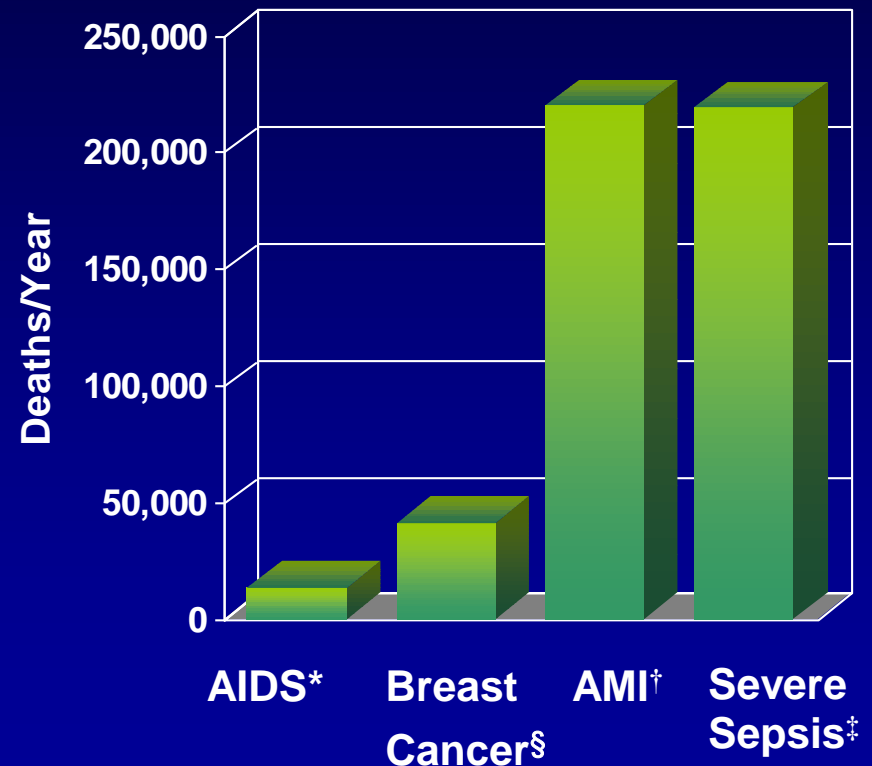
Severe Sepsis

How Common – How Deadly?

Incidence of Severe Sepsis



Mortality of Severe Sepsis



†National Center for Health Statistics, 2001. §American Cancer Society, 2001.

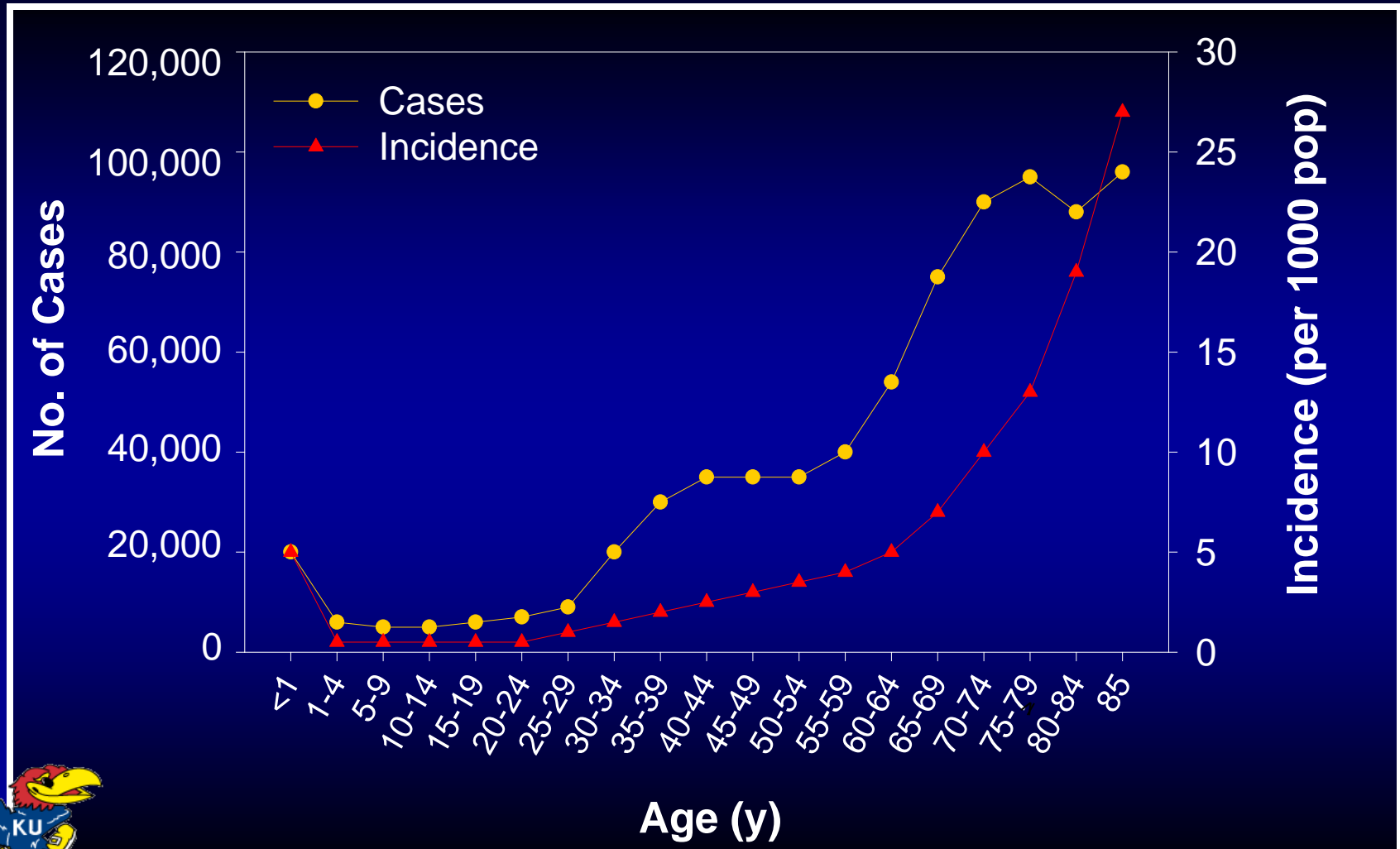
*American Heart Association, 2000. ‡Angus DC et al. *Crit Care Med.* 2001 (In Press).

The segment of the population at greatest risk for severe sepsis is:

- A. Baby boomers
- B. Gen X
- C. Gen Y
- D. Patients on chemotherapy



Age Related Incidence of Severe Sepsis



The segment of the population at greatest risk for severe sepsis is:

- A. Baby boomers
- B. Gen X
- C. Gen Y
- D. Patients on chemotherapy



Sepsis Incidence

A. Hospitalization

135

Compounding Growth
Doubling time = 8.5 years



1979 1981 1983 1985 1987 1989 1991 1993 1995 1997 1999 2001



Martin, G, et al. N Engl J Med 348:1546-54, 2003.

Dombrovskiy V, et al. Critical Care Medicine 35:1244 – 1250, 2007.

Sepsis
≠
Hypotension



Sepsis
≠
Bacteremia



ACCP/SCCM Consensus Definitions

- Infection

- Inflammatory response to microorganisms, or
- Invasion of normally sterile tissues

- Systemic Inflammatory Response Syndrome (SIRS)

- Systemic response to a variety of processes
- ≥ 2 SIRS criteria

- Sepsis

- Infection plus ≥ 2 SIRS criteria

- Severe Sepsis

- Sepsis
- Organ dysfunction

- Septic shock

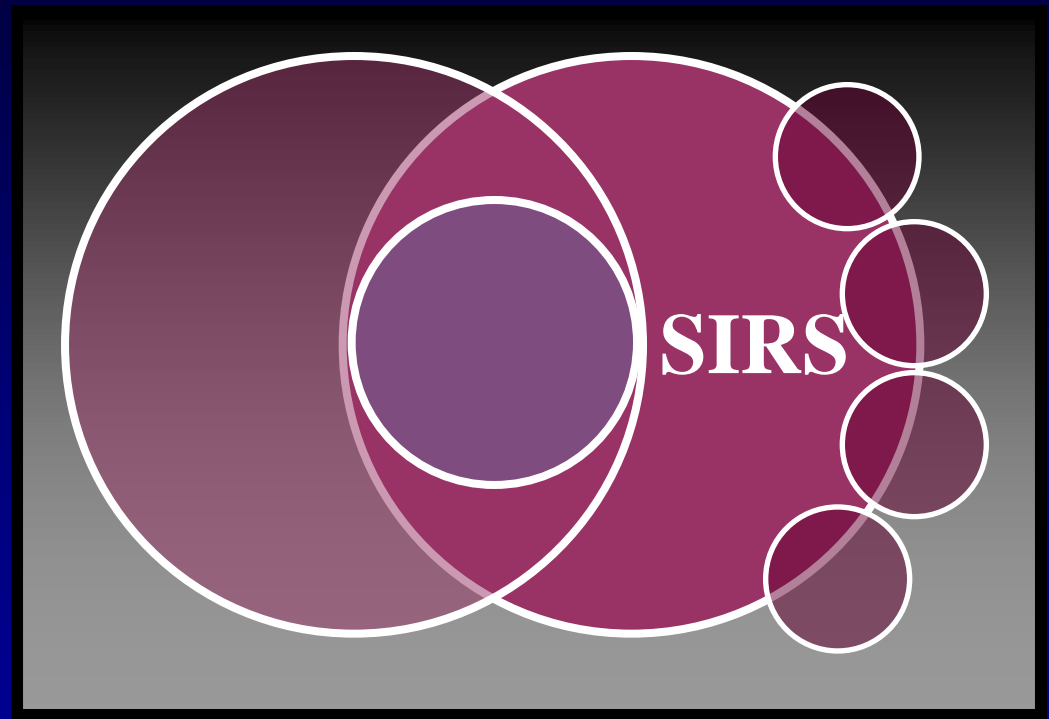
- Sepsis
- Hypotension despite fluid resuscitation



SIRS:

Systemic Inflammatory Response Syndrome

- SIRS: nonspecific insult
≥2 of the following:
 - Temperature
≥38° C or ≤36° C
 - HR ≥90 beats/min
 - Respirations ≥20/min
 - WBC ≥12,000/μL,
≤4,000/μL, or >10%
immature neutrophils



Adapted from: Bone RC et al. *Chest*. 1992;101:1644-55.
Opal SM et al. *Crit Care Med*. 2000;28:S81-2.

Acute Organ Dysfunction as the Hallmark of Severe Sepsis

Altered
Consciousness
Confusion
Psychosis

Tachypnea
 $\text{PaO}_2 < 70 \text{ mm Hg}$
 $\text{SaO}_2 < 90\%$
 $\text{PaO}_2/\text{FiO}_2 \leq 300$

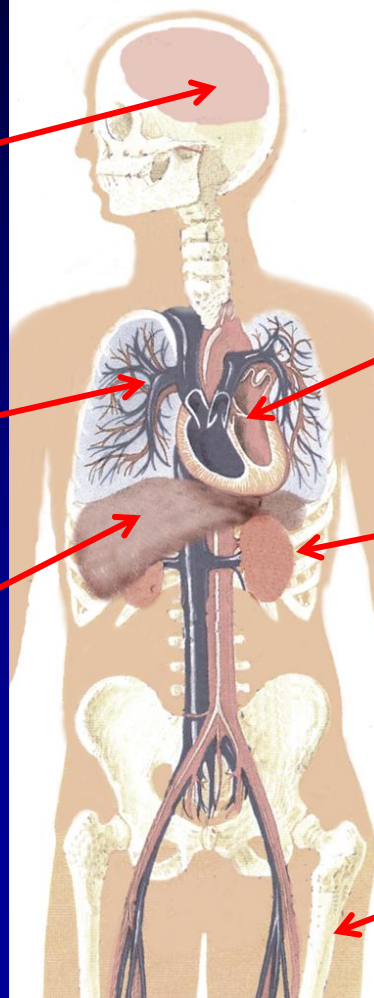
T. Bilirubin
 $> 4 \text{ mg/dL}$

Lactic acidosis

Hypotension
 $\text{SBP} < 90$
 $\text{MAP} < 65$

Oliguria - $< 20 \text{ mL/hr}$
Anuria
 $\uparrow \text{Creatinine}$
 $\uparrow (> 0.5 \text{ mg/dL})$

$\downarrow \text{Platelets} (< 100\text{k})$
 $\downarrow (\text{INR} > 1.5, \text{PTT} > 60 \text{ sec})$
 $\uparrow \text{D-dimer}$



Severe Sepsis: A Diagnostic Challenge

- Timely and accurate diagnosis remains a challenge
 - 17% of physicians agreed on definition of sepsis
 - Occurs throughout the institution
 - Clinical definition not applied at bedside
 - No single test or marker
- Focus is on supporting underlying organ failure



Poeze M, et al. *Crit Care* 2004, R409.

Diagnostic criteria for severe sepsis include:

- A. Positive blood cultures, hypotension
- B. Positive blood cultures, tissue hypoxia
- C. Positive blood cultures, SIRS, and lactic acidosis
- D. Suspected infection, SIRS, and organ dysfunction



Diagnostic criteria for severe sepsis include:

- A. Positive blood cultures, hypotension
- B. Positive blood cultures, tissue hypoxia
- C. Positive blood cultures, SIRS, and lactic acidosis
- D. Suspected infection, SIRS, and organ dysfunction



Sepsis: What Are We Talking About?



Roger C. Bone, MD

- ICD-9: “septicemia”
- Positive blood cultures
- Multiple positive blood cultures
- Positive blood cultures + hypotension
- Syndrome: how shall we define it?



Urology Case

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Surviving Sepsis Campaign (SSC) Guidelines for Management of Severe Sepsis and Septic Shock

Dellinger RP, Carlet JM, Masur H, Gerlach H, Calandra T, Cohen J,
Gea-Banacloche J, Keh D, Marshall JC, Parker MM, Ramsay G,
Zimmerman JL, Vincent JL, Levy MM and the

SSC Management Guidelines Committee

Crit Care Med 2004;32:858-873

Intensive Care Med 2004;30:536-555

Crit Care Med 2013; 41:580-637.

www.survivingsepsis.org



Table 1. Grading system

Grading of recommendations

- A. Supported by at least two level I investigations
- B. Supported by one level I investigation
- C. Supported by level II investigations only
- D. Supported by at least one level III investigation
- E. Supported by level IV or V evidence

Grading of evidence

- I. Large, randomized trials with clear-cut results; low risk of false-positive (alpha) error of false-negative (beta) error
- II. Small, randomized trials with uncertain results; moderate-to-high risk of false-positive (alpha) and/or false-negative (beta) error
- III. Nonrandomized, contemporaneous controls
- IV. Nonrandomized, historical controls and expert opinion
- V. Case series, uncontrolled studies, and expert opinion

Sackett DL. *Chest* 1989; 95:2S–4S

Sprung CL, Bernard GR, Dellinger RP. *Intensive Care Medicine* 2001; 27(Suppl):S1-S2



Time Sensitive Interventions

- AMI – “Door to PCI”
 - Focus on the timely return of blood flow to the affected areas of the heart.
- Stroke – “Time is Brain”
 - The sooner that treatment begins, the better are one’s chances of survival without disability.
- Trauma – “The Golden Hour”
 - Requires immediate response and medical care “on the scene.”
 - Patients typically transferred to a qualified trauma center for care.



Bundles of Care

- Combine multiple elements known to be effective
- Outcome is additive or synergistic
- Framework that leverages change
- Avoids a piecemeal approach



Sepsis Resuscitation Bundle (6 hours):

1. Serum lactate measured.
2. Blood cultures obtained prior to antibiotic administration.
3. broad-spectrum antibiotics: < 1 hour
4. hypotension and/or lactate > 4 mmol/L (36 mg/dl):
 - a) 20 ml/kg of crystalloid (or colloid equivalent).
 - b) Vasopressors to MAP > 65 mm Hg.
5. Septic shock and/or lactate > 4 mmol/L (36 mg/dl):
 - a) insert central line
 - b) central venous pressure (CVP) > 8 mm Hg.
 - c) central venous oxygen saturation (ScvO₂) > 70%.



Sepsis Management Bundle (24 hours)

1. Low-dose steroids administered for septic shock in accordance with a standardized ICU policy.
2. Recombinant Activated Protein C administered in accordance with a standardized ICU policy.
3. Glucose control maintained $>$ lower limit of normal, but $<$ 150 mg/dl (8.3 mmol/L).
4. Inspiratory plateau pressures maintained $<$ 30 cm H₂O for mechanically ventilated patients.



Surviving Sepsis Campaign Bundles

To be completed within 3 hours:

1. Measure serum lactate level
2. Obtain blood cultures prior to administration of antibiotics
3. Administer broad spectrum antibiotics
4. Administer 30 mL/kg crystalloid for hypotension or lactate ≥ 4 mmol/L



Surviving Sepsis Campaign Bundles

To be completed within 6 hours

1. Apply vasopressors (for hypotension that does not respond to initial fluid resuscitation) to maintain a mean arterial pressure (MAP) ≥ 65 mm Hg
2. In the event of persistent arterial hypotension despite volume resuscitation (septic shock) or initial lactate ≥ 4 mmol/L (36 mg/dL)

Measure central venous pressure (CVP)*

Measure central venous oxygen saturation (ScvO₂)*

3. Remeasure lactate if initial lactate was elevated*



*Targets are: CVP 8 mm Hg, ScvO₂ > 70%, lactate normal

In the early resuscitation of the severe sepsis patient, the MOST important feature is:

- A. IV fluid boluses
- B. Antibiotics as fast as they can get in
- C. Measurement of serum lactate
- D. Measurement of ScvO₂ within 6 hours

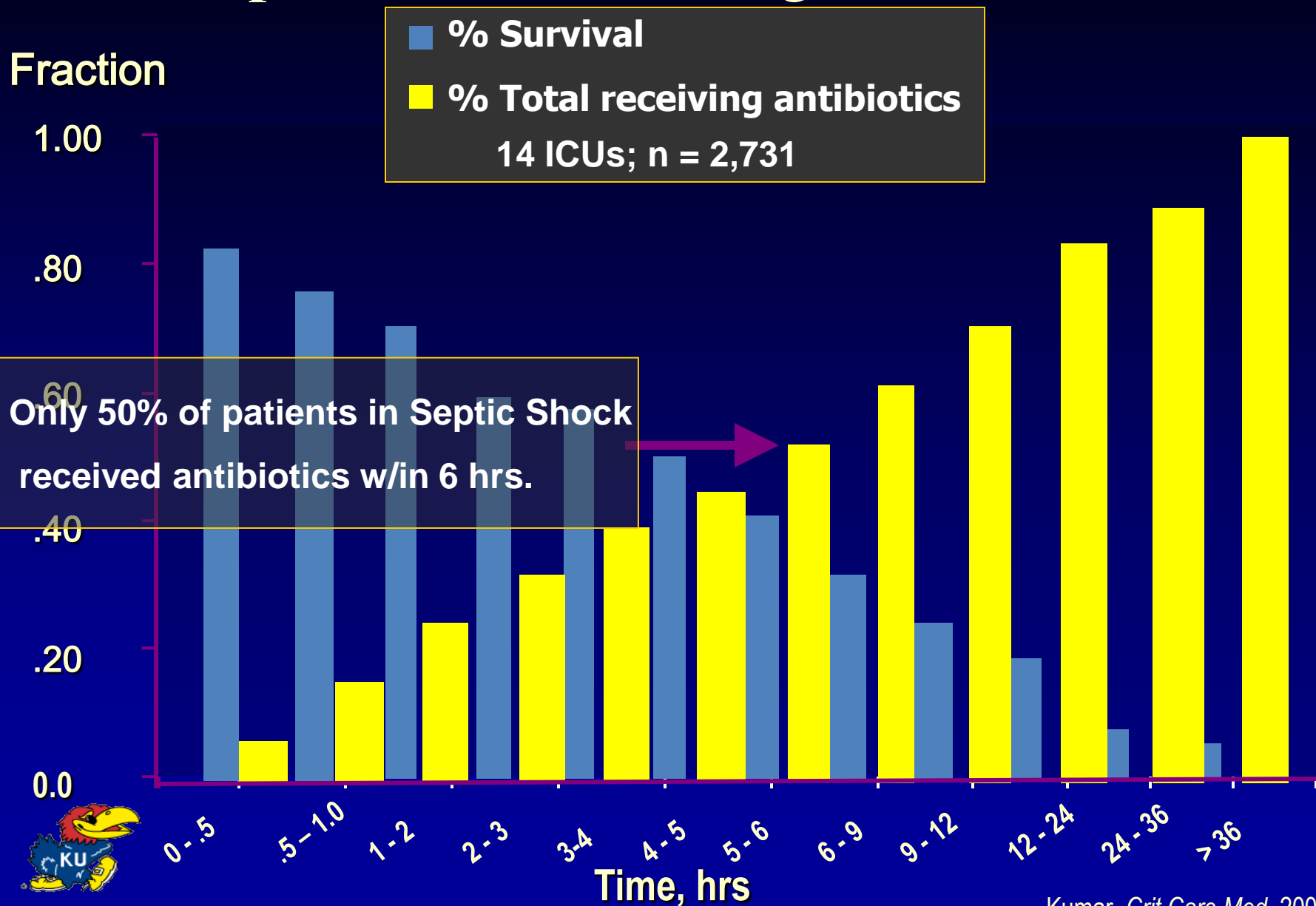


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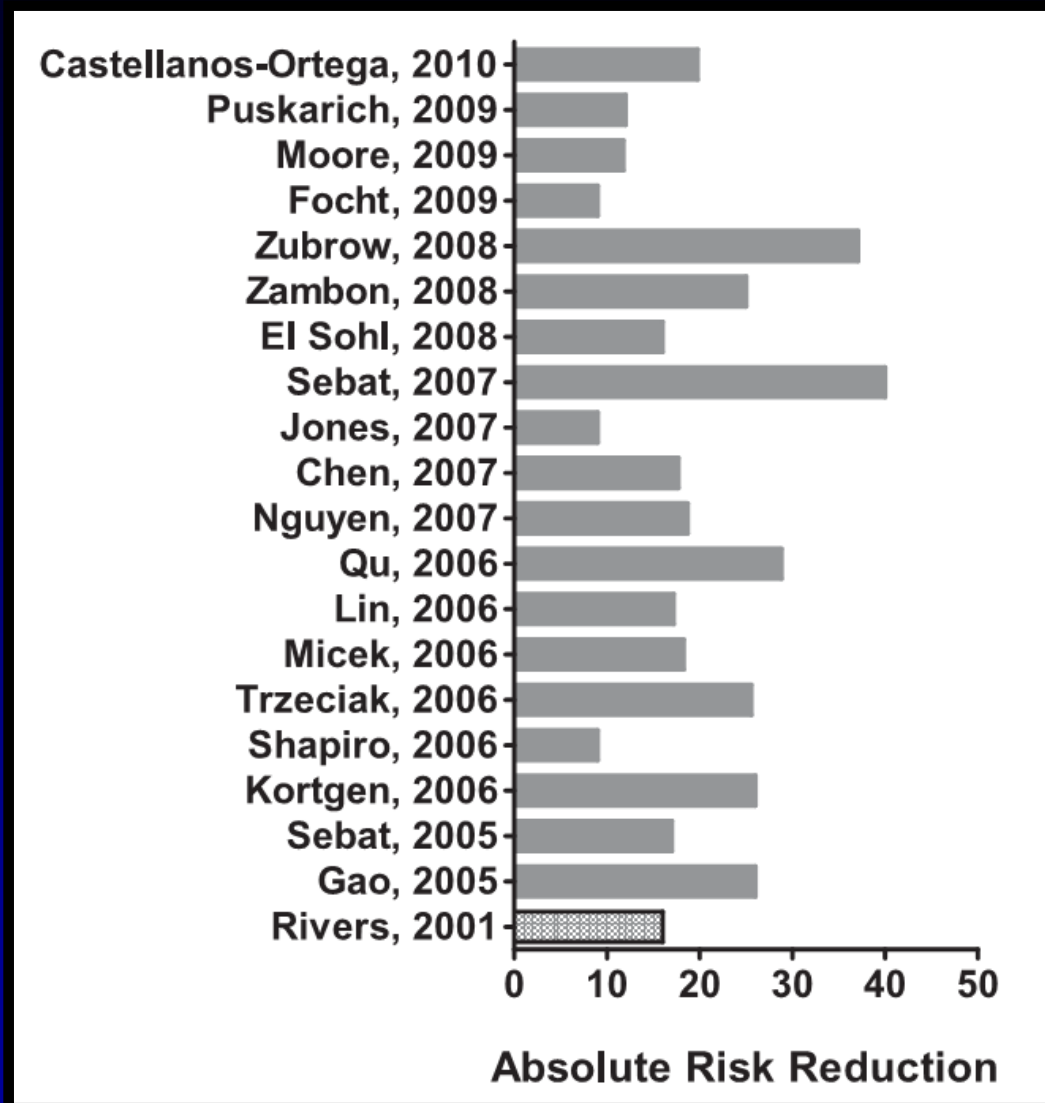
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- B. Antibiotics as fast as they can get in
- C. Measurement of serum lactate
- D. Measurement of ScvO₂ within 6 hours



•Septic Shock: Timing of Antibiotics



Studies Using EGDT and/or Bundled Care to Treat Sepsis



Rivers E. Chest 136:476 – 480, 2010.



An IV fluid bolus consists of:

- A. 250 mL NS over $\frac{1}{2}$ hour
- B. 500 mL NS over an hour
- C. 1 L $\frac{1}{2}$ NS over $\frac{1}{2}$ hour
- D. 1 L NS over $\frac{1}{2}$ hour

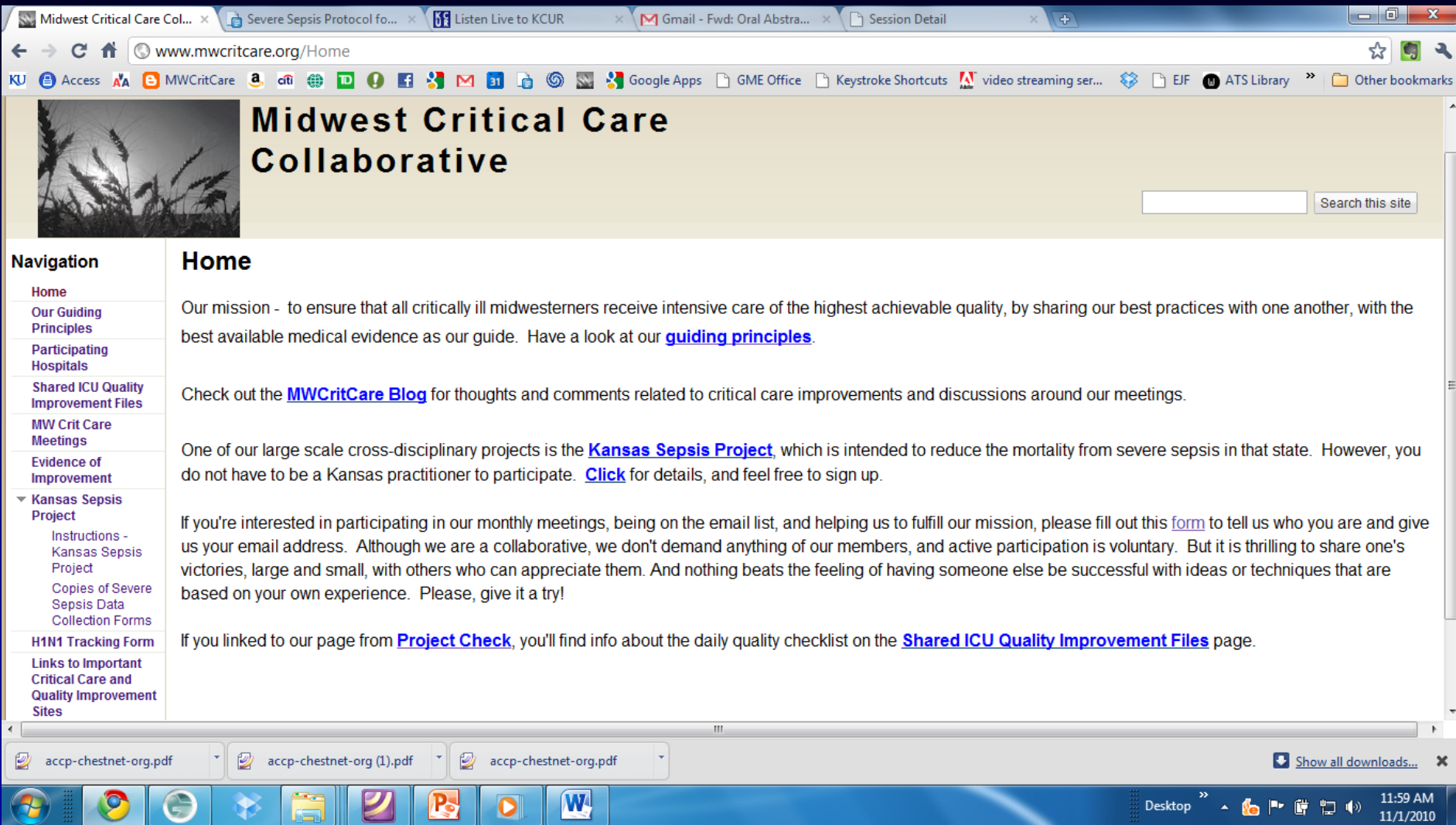


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www.mwcritcare.org



The screenshot shows a web browser window with multiple tabs open. The active tab is 'www.mwcritcare.org/Home'. The browser's address bar shows the URL. The website has a navigation menu on the left and a main content area. The navigation menu includes links to Home, Our Guiding Principles, Participating Hospitals, Shared ICU Quality Improvement Files, MW Crit Care Meetings, Evidence of Improvement, Kansas Sepsis Project (with sub-links for Instructions, Copies of Severe Sepsis Data, and Collection Forms), H1N1 Tracking Form, and Links to Important Critical Care and Quality Improvement Sites. The main content area has a header with the site name and a search bar. Below the header, there is a 'Home' section with a mission statement, a link to the MWCritCare Blog, a description of the Kansas Sepsis Project, and a link to a form for participation. At the bottom, there is a link to the Shared ICU Quality Improvement Files page. The browser's taskbar at the bottom shows several open applications, including a PDF viewer with 'accp-chestnet-org.pdf' and a Windows taskbar with the date and time '11:59 AM 11/1/2010'.

Midwest Critical Care Collaborative

Search this site

Navigation

- Home
- Our Guiding Principles
- Participating Hospitals
- Shared ICU Quality Improvement Files
- MW Crit Care Meetings
- Evidence of Improvement
- ▼ Kansas Sepsis Project
 - Instructions - Kansas Sepsis Project
 - Copies of Severe Sepsis Data
 - Collection Forms
- H1N1 Tracking Form
- Links to Important Critical Care and Quality Improvement Sites

Home

Our mission - to ensure that all critically ill midwesterners receive intensive care of the highest achievable quality, by sharing our best practices with one another, with the best available medical evidence as our guide. Have a look at our [guiding principles](#).

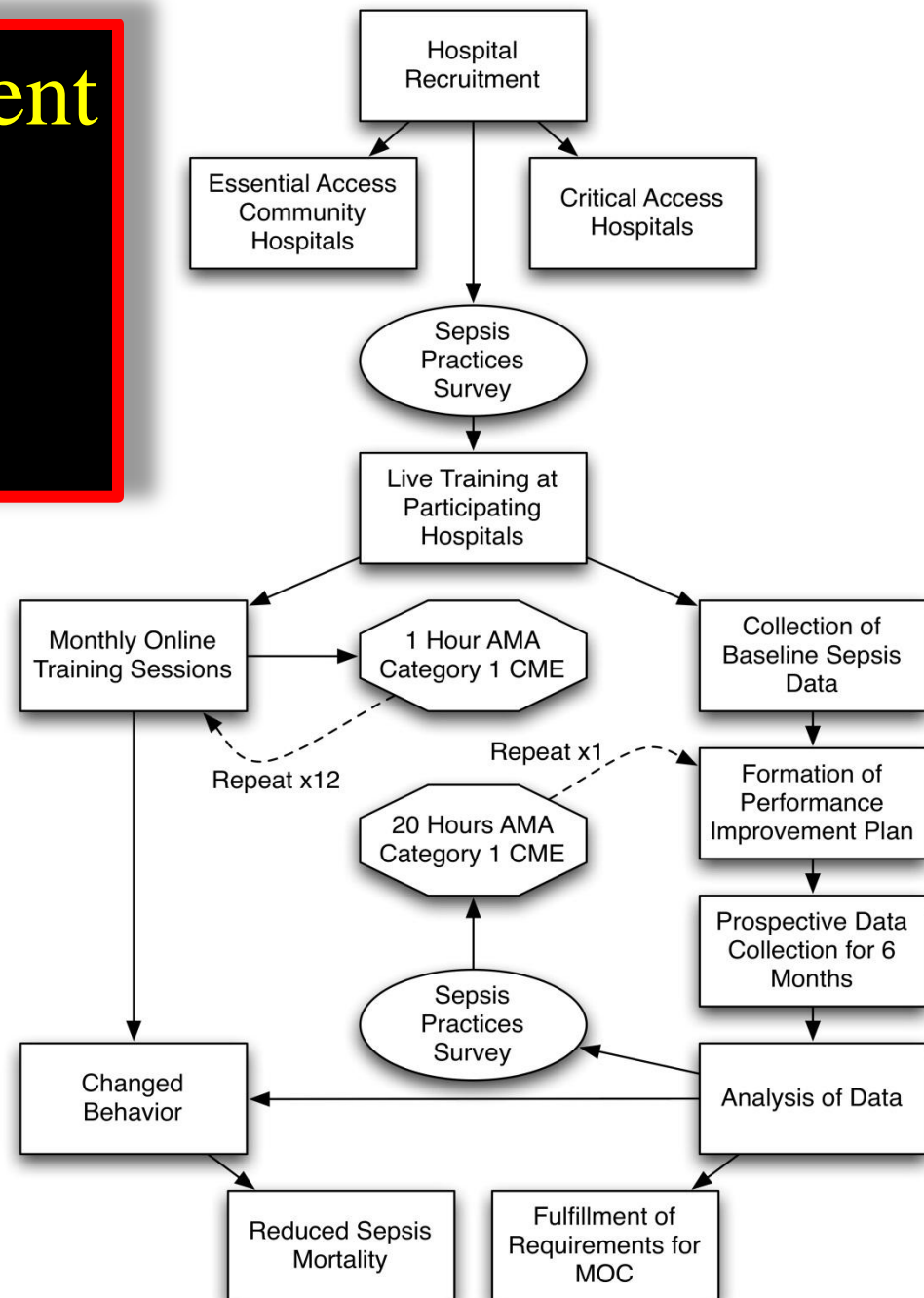
Check out the [MWCritCare Blog](#) for thoughts and comments related to critical care improvements and discussions around our meetings.

One of our large scale cross-disciplinary projects is the [Kansas Sepsis Project](#), which is intended to reduce the mortality from severe sepsis in that state. However, you do not have to be a Kansas practitioner to participate. [Click](#) for details, and feel free to sign up.

If you're interested in participating in our monthly meetings, being on the email list, and helping us to fulfill our mission, please fill out this [form](#) to tell us who you are and give us your email address. Although we are a collaborative, we don't demand anything of our members, and active participation is voluntary. But it is thrilling to share one's victories, large and small, with others who can appreciate them. And nothing beats the feeling of having someone else be successful with ideas or techniques that are based on your own experience. Please, give it a try!

If you linked to our page from [Project Check](#), you'll find info about the daily quality checklist on the [Shared ICU Quality Improvement Files](#) page.

Quality Improvement As a Tool for Continuing Education



RSVP

to Elizabeth Wenske, PhD
ewenske@ku.edu
(o) 913-588-4493
(f) 913-588-4486

Walk-ins welcome



Planning Committee

Simpson, Steven, MD, Course Director, Professor of Medicine, Division of Pulmonary and Critical Care Medicine, University of Kansas, Chair, KUMC Sepsis Team, Kansas City, KS

Pitts, Lucas, MD, Assistant Professor of Medicine, Division of Pulmonary and Critical Care Medicine, University of Kansas Medical Center, Kansas City, KS

Warren, Mary Beth, BSN, MS, Statewide Area Health Education Director, Pittsburg, KS

Radford, Linda, PhD, RN, Senior Research Associate, Landon Center on Aging, University of Kansas Medical Center, Kansas City, KS

Wenske-Mulliner, Elizabeth, PhD, Project Manager, University of Kansas Center Office of Continuing Education, Kansas City, KS

Brul, Jon, MD, Family Medicine, Prairie Star Family Practice, Plainville, KS

Bjornsted, Stephanie, RN, BSN, Quality Coordinator / Risk Manager, Rook Health Center, Plainville, KS

Faculty Involved

Simpson, Steven, MD, Professor of Medicine, Division of Pulmonary and Critical Care Medicine, University of Kansas, Chair, KUMC Sepsis Team, Kansas City, KS

Pitts, Lucas, MD, Assistant Professor of Medicine, Division of Pulmonary and Critical Care Medicine, University of Kansas Medical Center, Kansas City, KS

Brul, Jon, MD, Family Medicine, Prairie Star Family Practice, Plainville, KS

Bjornsted, Stephanie, RN, BSN, Quality Coordinator / Risk Manager, Rook Health Center, Plainville, KS

McNeil, Jennifer, RN, BSN, CCRN, Unit Educator, Medical and Intensive Care, The University of Kansas Hospital

Burns, Katie, MS, PharmD, BCPS, Pharmacy Clinical Manager/Trauma Pharmacist, Stormont-Vail HealthCare, Topeka, KS

SEPSIS FACTS

- 1 Severe sepsis affects more than 10,000 Kansans every year.
- 2 The mortality rate for severe sepsis in most hospitals in Kansas is approximately 50%.
- 3 Severe sepsis kills as many people in Kansas as acute MI.
- 4 With specific plans for recognition and treatment, the mortality rate can be lowered to below 20%.

COURSE OBJECTIVES

PARTICIPANTS WILL:

- 1 Recognize cardinal features of severe sepsis.
- 2 Initiate rapid, organized care for severe sepsis.
- 3 Be able to initiate a performance improvement program.
- 4 Be able to participate in the Kansas Sepsis Project.

WORKSHOP AGENDA

September 10th

CONTINENTAL BREAKFAST



Provided by
University of Kansas CME

7:30 a.m.

WORKSHOP



Lunch Provided

Stopping Sepsis in Kansas:
The Kansas Sepsis Project

8:00 a.m. - 3:00 p.m.

- 1 What is severe sepsis? Why it is missed and how to avoid missing it?
- 2 Aggressive treatment of severe sepsis - heading off septic shock at the pass.
- 3 How one Critical Access Hospital in Kansas is recognizing and treating severe sepsis aggressively and improving the level of care.
- 4 What antibiotics should you use, and why? Hitting hard and backing off.
- 5 Quality improvement: How it applies to medical care. Principles and practices that any provider can use successfully.
- 6 Why interdisciplinary teams are necessary for quality improvement, and how nursing plays an essential role.
- 7 Using the Kansas Sepsis Project to tie it all together.

TARGET AUDIENCE

This workshop is designed for physicians, mid levels, and nurses, particularly those working in hospitals or healthcare facilities.

ACCREDITATION

All participants are required to sign attendance rosters. A certificate of completion will be provided to all activity participants based on documentation of actual attendance time.

Physicians: The University of Kansas Medical Center Office of Continuing Medical Education is accredited by the Accreditation Council for Continuing Medical Education to provide continuing medical education for physicians.

The KU Medical Center Office of Continuing Medical Education designates this live activity for a maximum of 7 AMA PRA Category 1 Credits TM. Physicians should claim only the credit commensurate with the extent of their participation in the activity.

Nurses: The University of Kansas Medical Center Area Health Education Center East, as an approved provider of continuing education by the Kansas State Board of Nursing, presents this offering for a maximum of 7.5 contact hours credit applicable for relicensure of RNs, LPNs and LMHTs. Kansas Provider Number LT0056-0749.

Continuing education credit will be prorated according to documented attendance.

CME and CNE credit will be awarded for attending the workshop. In addition, CME and CNE are available for participation in the Kansas Sepsis PI project.



Kansas Sepsis Project

The Kansas Sepsis Project and its participating physicians seeks to cut the mortality from severe sepsis in the state of Kansas by 10% by the end of 2015. Our mission is to teach physicians, extenders, and nurses in all specialties and in hospitals of every size to recognize severe sepsis, to realize that it is an emergency, and to take rapid, organized steps to treat severe sepsis aggressively and successfully. We also hope to teach all participants skills in performance improvement that can be translated to every aspect of their practices. Physicians, nurse practitioners, physicians assistants, and registered nurses are eligible for continuing education credit by participating in our severe sepsis quality improvement initiatives.

Here are some facts regarding severe sepsis:

- Severe sepsis affects more than 10,000 Kansans every year.
- The mortality rate for severe sepsis in most hospitals in Kansas is approximately 50%.
- Severe sepsis kills as many people in Kansas as acute MI.
- With specific plans for recognition and treatment, the mortality rate can be lowered to below 20%.

If you participate in the Kansas Sepsis Project you will:

- Recognize cardinal features of severe sepsis.
- Initiate rapid, organized care for severe sepsis.
- Evaluate your own data for recognizing and caring for severe sepsis patients.
- Be able to initiate a performance improvement program.
- Improve the outcomes, especially survival, of your patients with severe sepsis.

Kansas Sepsis Project is supported by:

- The Midwest Critical Care Collaborative
- The American College of Chest Physicians
- The One Breath Foundation
- The University of Kansas Department of Continuing Medical Education
- The University of Kansas Hospital
- The Great Plains Geriatric Education Center



Get Started >>

New to the Kansas Sepsis Project?
Register now to receive details on
continuing education credit:

[Register Now](#)

ssimpson3@kumc.edu