Sepsis

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Life-threatening organ dysfunction caused by dysregulated host response to infection

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Septic Shock

Subset of Sepsis in which profound circulatory, cellular, and metabolic abnormalities are associated with a greater risk of mortality than with sepsis alone

Real terms vs billing


SEPSIS IS SERIOUS
THIS MEME IS NOT
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Data & Reports

Each year, at least **1.7** million adults in America develop sepsis.

Nearly **270,000** Americans die as a result of sepsis each year.

1 in **3**

One in three patients who die in a hospital have sepsis.

Question 1

Which of the following is accurate about the etiology and epidemiology of sepsis?

A. In the most common form of MODS, the hematologic, cardiovascular, or renal systems are involved, as opposed to the lungs
B. In most patients with sepsis, the source of the infection is rarely identified
C. Soft tissue and urinary tract infections are the most common causes of sepsis
D. Risk factors for sepsis and septic shock include extremes of age (<10 years, >70 years) and underlying genetic susceptibility

Risk factors for sepsis and septic shock

- Extremes of age (<10 years and >70 years)
- Primary diseases (liver cirrhosis, alcoholism, diabetes, cardiopulmonary diseases, solid malignancy, and hematologic malignancy
- Immunosuppression (neutropenia, immunosuppressive therapy, corticosteroid therapy, injection or intravenous drug use, complement deficiencies, asplenia
- Major surgery, trauma, or burns
- Invasive procedures (placement of catheters, intravascular devices, prosthetic devices, HD and PD dialysis catheters, or endotracheal tubes
- Previous antibiotic treatment
- Prolonged hospitalization
- Underlying genetic susceptibility
- Other factors (childbirth, abortion, and malnutrition)

SOFA score predicts ICU mortality (MD Calc)

Score of 0-4 for each of 6 organ systems assessed

1) Respiratory (PaO2, FiO2, whether on mechanical ventilation including CPAP)
2) Coagulation (platelets)
3) Hepatic (bilirubin)
4) Cardiovascular (MAP or administration of vasopressors required)
5) Central nervous (GCS)
6) Renal (creatinine or urine output)

qSOFA score predicts in-hospital mortality in non-ICU patients with infection (MD Calc)

One point for each of three criteria:

1) RR ≥ 22
2) Altered mentation
3) SBP ≤ 100 mmHg

Score	predicted mortality
0	< 1%
1	2-3%
2	≥ 10%

Management of Sepsis

1) Supporting organ perfusion and function
2) Controlling the infection

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- Fluid resuscitation
- Vasopressors
- Antibiotics and source control

Question 2

A 50 yo diabetic man was brought to the ED by his family after 2 days of fevers and lethargy. He has a chronic foot wound that he's been reluctant to see his doctor about. His right foot now has purulent drainage and he has warmth, redness, and swelling up to the mid-shin. He is obtunded and will only awaken briefly and mumble incomprehensibly to questioning, although he does localize to pain.

Vitals: HR 115, RR 12, BP 89/56, O2 SAT 92% on RA

WBC 17 Plt 130 Cr 1.7 Bilirubin 1.1 Lactic acid 2.5

What scoring system would you use to calculate his mortality risk and what is the score?

Question 2

A. qSOFA with a score of 2
B. qSOFA with a score of 3
C. SOFA with a score of 4
D. SOFA with a score of 9

Question 2

PaO2 - assumed to be in the normal range (90)

FiO2 - 21%

GCS - 10

MAP - 67

SOFA score = 4 (20.2% mortality)

Question 3

What is the most appropriate initial fluid resuscitation in this 83kg man?

A. 1.5L bolus of normal saline
B. 1.5L bolus of 5% albumin
C. 2.5L bolus of normal saline
D. 2.5L bolus of lactated ringer’s

Question 3

Early and aggressive fluid resuscitation begins with an initial bolus of 30mL/kg body weight of normal saline or other balanced crystalloid solution

Antibiotic therapy

Broad-spectrum antibiotics should be given **within the first hour** of suspected sepsis, and the regimen should be adjusted based on culture results

CHEST

ED Door-to-Antibiotic Time and Long-term Mortality in Sepsis

Ithan D. Peltan, MD; Samuel M. Brown, MD; Joseph R. Bledsoe, MD; Jeffrey Sorensen, MStat; Matthew H. Samore, MD; Todd L. Allen, MD; and Catherine L. Hough, MD

BACKGROUND: The impact of antibiotic timing on sepsis outcomes remains controversial due to conflicting results from previous studies.

OBJECTIVES: This study investigated the association of door-to-antibiotic time with long-term mortality in ED patients with sepsis.

METHODS: This retrospective cohort study included nontrauma adult ED patients with clinical sepsis admitted to four hospitals from 2013 to 2017. Only patients' first eligible encounter was included. Multivariable logistic regression was used to measure the adjusted association between door-to-antibiotic time and 1-year mortality. Secondary analyses used alternative antibiotic timing measures (antibiotic initiation within 1 or 3 h and separate comparison of antibiotic exposure at each hour up to hour 6), alternative outcomes (hospital, 30-day, and 90-day mortality), and alternative statistical methods to mitigate indication bias.

RESULTS: Among 10,811 eligible patients, median door-to-antibiotic time was 166 min (interquartile range, 115-230 min), and 1-year mortality was 19%. After adjustment, each additional hour from ED arrival to antibiotic initiation was associated with a 10% (95% CI, 5-

- Retrospective cohort study of 10,8011 ED patients with sepsis
- Initially found that patients with door-to-antibiotic time was < 3Hr had a higher mortality than those with door-to antibiotic time > 3Hr
- When the data was adjusted for severity of illness they found that for each one hour delay in door-to-antibiotic time was associated with a 10% increase in the odds of 1-year mortality
- Similar data for 30 and 90 day mortality but not for hospital mortality
- They recommended a goal of < 1.5H for door-to-antibiotics

“Broad spectrum” antibiotic therapy

amikacin ampicillin-sulbactam aztreonam cefepime cefotaxime ceftaroline fosamil ceftazidime ceftazidime/avibactam ceftriaxone chloramphenicol ciprofloxacin doripenem	ertapenem gentamicin imipenem-cilastin kanamycin levofloxacin meropenem moxifloxacin piperacillin piperacillin-tazobactam tigecycline tobramycin

Procalcitonin

Procalcitonin should only be measured when the probability of infection is low

There is no role for procalcitonin measurement in sepsis likely due to an infection

Controlling the infection

Prompt identification and control of any potential sources of infection is essential

- Drainage of abscesses
- Removal of possibly infected IV’s and urinary catheters

Question 4

2 hours later our patient has received broad-spectrum antibiotics and the initial fluid bolus and his MAP is still 60. He appears clinically about the same. What is the best next step?

A. Start norepinephrine to keep MAP > 65
B. Start methylprednisolone 100mg IV Q8H
C. Start dobutamine to keep MAP > 65
D. Repeat the initial fluid bolus

Vasopressors

Norepinephrine (Levophed) - titrated to keep MAP > 65

Vasopressin - cont dose of 0.03-0.04units/min can be added if norepinephrine is ineffective

Glucocorticoids

Glucocorticoids are suggested of fluid resuscitation and vasopressor therapy are unable to restore hemodynamic stability

Glucocorticoids are not recommended if there is sepsis without shock

Question 5

Pt is now in the ICU on 4mcg/kg/min of norepinephrine and MAP is 65-70. He is starting to wake up and says he feels better but he’s having foot pain. All of the following are important next steps in managing this patient EXCEPT:

A. Follow blood cultures and narrow antibiotics when possible
B. Place a central line
C. Place a surgical consult for possible BKA
D. Monitor lactic acid until improved to normal range

Banner Sepsis Initiative

S.A.F.E. Alert Fires

1) Lactic acid (ordered automatically)
2) Blood cultures
3) Broad spectrum antibiotics

What triggers the SAFE Alert?

2 SIRS + 1 OD = Alert

Within 6 hours

Within 8 hours

Systemic Inflammatory Response Syndrome (SIRS) Criteria
• Respiratory Rate > 20
• Heart Rate > 90
• Core temperature < 36°C or > 38.3°C
• WBC < 4 or > 12 or Bands > 10

Organ Dysfunction (OD) Criteria
• Creatinine > 2.0 and increased from prior result and not on epoetin alfa (home or IP med)
• Bilirubin Total > 2.0 and increased from prior result by .5
• Platelet < 100k and decreased from prior result
• aPTT > 60 and no active order for anticoagulant
• Hypoxemia: O2 Saturation < 90
• Delirium Assessment = Positive
• MAP < 65
• SBP < 90
• Lactic Acid > 2.0
• INR > 1.5
• Urine output < 0.5 mL/kg/hr for 2 or more hours

Surviving Sepsis Campaign

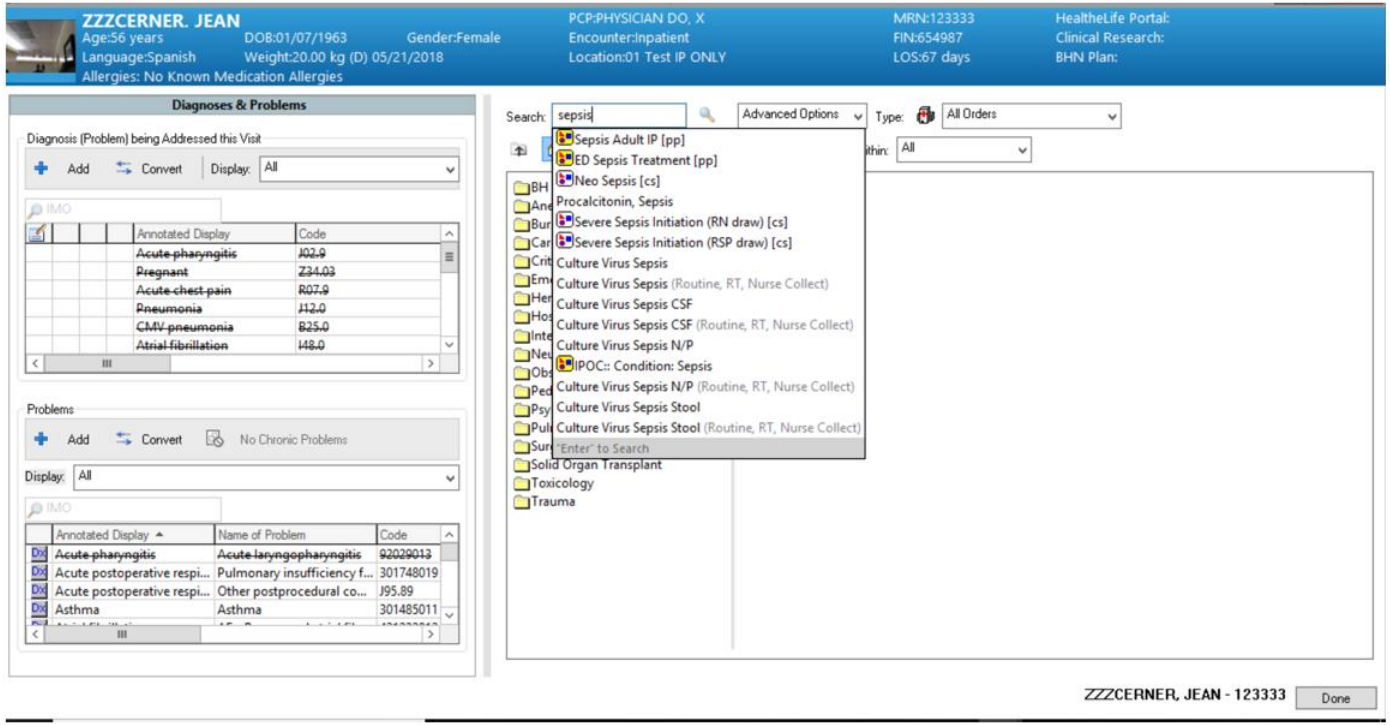
- Treatment focuses on
  - Drawing labs (Blood Cultures and Lactic Acid (LA))
  - Administering Antibiotics
  - Restoring hemodynamic stability (fluids & vasopressors)
- Determine Time Zero
- 3 Hour Bundle
  1. Lactic Acid
  2. Blood Cultures
  3. Antibiotics
  4. IV Fluids- 30 ml/ kg
- 6 Hour Bundle

  Hypotension management

  Repeat Lactic Acid

  Physician Reassessment

I think that my patient is septic…




YOU GET A SEPSIS BUNDLE!
& YOU GET A SEPSIS BUNDLE!!!
YOU'RE ALL GETTING
SEPSIS BUNNNNDLES!!!
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But the S.A.F.E. Alert always fires on patients who aren't septic!

So…Banner just wants me to order antibiotics on everyone?

NO! Use your critical thinking and give antibiotics ONLY when you think the patient might be developing an infection, and quickly (be more decisive)

Data review - lots of patients who fired a SAFE Alert who were not septic, but there were about the same amount of patients who developed sepsis in the next 24-48 hours