SEPSIS

March 12, 2019

Dr. Mark Middlebrooks

Sepsis

“A syndrome of life-threatening organ dysfunction due to a person’s dysregulated response to infection”

Sepsis

“The final common pathway for how infections cause death”

Sepsis

In the USA, there are approximately 1.7 million cases of sepsis each year.

Sepsis

Sepsis contributes to an estimated 265,000 deaths each year.

Sepsis

The definitions of “sepsis” and “septic shock” have undergone evolution over the past 15 years.

Sepsis

No definition provides optimal sensitivity or specificity.

Sepsis

One goal of our current sepsis initiative is to improve the sensitivity and specificity of identification and treatment of septic patients, with measurable improvements in outcomes.

Sepsis

The “CODE R SEPSIS” is one tool that we are using to promptly identify septic patients and begin appropriate treatment.

Sepsis

We are monitoring outcomes closely, and making adjustments within our initiative as needed.

Sepsis

My goal is for us to identify and refine the most effective components of the initiative as we proceed, and to provide the best care for our patients, as evidenced by improved outcomes.

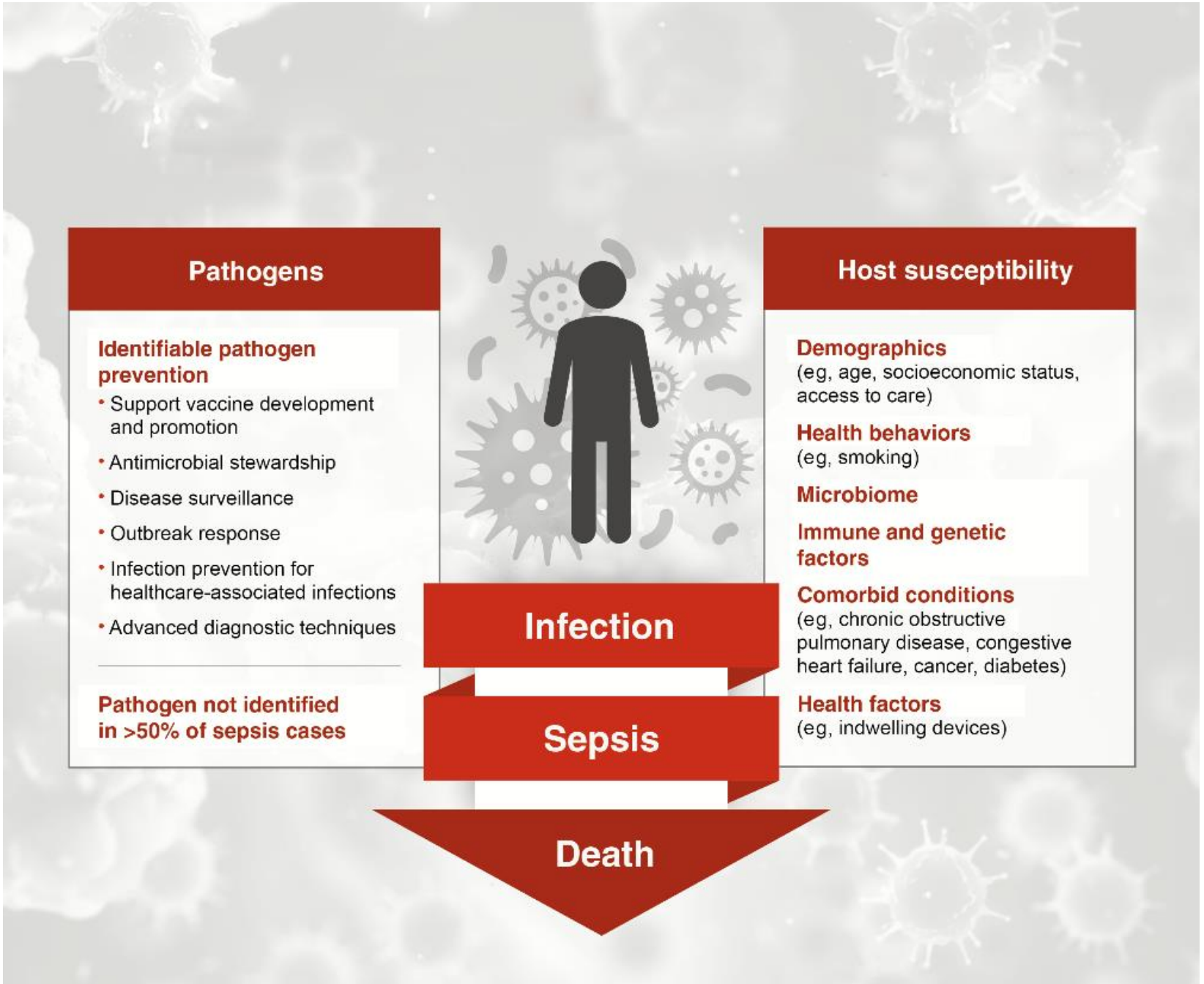
Sepsis

Optimal patient care is our priority, and requires the participation of the entire medical team:

- Quality
- Nursing
- Lab
- Pharmacy
- Medical Staff
- Infection Control Practitioners
- Nutrition Services
- Environmental Services
- Administration

Sepsis

Today’s discussion is an interim update on our sepsis initiative.


Pathogens
Identifiable pathogen prevention
• Support vaccine development and promotion
• Antimicrobial stewardship
• Disease surveillance
• Outbreak response
• Infection prevention for healthcare-associated infections
• Advanced diagnostic techniques
Pathogen not identified in >50% of sepsis cases
Host susceptibility
Demographics
(eg, age, socioeconomic status, access to care)
Health behaviors
(eg, smoking)
Microbiome
Immune and genetic factors
Comorbid conditions
(eg, chronic obstructive pulmonary disease, congestive heart failure, cancer, diabetes)
Health factors
(eg, indwelling devices)
Infection
Sepsis
Death

Sepsis Core Measure

- The Core Measure bundle was introduced by CMS in October 2015.
- The bundle promotes guidelines for early recognition and treatment within the first three and six hours of symptoms.

Sepsis Definitions

- Sepsis – a life threatening organ dysfunction caused by a dysregulated host response to infection.
- Septic Shock – a subset of sepsis in which particularly profound circulatory, cellular, and metabolic abnormalities are associated with a greater risk of mortality than with sepsis alone.
- The terms “severe sepsis,” “sepsis syndrome” and “septicemia” were deemed redundant or overly narrow and are not included in the new definitions.
  However, CMS still utilizes the old terms/definitions of Severe Sepsis.

- In 2016, new sepsis definitions and early warning signs were released by the European Society of Intensive Care Medicine and the Society of Critical Care Medicine in the Third International Consensus Definitions for Sepsis and Septic Shock (Sepsis-3).

Sepsis Definitions

- The inconsistencies between regulating authorities and guidelines are confusing.

- When I see patients in the hospital, I stratify them into “sepsis, ” “severe sepsis,” and “septic shock.”

Severe Sepsis Criteria

- All must be met within a 6 hour window:
  - Documentation of infection or suspected infection by MD/Licensed Independent Practitioner
  - TWO or more SIRS Criteria
  - ONE or more Organ Dysfunction

SIRS CRITERIA

- Temperature > 38.3 C or < 36.0 C (100.9 F or < 96.8 F)
- Heart Rate > 110
- Respiratory Rate > 22 per minute
- WBC > 12,000 or < 4,000

Organ Dysfunction

Cardiovascular:

- Systolic B/P < 90 or MAP < 65

Respiratory:

- Acute Respiratory Failure with NEW need for invasive or non-invasive (BIPAP, CPAP, or intubation) ventilation

Metabolic:

- Lactic Acid > 2.0 mmol/L

Renal:

- Urine output < 0.5 ml/kg/hr for 2 consecutive hours
- Creatinine > 2.0

Hematologic:

- Platelets < 100,000/mm
- INR > 1.5 or aPTT > 60 sec

Hepatic:

- Bilirubin > 2.0 mg/dL

Septic Shock Criteria

- Severe Sepsis Present

  -AND-

- Lactic Acid $\geq$ 4

  -OR-

  Persistent Hypotension after crystalloid fluid administration (30ml/kg)

Severe Sepsis Treatment

3 Hour Bundle

- Lactic Acid level collected
  - **Must be repeated within 6 hours if initial is > 2.0**
- Blood cultures collected
- Broad spectrum antibiotics administered
  - Monotherapy or Combination Therapy. If combination therapy, both antibiotics must be infusing within 3 hours of time zero
- **If initial hypotension present, 30 ml/kg of crystalloid fluid required**
  - Vasopressors (Norepinephrine) If MAP <65mmHg or SBP < 90 mmHg after above fluid administration is complete

Initial Hypotension and Fluids

- CMS defines initial hypotension as two low blood pressure readings (SBP < 90 or MAP < 65) from different measurements either 6 hours prior to or within 6 hours following Severe Sepsis presentation.
- Low blood pressure readings do not have to be consecutive
- **No exceptions for fluid administration per CMS**
- Morbidly obese patients (defined as Body Mass Index >30)
  - Calculate fluids based on IBW.
  - Patient must have diagnosis of morbid obesity.
  - Must document in EMR that fluids are being calculated based on IBW

Septic Shock Treatment

Same treatment as Severe Sepsis initially

must have 30 ml/kg of crystalloid fluid

- 6 Hour Bundle
  - Repeat LA if initial result is > 2.0
  - Repeat Volume Status and Tissue Perfusion Assessment
  - Vasopressors (Norepinephrine) If MAP <65mmHg or SBP < 90 mmHg after fluid administration is complete

Tissue Perfusion Assessment

- **Repeat Volume Status and Tissue Perfusion Assessment** must be completed within 6 hours of crystalloid fluid administration (Time fluids were started)
- This is a focused exam that must include at least **5 of the following**:
  - Arterial oxygen saturation
  - Cardiopulmonary Exam
  - Cap refill
  - Peripheral pulse eval (include location)
  - Skin color or condition
  - Urine output
  - Vital sign review

OR

- Any 1 of the following:
  - CVP measurement
  - ScvO2 measurement
  - Bedside cardiovascular ultrasound
  - Passive leg raises or fluid challenge

Antimicrobial Treatment Options
Urinary Tract Infection/Pyelonephritis

PYELONEPHRITIS/Complicated UTI **Low risk for multi-drug resistant organisms**	**PYELONEPHRITIS/Complicated UTI** **High risk for Multi-drug Resistant organisms, including Pseudomonas aeruginosa,**	**PYELONEPHRITIS/Complicated UTI** **Documented history of urinary infection or colonization WITH Extended Spectrum Beta Lactamase (ESBL) organisms**
Ceftriaxone *For patients with CONFIRMED type-I allergy to cephalosporin antibiotics:* *Ciprofloxacin*	*Cefepime* ******OR****** *Piperacillin/tazobactam* *For patients with CONFIRMED type-I allergy to both penicillin and cephalosporin antibiotics:* *Ciprofloxacin AND Gentamicin* ******OR****** *Ciprofloxacin AND Gentamicin*	*Meropenem* *(IF MEROPENEM IS ORDERED, THE CRITERIA FOR USE FORM MUST SUBMITTED TO PHARMACY)*

Antimicrobial Treatment Options
Community Acquired Pneumonia

Inpatient Non ICU	Inpatient ICU
Ceftriaxone ****THEN**** *Cefuroxime* ***AND*** *Azithromycin* ******OR****** *Ceftriaxone* ****THEN**** *Cefuroxime* ***AND*** *Doxycycline* For patients with CONFIRMED type-I allergy to cephalosporin antibiotics: *Levofloxacin*	*Ceftriaxone* ****AND**** *Azithromycin* For patients with CONFIRMED type-I allergy to cephalosporin antibiotics: *Levofloxacin*

Antimicrobial Treatment Options
HAP/VAP

Antibiotics: Hospital-Acquired Pneumonia (HAP) or Ventilator-Associated Pneumonia (VAP) or Structural Lung Disease
Piperacillin/tazobactam ***OR*** *Cefepime* *For patients with CONFIRMED allergy to both penicillin AND cephalosporin antibiotics:* *Meropenem* ***ADD IF NEEDED*** ***In addition to above, consider the following for MRSA Risk*** *Vancomycin* ***ADD IF NEEDED*** ***In addition to above, consider the following if double gram negative coverage for MDROs necessary*** *Tobramycin*

Antimicrobial Treatment Options

Intra-Abdominal

Mild/Moderate Community Onset	Healthcare associated Severe Sepsis/Septic Shock	Healthcare associated With Surgical Wound Infection
Ceftriaxone ***AND*** *Metronidazole* ***OR*** *Ceftriaxone* For patients with CONFIRMED type-I allergy to cephalosporin antibiotics: *Levofloxacin* ***AND*** *Metronidazole*	*Piperacillin-tazobactam* ***OR*** *Cefepime* ***AND*** *Metronidazole* For patients with CONFIRMED allergy to both penicillin AND cephalosporin antibiotics or CONFIRMED history of ESBL: *Meropenem*	*Piperacillin-tazobactam* ***OR*** *Cefepime* ***AND*** *Metronidazole* For patients with CONFIRMED allergy to both penicillin AND cephalosporin antibiotics or CONFIRMED history of ESBL: *Meropenem* ***ADD IF NEEDED*** *Additional Antibiotics If MRSA suspected add:* *Vancomycin*

Antimicrobial Treatment Options

Skin and Soft Tissue

Non-diabetic	Diabetic Severe Sepsis Septic Shock Necrotizing Infection
High Streptococcal risk, low MRSA risk: *Cefazolin* ******ADD IF NEEDED****** *Additional Antibiotics If MRSA suspected add:* *Vancomycin*	*Piperacillin-tazobactam* ******AND****** *Vancomycin* ******OR****** *Cefepime* ******AND****** *Metronidazole* ******AND****** *Vancomycin* For patients with CONFIRMED allergy to both penicillin AND cephalosporin antibiotics or CONFIRMED history of ESBL: *Meropenem* ******AND****** *Vancomycin*

Antimicrobial Treatment Options
Febrile Neutropenia

Cefepime

******OR******

Piperacillin-tazobactam

For patients with CONFIRMED allergy to both penicillin AND cephalosporin antibiotics:

Meropenem

******ADD IF NEEDED******

Additional Antibiotics for known history of MRSA, infiltrates on CXR or pneumonia symptoms, suspected line infection, skin soft tissue infection, or hemodynamic instability

Vancomycin

Antimicrobial Treatment Options
Important Note

If more than one medication is ordered then appropriate monotherapy options must be started FIRST.

Acceptable monotherapy options (not diagnosis dependent):

- Cefepime
- Ceftazidime
- Ceftriaxone
- Piperacillin/tazobactam

Antimicrobial De-escalation

- Antimicrobial therapy must be reviewed daily for de-escalation or discontinuation.

- Antibiotic “time-out” at 48 or 72 H is being utilized by more and more facilities.

Sepsis Mortality Reduction
and
Increasing Bundle Compliance

Sepsis Mortality Reduction

- FY19 Ascension Goal – Reduce sepsis mortality by 10% = 350 lives saved
- Ascension Alabama health system has the opportunity to save 34 lives if we meet this goal

Sepsis Mortality Reduction

- Ascension Alabama **market** target rate of **1.28**
- **STVE** hospital target of **1.72**
  (End FY18: **1.86**)
- Ascension Alabama **market currently** at **0.995**
- **STVE currently** at **1.17**

Bundle Compliance

- CMS publicly reports Sep – 1 bundle compliance as of July 2018
- STVE ended FY18 with a bundle compliance of 25.64%
- For December 2018, STVE had a bundle compliance of 66.67%

Sepsis Mortality Reduction and Increased Bundle Compliance

- Standardized order sets – Power plans titled ED Sepsis OC and Med Sepsis OC
- Sepsis Education
  - Badge buddies, posters, and mandatory classes for all ED and Inpatient RNs at STVE
- Health system Sepsis Team
- Code R Sepsis

Code R Sepsis

- Code R Sepsis rollout November 14th
- From November 14th to December 14th, 71 patients with a sepsis diagnosis.
- 42 – appropriate bundle components
- 59% pass rate hospital wide

Opportunities for improvement