Antimicrobial Therapy in Sepsis

Siu Yan Amy Yeung, PharmD, BCPS
Critical Care Clinical Specialist
University of Maryland Medical Center

Learning Objectives

• Explain the optimal time for antimicrobial therapy in a patient with sepsis
• Develop an empiric antimicrobial regimen for a patient with sepsis based on patient specific factors
• Modify antimicrobial regimen and duration based on patient clinical course and data

Antimicrobial Therapy in Sepsis

• Recommend that administration of IV antimicrobials be initiated as soon as possible after recognition and within 1 hour for both sepsis and septic shock (Strong recommendation, moderate quality of evidence)
• Recommend empiric broad-spectrum therapy with one or more antimicrobials to cover all likely pathogens (Strong recommendation, moderate quality of evidence)
• Suggest empiric combination therapy (using at least two antibiotics of different antimicrobial classes) aimed at the most likely bacterial pathogen(s) for the initial management of septic shock (Weak recommendation; low quality of evidence)

Rhodes et al. Crit Care Med. 2017; 45:1013

Timing of Antimicrobials in Sepsis


Inappropriate Antimicrobials


Antimicrobial Selection

• What is the source of infection?
• Prevalence of pathogens in hospital or community
• Resistance pattern in hospital or community
• Is patient immunocompromised?
• Is patient at risk of infection with multi-drug resistant (MDR) organisms?
• Is patient at risk for candida infection?
• Drug allergies?
Common infections can lead to sepsis
Among adults with sepsis:
- had a lung infection (e.g., pneumonia)
- had an urinary tract infection (e.g., kidney infection)
- had a type of gut infection
- had a skin infection

Nose, nasopharynx & sinuses:

Mouth & Throat:
- Streptococci, diphtheroids, anaerobes, S. epidermidis, spirochetes

Intra abdominal:
- Enterobacteriaceae (E. coli, Klebsiella), Enterococci, Bacteroides spp., Streptococcus, Candida sp.

Skin flora:
- S. epidermidis, S. aureus, Diphtheroids (Corynebacterium)

Pneumonia:
- Community acquired – S. pneumoniae, H. influenzae, Atypical (M. pneumoniae, C. pneumoniae, Legionella)
- Nosocomial – Pseudomonas, Klebsiella, S. aureus, Acinetobacter

Urinary Tract:
- E. coli, Proteus

Antimicrobial Selection
- Is patient at risk of infection with multi-drug resistant (MDR) organisms?
- Prolonged hospital (5 or more days) or long term care facility stay
- Prior antimicrobial use within 90 days
- Prior infection or colonization with MDR organism
Antifungal Selection

- Is patient at risk for candida infection?
  - Immunocompromised state
  - Prolonged invasive vascular device
  - Total parenteral nutrition
  - Prolonged administration of broad spectrum antibiotics
  - Recent major surgery (especially abdominal surgery)
  - Multisite colonization

Rhodes et al. Crit Care Med. 2017; 45:486–552

Antibiotic Combination Therapy

- Increase spectrum of coverage to increase probability of appropriate initial therapy
- Synergistic effect to increase pathogen clearance
- Reduce risk for emergence of resistance

Vazquez-Grande et al. Semin Respir Crit Care Med. 2015; 36:154–166

Antimicrobial Stewardship

- Recommend that empiric antimicrobial therapy be narrowed once pathogen identification and sensitivities are established and/or adequate clinical improvement is noted (Best Practice Statement)

- Suggest that an antimicrobial treatment duration of 7-10 days is adequate for most serious infections associated with sepsis and septic shock (Weak recommendation; low quality of evidence)

- Recommend daily assessment for de-escalation of antimicrobial therapy in patients with sepsis and septic shock (Best Practice Statement)

Rhodes et al. Crit Care Med. 2017; 45:486–552

Take Home Points

- Initiation of appropriate broad spectrum antimicrobials is crucial in patients with sepsis
- Antimicrobials should be given within 1 hour after recognition of sepsis
- Broad spectrum antimicrobials should cover all potential pathogens
- Consider combination antimicrobials in patients with septic shock
- Antimicrobials should be de-escalated once pathogen is identified, or if patient has adequate clinical response

Rhodes et al. Crit Care Med. 2017; 45:486–552
Interprofessional Education Module to Learn, Teach, and Optimize the Treatment of Sepsis

- Jeffrey P. Gonzales, PharmD
- Nirav G. Shah, MD
- Renee Dixon, MD
- Joan M. Davenport, RN, PhD
- Mojdeh Heavner, PharmD
- Samuel A. Tisherman, MD
- Tracey Wilson, DNP
- Siu Van Amy Yeung, PharmD
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