

 UNIVERSITY of MARYLAND

Antimicrobial Therapy in Sepsis

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

Learning Objectives

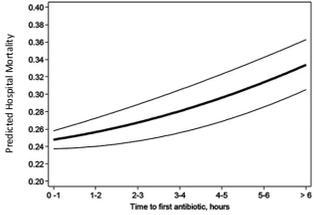
- Explain the optimal time for antimicrobial therapy in a patient with sepsis
- Develop an empiric antimicrobial regimen for a patient with sepsis based on patient specific factors
- Modify antimicrobial regimen and duration based on patient clinical course and data

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; 45:486-502

Timing of Antimicrobials in Sepsis



Ferner et al. Crit Care Med 2014; 42:1749-1755

Inappropriate Antimicrobials

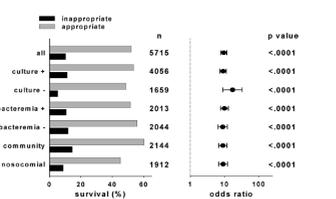


FIGURE 2. Impact of antimicrobial appropriateness on survival in major epidemiologic subgroups. See the legend of Figure 1 for abbreviations not used in the text.
Kumar A, et al. Chest 2009;136:1237-1248.

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?

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. *Oil Care Med* 2017; 45:486-502

Antibiotic Combination Therapy

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

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

Antibiotics - Pneumonia

- Cover Negative Coverage (Single Response)**
- piperacillin-tazobactam (ZOSYN) and ampicillin extended interval (AMRON)
 - piperacillin-tazobactam (ZOSYN) IV
 - ampicillin (AMRON) IV
- For mild penicillin allergy or unknown penicillin allergy history - cefepime (MAXPME) and ampicillin (AMRON) extended interval and cefepime (MAXPME) IV**
- ampicillin (AMRON) IV
 - cefepime (MAXPME) IV
- For SEVERE penicillin allergy ONLY - ciprofloxacin (CIPRO) IV and ampicillin (AMRON) extended interval**
- ciprofloxacin (CIPRO) IV
 - ampicillin (AMRON) IV
- Resistant Gram Positive Coverage (Single Response)**
- vancomycin (VANCOCON) IV loading dose followed by Pharmacist to Dose and Manage - for patients not known to be VRE colonized
 - vancomycin (VANCOCON) IV
 - VANCOMYCIN THERAPY MANAGED BY PHARMACIST
- Resistant Gram Positive Coverage (Single Response)**
- linezolid (ZYVOX) IV - for patients known to be VRE colonized
- For Community Acquired Pneumonia or Legionella risk (Single Response)**
- levofloxacin (LEVAGLIN) IV
 - azithromycin (ZITHROMAX) IV

Antibiotics - Intra-abdominal

- Cover Negative Coverage (Single Response)**
- piperacillin-tazobactam (ZOSYN) and ampicillin extended interval (AMRON)
 - piperacillin-tazobactam (ZOSYN) IV
 - ampicillin (AMRON) IV
- For mild penicillin allergy or unknown allergy history - cefepime (MAXPME) and ampicillin (AMRON) extended interval and meropenem (MERENAZOLE) IV**
- ampicillin (AMRON) IV
 - meropenem (MERENAZOLE) IV
- For SEVERE penicillin allergy ONLY - ciprofloxacin (CIPRO) IV and ampicillin (AMRON) extended interval and meropenem (MERENAZOLE) IV**
- ciprofloxacin (CIPRO) IV
 - ampicillin (AMRON) IV
 - meropenem (MERENAZOLE) IV
- Resistant Gram Positive Coverage (Single Response)**
- vancomycin (VANCOCON) IV loading dose followed by Pharmacist to Dose and Managed by Pharmacist Panel - for patients not known to be VRE colonized
 - vancomycin (VANCOCON) IV
 - VANCOMYCIN THERAPY MANAGED BY PHARMACIST
- Resistant Gram Positive Coverage (Single Response)**
- linezolid (ZYVOX) IV - for patients known to be VRE colonized
- Antifungal**
- Consider fluconazole if recent abdominal surgery, open abdomen, or peritonitis
 - Fluconazole (DIFLUCAN) loading dose followed by maintenance dose
 - Isavuconazole (DIFLUCAN) IV
 - Isavuconazole (DIFLUCAN) IV

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. *Oil Care Med* 2017; 45:486-502

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

**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 Yan Amy Yeung, PharmD
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- Peter P. Olivieri, MD