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MICHIGAN MEDICINE

EMPIRIC ANTIBIOTIC GUIDELINES FOR UNDIFFERENTIATED SEPSIS WITH ORGAN DYSFUNCTION OR SHOCK IN PATIENTS ON PEDIATRIC SERVICES (EXCLUDING NICU)

Clinicians should prescribe antibiotics promptly for patients with septic shock or sepsis-associated organ dysfunction (respiratory failure, hemodynamic instability, or dysfunction of two other organ systems; see pediatric sepsis CPG for full definitions), ideally after obtaining appropriate cultures. This guideline applies to patients with **undifferentiated sepsis** (defined as sepsis in which the site of infection is not yet known) who present with **organ dysfunction or shock**. For patients with sepsis secondary to a known infectious etiology (e.g. pneumonia), condition-specific guidelines should be followed instead. Empiric therapy for Neonatal Intensive Care Unit (NICU) patients, except for febrile young infants admitted from home, should be guided by NICU early/late-onset sepsis pathways.

Setting	Empiric Therapy	Comments
Healthy infant 0 – 60 days, admitted from home within last 72 hrs	See Febrile Young Infant guideline	Follow febrile young infant guideline, even if NICU patient
Patients 61 days or older WITHOUT Increased multi-drug resistant gram-negative (MDR-GN) risk Must meet the following: • Immunocompetent • No at risk[1] implanted or indwelling devices • No more than 72 hours of hospitalization in past 90 days (including current hospitalization)	1st line therapy: **Vancomycin IV*** + **Ceftriaxone** 100 mg/kg IV once, then 50 mg/kg/DOSE IV q12h (max: 2 g/DOSE) ****Ceftriaxone can be used in patients with low-/high-risk[2,3] penicillin allergies or low-risk allergies to cephalosporins with dissimilar side chains (similar side chains: cefepime, cefotaxime, or cefpodoxime)* Low-risk[2] allergy to ceftriaxone or cephalosporin w/similar side chains (see above), high-risk[3] cephalosporin allergy, or contraindication[4] to beta-lactams: **Vancomycin IV*** + **Aztreonam*** 50 mg/kg/DOSE IV q8h (max: 2 g/DOSE) Suspected intra-abdominal or oropharyngeal source: ADD **metronidazole** 30 mg/kg/DOSE IV q24h (max: 1.5 g/DOSE) Concern for toxic shock syndrome: ADD **clindamycin** 13 mg/kg/DOSE IV q8h (max: 900 mg/DOSE)	******Empiric regimen may require adjustment for patients with infection or colonization with multidrug-resistant organisms in past 12 months****** **Order all antibiotics for sepsis STAT** For most patients, if antibiotics cannot be administered simultaneously, the cephalosporin or aztreonam should be given first. However, if there is strong suspicion for *Staphylococcus aureus* as the cause of sepsis, and in particular, methicillin-resistant *S. aureus* (MRSA), administer vancomycin first. Antibiotics should be de-escalated if cultures are negative at 36-48 hours and no bacterial infection is identified, or if results indicate that narrower therapy is sufficient. Consider Infectious Diseases consult, especially if: • significant prior antibiotic exposure • positive blood or CSF cultures • complicated infection (see separate condition-specific guidelines when available) • need for extensive infectious evaluation • unusual exposure history
Patient of any age, excluding those in NICU AND Increased MDR-GN risk: • Immunocompromised • At risk[1] implanted or indwelling device • Greater than 72 hours hospitalization in past 90 days (including current hospitalization)	1st line therapy: **Vancomycin IV*** + **Cefepime** 50 mg/kg/DOSE IV q8h (max: 2 g/DOSE) ****Cefepime can be used in patients with low-/high-risk[2,3] penicillin allergies or low-risk allergies to cephalosporins with dissimilar side chains (similar side chains: ceftriaxone, cefotaxime, or cefpodoxime)* Low-risk[2] allergy to cefepime or cephalosporin w/similar side chains (see above), high-risk[3] cephalosporin allergy, or contraindication[4] to beta-lactams: **Vancomycin IV*** + **Aztreonam*** 50 mg/kg/DOSE IV q8h (max: 2 g/DOSE) *If hemodynamically unstable or immunocompromised:* ADD **tobramycin** 7.5 mg/kg/DOSE IV q24h (max initial: 300 mg/DOSE) Suspected intra-abdominal or oropharyngeal source: ADD **metronidazole** 30 mg/kg/DOSE IV q24h (max: 1.5 g/DOSE) Concern for toxic shock syndrome: ADD **clindamycin** 13 mg/kg/DOSE IV q8h (max: 900 mg/DOSE) ≥1 risk factor for Candida infection (5): ADD **micafungin** 5 mg/kg/DOSE IV q24h (max: 150 mg/DOSE)	

*Renal adjustment may be necessary. See Pediatric Renal Dosing Guidelines.

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Footnotes:

[1] At risk implanted or indwelling devices are those deemed by the clinician to have a high risk of colonization or infection with resistant gram-negative organisms, including but not limited to Pseudomonas aeruginosa (e.g., central venous catheter, tracheostomy, nephrostomy/suprapubic catheter, percutaneous biliary catheter)

[2] Low-risk allergies include: remote (>10 years) unknown reaction, patient denies allergy but is on record, pruritus without rash, urticaria/hives with no other symptoms, or mild to severe rash with no other symptoms (if severe rash, screen for contraindications in footnote 4).

[3] High-risk allergies include: anaphylaxis, respiratory symptoms (chest tightness, bronchospasm, wheezing, cough), angioedema (swelling, throat tightness), or cardiovascular symptoms (hypotension, dizzy/lightheadedness, syncope/passing out, arrhythmia).

[4] Previous reactions that are contraindications to further beta-lactam use (**except aztreonam, which can be used unless the reaction was to ceftazidime, cefiderocol, or aztreonam**) unless approved by Allergy: organ damage (kidney, liver), drug-induced immune-mediated anemia/thrombocytopenia/leukopenia, rash with mucosal lesions (Stevens Johnson Syndrome/Toxic Epidermal Necrosis), rash with pustules (acute generalized exanthematous pustulosis), rash with eosinophils and organ injury (DRESS – drug rash eosinophilia and systemic symptoms), rash with joint pain, fever, and myalgia (Serum Sickness). See β-lactam allergy evaluation and empiric guidance for further information.

[5] Risk factors for Candida infection:

1. Invasive Candida infection in the past 12 months or
2. ICU-level patient with one of the following AND not receiving systemic antifungal prophylaxis:
   a. short bowel syndrome and TPN-dependence
   b. liver transplantation in the past 30 days
   c. prolonged (>7 days) neutropenia due to chemotherapy
   d. immunosuppression for GVHD

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References:

1. Timsit JF, et al. Empirical Micafungin Treatment and Survival Without Invasive Fungal Infection in Adults With ICU-Acquired Sepsis, Candida Colonization, and Multiple Organ Failure. JAMA. 2016 Oct 18;316(15):1555-1564.
2. Schuster MG et al. Empirical fluconazole versus placebo for intensive care unit patients: a randomized trial. Ann Intern Med. 2008 Jul 15;149(2):83-90.

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The recommendations in this guide are meant to serve as treatment guidelines for use at Michigan Medicine facilities. If you are an individual experiencing a medical emergency, call 911immediately. These guidelines should not replace a provider's professional medical advice based on clinical judgment or be used in lieu of an Infectious Diseases consultation when necessary. As a result of ongoing research, practice guidelines may from time to time change. The authors of these guidelines have made all attempts to ensure the accuracy based on current information, however, due to ongoing research, users of these guidelines are strongly encouraged to confirm the information contained within them through an independent source.

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