

Guideline Updates for Common Infections in Neonates and Children

Lisa Lubsch, PharmD, AE-C
Southern Illinois University Edwardsville
School of Pharmacy

The speaker has no conflict to disclose.

Objectives for Pharmacists

- Review the latest recommendations for management of early-onset sepsis in neonates, urinary tract infections (UTIs) in infants and young children, and community-acquired pneumonia (CAP) in infants and children.
- Select appropriate empiric antibiotic therapy for a neonate with sepsis or a child with a UTI or CAP.
- Recommend transition from parenteral to oral antibiotic therapy for a child with a UTI or CAP when appropriate.
- Indicate the appropriate duration of antibiotic therapy for a neonate with sepsis or a child with a UTI or CAP.

Objectives for Technicians

- List the antibiotics used for treating early-onset sepsis in neonates, UTIs in infants and young children, and CAP in infants and children.
- Describe how to calculate the regimen (including dose and frequency) for the recommended parenteral antibiotic prescribed for a neonate with sepsis or a child with a UTI or CAP.

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Guidance for the Clinician in
Sustaining Pediatric Care

CLINICAL REPORT

Management of Neonates With Suspected or Proven
Early-Onset Bacterial Sepsis

Pediatrics 2012;129:1006–15

Question 1

- EW is a 2 day old male with fever and decreased PO intake. What is the most likely pathogen causing fever in EW?
 - A. Group B streptococci (GBS)
 - B. *Escherichia coli*
 - C. *Listeria monocytogenes*
 - D. Herpes simplex virus

Early Onset Sepsis

- Suspected sepsis, septic work-up (SWU), rule-out sepsis
- **Onset \leq 3 days**
- Risk factors
 - Preterm birth / low birth weight
 - Chorioamnionitis (maternal fever / leukocytosis)
 - Premature rupture of membranes (> 18 hours)
 - Maternal colonization with GBS

Early-Onset Sepsis

- Sign and symptoms are nonspecific
- Laboratory data
 - Neutrophil indices are useful, but vary
 - Peripheral blood culture preferred
 - Lumbar puncture may be unnecessary
 - Urine culture is unnecessary
 - Tracheal aspirate culture with ET tube placement may be helpful
 - Others

Early-Onset Sepsis Treatment

- Ampicillin + Aminoglycoside is preferred
 - Cefotaxime is alternative to AMG
 - Avoid Ceftriaxone

Empiric Use of Ampicillin and Cefotaxime, Compared With Ampicillin and Gentamicin, for Neonates at Risk for Sepsis Is Associated With an Increased Risk of Neonatal Death

Reese H, Clark, MD, Barry T, Elson, MD, Alvar K, Spitzer, MD, Cain R, Gennerson, MD

Pediatrics 2006;117:67-74

Question 2

- What is the recommended gentamicin regimen for EW?
 - 5 mg/kg q 36 hours
 - 5 mg/kg q 24 hours
 - 4 mg/kg q 24 hours
 - 2.5 mg/kg q 12 hours

Aminoglycoside Regimen

- **Extended interval** versus traditional dosing
 - Based on gestational age, postnatal age and/or birth weight
- Obtain peak and trough concentrations if treating longer than 48 hours
 - Peak 8 – 12 mcg/ml
 - Trough < 1 mcg/ml

Antibiotic Duration

	Duration
Laboratory data normal	48 hours
Bacteremia without focus	10 days
Meningitis from GBS	≥ 14 days
Meningitis from Gram-negative organisms	≥ 21 days

Question 3

- EW has negative blood and CSF cultures x 48 hours. What is the most appropriate plan for EW's antibiotics?
 - Discontinue Ampicillin and Gentamicin
 - Continue Ampicillin and discontinue Gentamicin
 - Continue Ampicillin and Gentamicin x 10 days
 - Continue Ampicillin and Gentamicin x 14 days

When Is An Antiviral Necessary?

- Herpes simplex virus type 2
- Risk factors
 - Maternal infection, especially during 3rd trimester
- Categorized as skin, eye, mouth (SEM) disease, CNS disease, or disseminated disease
- Acyclovir 20 mg/kg IV q 8 hours, duration depends on diagnosis

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FROM THE AMERICAN ACADEMY OF PEDIATRICS

CLINICAL PRACTICE GUIDELINE
Urinary Tract Infection: Clinical Practice Guideline for the Diagnosis and Management of the Initial UTI in Febrile Infants and Children 2 to 24 Months
Pediatrics 2011;128:595–610

Question 4

- BR is a 18 month old female with fever and decreased PO intake. What is the most common pathogen causing fever in BR?
 - A. Coagulase-negative staphylococci
 - B. *Lactobacillus spp*
 - C. *Enterobacter cloacae*
 - D. *Escherichia coli*

Urinary Tract Infection

- Prevalence of 5%, lower in boys
- Risk Factors

Female	Male*
White race	Nonblack race
< 12 months of age	Temperature ≥ 100.4°F
Temperature ≥ 100.4°F	Fever > 24 hours
Fever ≥ 2 days	Absence of other sources
Absence of other sources	

*Uncircumcised increases rate 4-20 x

Urinary Tract Infection

- Sign and symptoms are nonspecific
- Laboratory data
 - Urinalysis
 - Urine culture with **> 50,000 CFUs / mL** by urethral catheterization or suprapubic aspiration
 - Renal and bladder ultrasonography within 2 days
 - Voiding cystourethrography is unnecessary initially

URINALYSIS	
Color UA	Yellow
Clarity UA	SR cloudy
Specific Gravity UA	<= 1.005
pH UA	5.0
Protein UA	Trace
Blood UA	Trace
Leukocyte UA	2+
Nitrite UA	Negative
Glucose UA	Negative
Ketone UA	Negative
Bil UA	Negative
Urobilinogen UA	0.2
uBil TUB	ND 1.00
RBC UA	0-1
Epithelial Cell UA	2-10
Mucus UA	Trace
Bacteria UA	+

Urinary Tract Infection Management

- PO = IV therapy
- IV therapy x 24-48 hours if
 - Not tolerating oral intake
 - ‘Toxic’ appearance
 - Adherence issues
- Adjust based on culture and sensitivity data
- Duration 7-14 days

Parenteral Treatment	
Ceftriaxone	75 mg/kg q24h
Cefotaxime	50 mg/kg q8h
Gentamicin	2.5 mg/kg q8h

Oral Treatment	
SMX/TMP	3-6 mg/kg BID
Cephalexin	25 mg/kg QID
Cefixime	8 mg/kg daily

Question 5

- BR is on day 2 of cefotaxime with the following urine culture and sensitivity results. What is the preferred therapy for discharge?

CULTURE
 ESCHERICHIA COLI
 >100,000 CFU/mL
 Automated Tryptase results not available
 Call Micro Lab if needed at 636-947-6172
 Amikacin: S <=2
 Amp/Sulbactam: IR=32/16
 Ampicillin: R >=32
 Cefazolin: S <=4
 Cefepime: S <=1
 Ceftriaxone: S <=1
 Ciprofloxacin: S <=0.25
 Gentamicin: S <=1
 Levofloxacin: S <=0.12
 Nitrofurantoin: S <=16
 Tobramycin: S <=1
 Trimeth/Sulf: S <=20

- A. Amox/clav
- B. Cefixime
- C. SMX/TMP
- D. Nitrofurantoin

IDSA GUIDELINES

The Management of Community-Acquired Pneumonia in Infants and Children Older Than 3 Months of Age: Clinical Practice Guidelines by the Pediatric Infectious Diseases Society and the Infectious Diseases Society of America

Clinical Infectious Diseases 2011;53: e25-76

Question 6

- MY is a 6 year-old male with fever and decreased PO intake. What is the most common pathogen causing fever in MY?
- A. *Streptococcus pneumoniae*
 - B. *Haemophilus influenzae*
 - C. *Mycoplasma pneumoniae*
 - D. Influenza virus

Community Acquired Pneumonia

- Simple versus complicated
- Predisposing conditions
 - Bronchopulmonary Dysplasia
 - Gastroesophageal Reflux
 - Aspiration
 - Asthma
 - Sickle Cell
 - Cystic Fibrosis
 - Immunodeficiency
 - Neuromuscular Disease

Community Acquired Pneumonia

- Respiratory distress
- Pulse oximetry measurement < 90% on room air
- Laboratory data
 - Posteroanterior and lateral CXR
 - CBC if severe
 - Acute-phase reactants may be useful
 - Rapid viral testing during seasons
 - M. pneumoniae testing if suspicious
 - Blood culture if moderate to severe or complicated
 - Respiratory culture in sputum producers
 - Tracheal aspirate culture with ET tube placement
 - Urinary antigen testing is not recommended

Community Acquired Pneumonia Treatment

Setting	Recommended Treatment
Outpatient	Amoxicillin 90 mg/kg/day div BID x 10 days ± Azithromycin 10 mg/kg on day 1, then 5 mg/kg daily on days 2-5 ± Oseltamivir
Inpatient-immunized	Ampicillin 200 mg/kg/day div q6h ± Azithromycin 10 mg/kg on days 1 and 2 ± Vancomycin or clindamycin for CA-MRSA ± Oseltamivir
Inpatient- not fully immunized	Ceftriaxone 50-100 mg/kg/day q 12-24h or cefotaxime 150 mg/kg/day div q8h ± Azithromycin 10 mg/kg on days 1 and 2 ± Vancomycin or clindamycin for CA-MRSA ± Oseltamivir

Question 7

- MY's CXR reveals a lobar pneumonia. What is the recommended therapy for MY?
 - A. Ampicillin
 - B. Ampicillin + Azithromycin
 - C. Ceftriaxone + Azithromycin
 - D. Vancomycin

Summary

Infection	Etiology	Treatment
Early onset sepsis	Group B streptococci	ampicillin and gentamicin
Urinary tract infection	<i>Escherichia coli</i>	3 rd generation cephalosporin
Community acquired pneumonia	<i>Streptococcus pneumoniae</i>	ampicillin IV or amoxicillin PO

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