Table of Contents

Acute otitis media ................................................................. 1
Otorrhea .............................................................................. 5
Group A Streptococcal pharyngitis ........................................ 6
Community-acquired pneumonia (uncomplicated) ...................... 7
Acute bacterial rhinosinusitis .................................................. 8
Urinary Tract Infection Diagnosis Algorithm .......................... 10
Urinary Tract Infection Treatment Algorithm .......................... 11
Cystitis/uncomplicated urinary tract infection (UTI) .................... 12
Pyelonephritis & UTI in 2-24 months .................................... 13
Skin and soft tissue infections ............................................... 14
Periorbital cellulitis ................................................................ 17
Animal/ human bites ................................................................ 18
Dental abscess ....................................................................... 18
Acute lymphadenitis ............................................................. 19
Acute bacterial conjunctivitis ................................................. 20
Influenza Treatment .............................................................. 22
Influenza Chemoprophylaxis .................................................. 24
Children’s Mercy Antibiograms ............................................. 25
Dosing of amoxicillin-clavulanate ............................................ 28
Antibiotic Allergies: Beta-lactams Side Chain Chart ................. 29
References ............................................................................ 30
Notes ...................................................................................... 32

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Online version of the handbook is available on the Children’s Mercy Antimicrobial Stewardship website

[QR Code Image]

The most updated Children’s Mercy clinical practice guidelines and care process models may be accessed on the Evidence Based Practice section of childrensmercy.org. The algorithms included in this handbook may not reflect the most recent edits.

[QR Code Image]

The American Academy of Pediatrics’ table listing common pathogens, empiric antibiotic therapy and antibiotic duration for various infections can be accessed in the Redbook.

[QR Code Image]
Acute otitis media (AOM) (AAP guideline 2013)¹
Refer to Children’s Mercy Evidence Based Practice Care Process Model for more information on diagnosis and management.

Exclusion Criteria:
- Less than 60 days of age with fever (Febrile Infant CPG)

Special Considerations:
- Anatomic abnormalities (including cleft palate)
- Genetic conditions with craniofacial abnormalities (such as Down Syndrome)
- Presence of cochlear implants
- Immune deficiencies

Criteria for diagnosis of AOM: Middle ear effusion PLUS one of the following:
- Moderate/severe bulging of TM (image)
- Mild bulging of TM and 48 hours of otalgia
- Mild bulging of TM (image) and intense erythema of the TM
- New onset otorrhea NOT caused by otitis externa

Non-Severe Symptoms:
- Mild otalgia <48 hours AND
- Temperature <39°C (102.2°F)

Severe Symptoms:
- TM perforation
- Moderate/severe otalgia OR
- Otalgia ≥48 hours OR
- Temperature ≥39°C (102.2°F)

Watchful waiting / Safety-Net Antibiotic Prescription (SNAP):
- Joint decision between provider and caregiver
- Emphasize appropriate pain control
- Must have close follow-up (within 48-72 hours) if SNAP not given
- Must be able to fill prescription if signs/symptoms worsen or fail to improve in 48-72 hours

Education Handouts:
- Otorrhea with Tubes
- Otorrhea with Tubes (Spanish)
- Otorrhea without tubes
- Otorrhea without tube (Spanish)
- Watchful Waiting
- Watchful Waiting (Spanish)
- SNAP Flyer for Providers
- SNAP Visual Aid

Abbreviations/Acronyms (lab, radiology excluded):
pt = patient
AOM = Acute Otitis Media
TM = Typanic membrane
Acute otitis media (AOM) (AAP guideline 2013)

Refer to Children’s Mercy Evidence Based Practice Care Process Model for more information on diagnosis and management.
**Acute otitis media (AOM) (AAP guideline 2013)**

Refer to Children’s Mercy Evidence Based Practice Care Process Model for more information on **diagnosis** and **management**.

**Watchful waiting (WW)/ Safety-Net Antibiotic Prescription (SNAP):**
- Joint decision between provider and caregiver
- Must have close follow-up (within 48-72 hours) if SNAP not given
- Must be able to fill antibiotic prescription if signs/symptoms worsen or fail to improve in 48-72 hours from onset of symptoms

**NOTE:** If using WW/SNAP, please place a comment in prescription instructions to “fill only upon patient/family request”

**Antibiotic Recommendations**
- **Duration:**
  - < 2 years OR severe disease = 10 days
  - 2 – 5 years of age = 7 days
  - ≥ 6 years = 5 – 7 days

  **NOTE:** Recent data suggests 5 days of therapy may be sufficient for children ≥ 2 years with AOM of any severity ([Frost et al. J Pediatr. 2020 May; 220:109-115.e1.](https://jamanetwork.com/journals/jpeds/fullarticle/2760713))
• First line:
  o Amoxicillin 40-50 mg/kg/dose PO BID (max 2000 mg/dose)

• Alternative therapies:
  o If received amoxicillin ≤ 30 days prior OR concomitant conjunctivitis:
    ▪ Amoxicillin/clavulanate 40-50 mg/kg/dose (amoxicillin component) PO BID (max 2000 mg amoxicillin/dose)
      **NOTE:** Refer to [amoxicillin/clavulanate dosing table](#) on page 28.

• Mild/moderate penicillin allergy (e.g. rashes including hives):
  o Cefuroxime 250 mg PO BID for children able to swallow pills
    **NOTE:** Only available in tablet form and should not be crushed.
  o Cefdinir 7 mg/kg/dose PO BID (max 300 mg/dose)
  o Cefpodoxime 5 mg/kg/dose PO BID (max 200 mg/dose)
  o Cefprozil 15 mg/kg/dose PO BID (max 500 mg/dose)
  o Ceftriaxone 50 mg/kg IM/IV qDay x 1-3 days (max 1000 mg/dose)
    **NOTE:** Risk of penicillin/cephalosporin cross-reactivity extremely low when no shared side chains ([beta-lactam side chain chart](#) page 29). Consider referral for penicillin allergy testing.

• Severe penicillin allergy (e.g. anaphylaxis):
  o Clindamycin 10 mg/kg/dose PO TID (max 600 mg/dose)

• Failure to improve after 48-72 hours of initial antibiotic therapy:
  o Treatment failure with amoxicillin
    ▪ Amoxicillin/clavulanate 40-50 mg/kg/dose (amoxicillin component) PO BID (max 2000 mg amoxicillin/dose)
      **NOTE:** Refer to [amoxicillin/clavulanate dosing table](#) on page 28
  o Treatment failure with amoxicillin/clavulanate:
    ▪ Ceftriaxone 50 mg/kg/dose (max 1000 mg/dose) IM/IV daily x 3 days
      **OR**
    ▪ Clindamycin 10 mg/kg/dose PO TID (max 600 mg/dose) **PLUS** one of the following:
      • Cefuroxime 250 mg PO BID for children able to swallow pills
      • Cefpodoxime 5 mg/kg/dose PO BID (max 200 mg/dose)
Otorrhea

- AOM with a perforated tympanic membrane (the following could be considered in addition to systemic antibiotic) OR AOM with presence of patent tympanostomy tubes:
  - Ciprodex® (Ciprofloxacin 0.3% - Dexamethasone 0.1%) otic suspension, 4 drops instilled into affected ear twice daily for 7 days for patients >6 months of age
    - NOTE: If Ciprodex® on shortage or cost-prohibitive, may use ciprofloxacin ophthalmic 2 drops +/- dexamethasone ophthalmic 2 drops twice daily for 7 days in patients >6 months of age
  - Ofloxacin otic solution, 5 drops into affected ear twice daily for 10 days for children > 6 months of age

- Otitis externa with intact tympanic membrane
  - May use Ciprodex®, ciprofloxacin ophthalmic/dexamethasone ophthalmic or Ofloxacin as noted above
    - OR
  - Cortisporin® otic (neomycin-polymyxin B-hydrocortisone otic), 3 drops to affected ear 3 times per day for 7 day
Group A streptococcal pharyngitis (IDSA guidelines 2012)²

Refer to Children’s Mercy Evidence Based Practice Clinical Practice guideline for more information on diagnosis and management.

NOTE: Streptococcal pharyngitis is uncommon in children <3 years of age and children of any age with viral symptoms

- Duration: varies based on antibiotic used
- First Line:
  - Amoxicillin 50 mg/kg/dose PO qDay (max 1000 mg/day) x 10 days
  - Penicillin G benzathine IM
    - < 27 kg: 600,000 Units x 1 dose
    - ≥ 27 kg: 1.2 million Units x 1 dose
  - Penicillin VK
    - < 27 kg: 250 mg PO BID – TID x 10 days
    - ≥ 27 kg: 500 mg PO BID – TID x 10 days
- Mild penicillin allergy (e.g. rashes):
  - NOTE: consider referral for penicillin allergy testing
  - Cephalexin 20-25 mg/kg/dose PO BID (max 500 mg/dose) x 10 days
- Severe penicillin allergy (e.g., concern for immediate hypersensitivity reaction such as anaphylaxis):
  - Clindamycin 7 mg/kg/dose PO TID (max 300 mg/dose) x 10 days
  - Azithromycin 12 mg/kg/dose PO qDay (max 500 mg/dose) x 5 days
    - NOTE: Azithromycin is not recommended unless patient has severe allergy to penicillin and cephalosporins. Resistance is well known, and treatment failure may occur
Uncomplicated community-acquired pneumonia
(IDSA guidelines 2011)³

Refer to Children’s Mercy Evidence Based Practice Clinical Practice guideline

- Duration: 5 days
  NOTE: Shorter duration of 3 - 5 days may be sufficient based on recent data for patients > 6 months old (Kuitunen et al. Clin Infect Dis. 2023 Feb 8;76(3):e1123-e1128)

- First line:
  - Amoxicillin 40-50 mg/kg/dose PO BID (max 2000 mg/dose)
    NOTE: Amoxicillin/clavulanate provides no additional coverage for Streptococcus pneumoniae and is not a recommended first line agent
  - Cefuroxime 250 - 500 mg PO BID for children able to swallow pills
  - Cefpodoxime 5 mg/kg/dose PO BID (max 200mg/dose)
  - Cefprozil 15 mg/kg/dose PO BID (max 500mg/dose)
    NOTE: Cefdinir is NOT recommended for empiric treatment of pneumonia because it is less effective against Streptococcus pneumoniae. Clindamycin is preferred over cefdinir if the above antibiotics are not available
  - Clindamycin 10 mg/kg/dose PO TID (max 600mg/dose)

- Mild penicillin allergy (e.g. rashes including hives)
  NOTE: Risk of penicillin/cephalosporin cross-reactivity extremely low when no shared side chains (beta-lactam side chain chart page 29). Consider referral for penicillin allergy testing.
  - Cefuroxime 250 - 500 mg PO BID for children able to swallow pills
  - Cefpodoxime 5 mg/kg/dose PO BID (max 200mg/dose)
  - Cefprozil 15 mg/kg/dose PO BID (max 500mg/dose)

- Severe penicillin allergy (e.g anaphylaxis)/ cephalosporin allergy:
  - Clindamycin 10 mg/kg/dose PO TID (max 600mg/dose)

- Severe penicillin allergy / cephalosporin allergy AND intolerance of clindamycin:
  - Levofloxacin 8-10 mg/kg/dose PO BID (ages 6 months – 5 years) OR qDay (≥ 5 years) (max 750 mg/day)

- Atypical pneumonia (consider in adolescents with bilateral disease):
  - Azithromycin 10 mg/kg/dose PO qDay on day #1 (max 500 mg/dose), 5 mg/kg/dose PO qDay on days #2-5 (max 250 mg/dose)
    NOTE: Resistance to azithromycin is significant among typical bacterial pathogens, especially Streptococcus pneumoniae. For this reason, azithromycin monotherapy for patients with CAP is not routinely recommended.
    NOTE: Levofloxacin and doxycycline are alternatives for atypical coverage and do not require the addition of azithromycin.
Acute bacterial rhinosinusitis (ABRS) (AAP guidelines 2013)\textsuperscript{4}

**Presumptive diagnosis of ABRS:**

1. Persistent illness (i.e. nasal discharge, daytime cough or both lasting >10 days without improvement)  
   OR
2. Worsening course (i.e. worsening or new onset nasal discharge, daytime cough or fever) after initial improvement
   OR
3. Severe onset (i.e. concurrent fever ≥39°C/102.2°F) AND purulent nasal discharge for at least 3 days

**NOTE:** ABRS is uncommon in children < 2 years of age

---

**Diagnosis of acute bacterial rhinosinusitis**

- **If patient is immunocompromised, consult on-call Infectious Diseases**

**Allergy to beta lactams**

- **No**
  - Consider age, severity of symptoms, daycare attendance and recent antibiotic exposure

- **Yes**
  - **Mild/moderate penicillin allergy**
    - Cefpodoxime
    - Cefuroxime
    - Cefixime plus clindamycin
  - **Severe penicillin/cephalosporin allergy**
    - Levofoxacin
  - **Mild-moderate symptoms**  
    - AND
    - Does not attend daycare
    - AND
    - No antibiotic treatment in past 30 days
    - AND
    - ≥ 2 years of age
    - Amoxicillin
  - **Mild-moderate symptoms**  
    - AND
    - Attends daycare
    - OR
    - Received antibiotic treatment in past 30 days
    - OR
    - < 2 years of age
    - Amoxicillin/clavulanate
  - **Severe symptoms**
    - Levofoxacin

---

Outpatient ASP Handbook
Acute bacterial rhinosinusitis (ABRS) (AAP guidelines 2013)\(^4\)

Refer to algorithm on page 8 for more information on diagnosis of ABRS.

- **Treatment**
  - Duration: 5-7 days
  - First line:
    - Mild-moderate disease AND patient ≥ 2 years of age AND does not attend daycare AND has not received antibiotics within the past 30 days
    - Amoxicillin 45-50 mg/kg/dose PO BID (max 2000 mg/dose)
      **NOTE:** In communities with low rates of penicillin non-susceptible *S. pneumoniae*, standard dose amoxicillin may be considered.
    - Severe disease OR mild-moderate disease with ANY of the following: <2 years of age, attends daycare, received antibiotics in the past 30 days
      - Amoxicillin-clavulanate 40-50 mg/kg/dose (amoxicillin component) PO BID (max 2000 mg/dose)
        **NOTE:** Refer to [amoxicillin/clavulanate dosing table](#) on page 28
  - **Mild penicillin allergy (e.g. rashes including hives):**
    **NOTE:** Risk of penicillin/cephalosporin cross-reactivity extremely low when no shared side chains ([beta-lactam side chain chart](#) page 29). Consider referral for penicillin allergy testing.
    - Cefpodoxime 5 mg/kg/dose PO BID (max 200 mg/dose)
    - Cefuroxime 250 mg PO BID for children able to swallow pills
    - Cefixime 4 mg/kg/dose PO BID (max 200 mg/dose) **PLUS**
      - Clindamycin 10 mg/kg/dose PO TID (max 600 mg/dose)
        **NOTE:** Some cephalosporins have limited availability or variable insurance coverage
  - **Severe penicillin allergy (e.g anaphylaxis) or cephalosporin allergy:**
    - Levofloxac 10 mg/kg/dose PO BID (6 months- 5 years) **OR** qDay (>5 years)(max 500 mg/day)
    - Consider consulting Infectious Diseases physician
      **NOTE:** per AAP guideline, even patients with a history of serious type 1 immediate reaction to penicillin may be safely treated with cefuroxime and cefpodoxime given low risk of cross-reactivity
Urinary Tract Infection/Pyelonephritis – Management

Admission Criteria
- Requires IV fluids
- Outpatient follow up cannot be arranged
- Failed out therapy defined by:
  - Persistent clinical symptoms > 48h on appropriate therapy, OR
  - inability to maintain hydration status

RBUS Indications
- < 24 months of age with febrile UTI
- Recurrent (more than 1) febrile UTI
- Male with febrile UTI
- Concern for renal abscess: If no clinical improvement after 48 hours of antibiotic to which the organism is susceptible obtain RBUS within 24 hours
- UTI due to atypical organism (not E.coli, Klebsiella spp., or Enterococcus spp)

Pyelonephritis
- CVA tenderness
- Vomiting
- Fever > 39 C
- If RBUS performed, evidence of pyelo

UTI/Pyelo Management

Exclusion Criteria

Is the pt < 60 days old?
- No
- Yes

Does pt meet admit criteria?
- No
- Yes

Febrile infant:
- < 21 days of age
- > 22 to 28 days of age
- > 29 to 60 days of age

Empirically administer antibiotic
- If history of UTI, empiric therapy should be based on previous microbiology if available
- No minimum IV duration

Evaluate pt for need for RBUS within the next month*

Is pt < 24 months?
- No
- Yes

Does pt have pyelonephritis?
- No
- Yes/Unknown

Evaluate pt for RBUS

Switch to PO antibiotics when pt tolerating PO

Does pt meet discharge criteria?
- No
- Yes

Treat pyelonephritis:
- If susceptibilities are available, review for definitive therapy
- If not available, use empiric cephalaxin with higher dosing
  - NO Kirby Bauer needed
  - IV: Cefazolin (high dose) 100 mg/kg/day divided q8h (max: 6g/day)
  - IM: Ceftriaxone 50 mg/kg/dose IM q24h (max: 2000 mg/dose)
- Cystitis:
  - Oral: Cephalaxin 25 - 50 mg/kg/day divided q8h (max: 500 mg/dose)

Discharge Criteria
- Clinical response to therapy (ie: tolerating PO)
- Modifiable risk factors for UTI (eg: voiding dysfunction) addressed
- Family education provided
- If indicated, RBUS completed or scheduled

Treat cystitis:
- If susceptibilities are available, review for definitive therapy
- If not available, use empiric cephalaxin
- Total PO duration = 3-5 days
  - atypical clinical course
  - non-E. coli UTI
  - abnormal RBUS

Follow-up:
- Call family to review culture results
- Narrow coverage when sensitivities return
- If RBUS is indicated, schedule or communicate need to schedule with PCP
- Follow up with PCP, within 48 hours, if pt not improved

Algorithm:
- Diagnosing UTI/Pyelo
- Renal imaging for UTI/Pyelo

Acronyms:
- CVA: Costovertebral angle
- UTI: Urinary tract infection
- PO: Per oral
- PCP: Primary care physician
- RBUS: Renal Bladder Ultrasound
- UTI: Urinary tract infection

QR Code for mobile access
Cystitis/uncomplicated UTI in children >2 years of age

Refer to Children’s Mercy Evidence Based Practice Clinical Practice guideline for more information on diagnosis and management.

**NOTE:** If history of UTIs, empiric therapy should be based on previous microbiology, if available

- **Duration:** 3 – 5 days
- **First line:**
  - Cephalexin 17 mg/kg/dose PO TID (max 500 mg/dose)
- **Alternative therapies:**
  - Cefixime 8 mg/kg/dose PO qDay (max 400 mg/dose)
- **Severe penicillin allergy (e.g. anaphylaxis) or cephalosporin allergy:**
  - TMP/SMX 3-6 mg/kg/dose (trimethoprim component) PO BID (max 160 mg TMP/dose)
    **NOTE:** At CMH, there are increasing rates of *E coli* resistance to TMP/SMX
  - Nitrofurantoin (treatment duration 5-7 days) – *if cystitis alone*
    - Macrocrystal (Macrobid®) 100 mg PO BID (ADOLESCENTS ONLY)

**NOTE:** Avoid cephalexin in patients with severe penicillin allergy (e.g. anaphylaxis) due to same side chains. Other cephalosporins may be tolerated. Refer to beta-lactam side chain chart page 29. Consider referral for penicillin allergy testing.

**NOTE:** Cefdinir has lower urinary excretion in children than adults, thus recommend not using for pediatric UTIs unless confirmed susceptibilities to oral third generation cephalosporins.
Pyelonephritis (febrile urinary tract infection) in children ≥ 2 months of age (AAP guidelines 2011)\textsuperscript{5}

Refer to Children’s Mercy Evidence Based Practice Clinical Practice guideline

Evaluate need for admission:

General indications for admission include age < 2 months, ill appearance, poor intake, unable to tolerate oral antibiotic, vomiting, immune compromise, urinary tract obstruction and/or culture-positivity for bacteria known to be resistant to oral antibiotics

\textbf{NOTE:} If history of UTIs, empiric therapy should be based on previous microbiology if available

- Duration: 7-10 days
  \textbf{NOTE:} Shorter duration of 5 days may be sufficient based on recent data for patients > 2 months old (Zaoutis et al. JAMA Pediatr. 2023 Aug 1;177(8):782-789.)

- First line: Cephalexin 25-33 mg/kg/dose PO TID (max 1000 mg/dose)

- Alternative therapies:
  - Cefixime 8 mg/kg PO q24h (max 400 mg/dose)

- Severe penicillin allergy (e.g. anaphylaxis) or cephalosporin allergy:
  - TMP/SMX 3-6 mg TMP/kg/dose (trimethoprim component) PO BID (max 160 mg TMP/dose)
    \textbf{NOTE:} At CMH, there are increasing rates of \textit{E coli} resistance to TMP/SMX
  - Ciprofloxacin 10 - 20 mg/kg/dose PO BID (max 750 mg/dose)

\textbf{NOTE:} Avoid cephalexin in patients with severe penicillin allergy (e.g. anaphylaxis) due to same side chains. Other cephalosporins may be tolerated. Refer to beta-lactam side chain chart page 29. Consider referral for penicillin allergy testing.

\textbf{NOTE:} Cefdinir has lower urinary excretion in children than adults, thus recommend not using for pediatric UTIs unless confirmed susceptibilities to oral third generation cephalosporins.
Skin and soft tissue infections (IDSA guidelines 2014)

**Outpatient ASP Handbook**

**Exclusion Criteria:**
- Suspected sepsis
- Animal/human bites
- Post-surgical site
- Suspected toxic mediated reaction
- Concern for deeper infection
- Concern for necrotizing infection
- Immunocompromised

**Inpatient Criteria:**
- Altered mental status
- Worsening despite 48 hours of appropriate oral antibiotics
- Unable to tolerate oral antibiotics
- Suspected Systemic Inflammatory Response Syndrome

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**Patient >60 day old with suspected skin and soft tissue infection**

**History and Physical:**
- Labs typically **NOT** needed (CBC and inflammatory markers)
- Blood culture typically **NOT** needed
- Consider wound culture if there is purulent drainage
- Consider ultrasound if need to determine abscess size

**Does patient meet inpatient criteria?**
- Yes → **Inpatient Algorithm**
- No

**Paronychia (Images)**
- Paronychia with Cellulitis?
  - Yes → **Warm compresses + Incision & Drainage**
  - No → **Incision & Drainage + Warm compresses + Topical mupirocin x 5 days**

**Cellulitis or Erysipelas (Images)**
- Preferred PO cephalaxin
- Alternative PO amoxicillin-clavulanate
- If severe cephalosporin allergy or risk for MRSA:
  - PO clindamycin
  - Duration: 5 days
- Recommended reevaluation by medical professional within 5 days if not improved. (Extend treatment to total of 7-10 days if not improved.)

**Folliculitis (Images)**
- Folliculitis with Cellulitis?
  - Yes → **Topical mupirocin x 5 days**
  - No

**Impetigo (Images)**
- ≥ 5 Lesions or Lesions near mouth or Covering large surface area
  - Preferred PO cephalaxin
  - Duration: 7 days
- **PO clindamycin** (Inherently high risk for MRSA)
- Duration: 5 days

**Abscess (Images)**
- Does abscess require incision & drainage?
  - Yes → **Incision & Drainage + PO clindamycin** (Inherently high risk for MRSA)
  - Alternative PO TMP-SMX
  - Duration: 5 days

**Risk Factors for MRSA:**
- Personal history of MRSA
- Family history of MRSA
- Recent or frequent hospitalization

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**Outpatient Algorithm**

**Discharge Education**

**Antibiogram**

**Antibiotic Dosing**

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**QR code for mobile access**
Skin and soft tissue infections (IDSA guidelines 2014)\textsuperscript{6}

Refer to Children’s Mercy Evidence Based Practice Clinical Practice guideline for more information on diagnosis and management.

- **Paronychia**
  - Incision and drainage + warm compresses + topical mupirocin TID x 5 days
  - Concurrent cellulitis, refer to cellulitis or erysipelas management

- **Folliculitis**
  - Topical mupirocin x 5 days
  - Concurrent cellulitis, refer to cellulitis or erysipelas management

- **Impetigo**
  - Mild cases with less than 5 lesions
    - Topical mupirocin TID x 5 days
  - Extensive: ≥5 lesions, lesions covering large areas of the body, or lesions near the mouth
    - Duration: 7 days
    - First line treatment:
      - Cephalexin 17 mg/kg/dose PO TID (max 500 mg/dose)
      - If risk for MRSA (i.e. personal or family history of MRSA) OR severe penicillin/cephalosporin allergy (e.g. anaphylaxis):
        - Clindamycin 10 mg/kg/dose PO TID (max 450 mg/dose)
        - TMP-SMX 4-6 mg/kg/dose (trimethoprim component) PO BID (max 160 mg TMP/dose)

**NOTE:** TMP-SMX may not cover group A Streptococcus
• **Cellulitis or Erysipelas**
  o Duration: 5 days
  o First line:
    ▪ Cephalexin 17 mg/kg/dose PO TID (max 500 mg/dose)
  o Alternative:
    ▪ Amoxicillin-clavulanate 22.5 mg/kg/dose (amoxicillin component) PO BID (max 875 mg/dose)
      NOTE: Refer to amoxicillin/clavulanate dosing table on page 28
  o If risk for MRSA (i.e. personal or family history of MRSA) OR severe penicillin/cephalosporin allergy (e.g. anaphylaxis):
    ▪ Clindamycin 10 mg/kg/dose PO TID (max 450 mg/dose)
      NOTE: Clindamycin resistance for *Staphylococcus aureus* and group A Streptococcus has been increasing. Consider selecting an alternative if patient has a history of clindamycin-resistant *Staphylococcus aureus* or changing to a narrow spectrum antibiotic if culture results show MSSA or group A Streptococcus.

• **Abscess:**
  In addition to incision and drainage with culture:
  o Duration: 5 days
  o First-line treatment with one of the following:
    ▪ Clindamycin 10 mg/kg/dose PO TID (max 450 mg/dose)
      NOTE: Clindamycin resistance for *Staphylococcus aureus* and group A Streptococcus has been increasing. Consider selecting an alternative if patient has a history of clindamycin-resistant *Staphylococcus aureus* or changing to a narrow spectrum antibiotic if culture results show MSSA or GAS
    ▪ TMP-SMX 4-6 mg/kg/dose (TMP component) PO BID (max 160 mg TMP/dose)
  
  NOTE: Systemic antibiotics may not be needed for abscesses < 2 cm if incision and drainage is performed.
Periorbital Cellulitis

- Due to differences in management of orbital cellulitis (i.e. postseptal infections), consider more extensive work-up to assess for orbital cellulitis in patients with any of the following:
  - Proptosis
  - Decreased visual acuity
  - Painful/tender and/or restricted eye movements
  - Severe or persistent headache, lethargy, or fever
  - < 1 year of age
  - Unable to perform adequate eye exam

- Duration: 5 - 7 days

- First line if no concern for MRSA:
  - Cephalexin 17 mg/kg/dose PO TID (max 500 mg/dose)
  - Amoxicillin/clavulanate 22.5 mg/kg/dose (amoxicillin component) PO BID (max 875 mg/dose)
    **NOTE:** Refer to amoxicillin/clavulanate dosing table on page 28

- Mild/moderate penicillin allergy:
  **NOTE:** Avoid cephalexin in patients with severe penicillin allergy (e.g. anaphylaxis) due to same side chains. Other cephalosporins may be tolerated. Refer to beta-lactam side chain chart page 29. Consider referral for penicillin allergy testing.
  - Cefuroxime 250 – 500 mg PO BID
  - Cefpodoxime 5 mg/kg/dose PO BID (max 400 mg/dose)

- Severe penicillin/cephalosporin allergy (e.g. anaphylaxis) and/or risk factor for MRSA:
  - Clindamycin 10 mg/kg/dose PO TID (max 450 mg/dose)
Animal/human bites

- Duration:
  - Prophylaxis (for moderate to severe wounds with edema or crush injury, puncture wounds or facial bite wounds): 3 days
  - Treatment of infected wound: 5 - 7 days

- First line:
  - Amoxicillin/clavulanate 22.5 mg/kg/dose (amoxicillin component) PO BID (max 875 mg amoxicillin/dose)
    
    **NOTE**: Refer to amoxicillin/clavulanate dosing table on page 28

- Penicillin allergy:
  - Clindamycin 10 mg/kg/dose PO TID (max 450 mg/dose) **PLUS** one of the following:
    - TMP-SMX 5 mg/kg (TMP component) PO BID (max 160 mg TMP/dose)
    - Doxycycline 2.2 mg/kg PO BID (max 100 mg/dose)

  **NOTE**: Consider tetanus and rabies immunizations (discussion with ID)

**Dental abscess**

Assess for complicated infection (i.e. ill-appearing, signs of deep neck space infection, osteomyelitis of the mandible) as management may differ from what is listed below (e.g. hospital admission, longer duration of antibiotics, etc).

- Duration: 10 days

- First line:
  - Amoxicillin 17 mg/kg/dose PO TID (max 500 mg/dose)

  *(see next page for alternative therapies if complicated infection, amoxicillin failure, or penicillin allergy)*
Alternative for complicated infections or amoxicillin failure
- Amoxicillin/clavulanate 25 mg/kg/dose (amoxicillin component) PO BID (max 875 mg amoxicillin/dose)
  **NOTE:** Refer to amoxicillin/clavulanate dosing table on page 28

If buccal involvement AND/OR penicillin allergy:
- Clindamycin 10 mg/kg/dose PO TID (max 450 mg/dose)

**Acute lymphadenitis**

- Duration: 7 – 10 days

First line options:
- Cephalexin 17-25 mg/kg/dose PO TID (max 1000 mg/dose)
- Amoxicillin/clavulanate 22.5 mg/kg/dose (amoxicillin component) PO BID (max 875 mg amoxicillin/dose)
  **NOTE:** Consider in cases where oral anaerobes may be involved (e.g. unilateral cervical lymphadenitis in child with poor dental hygiene)
  **NOTE:** Refer to amoxicillin/clavulanate dosing table on page 28

If concern for MRSA (i.e. personal or family history of MRSA) AND/OR severe penicillin or cephalosporin allergy (e.g. anaphylaxis):
- Clindamycin 10 mg/kg/dose PO TID (max 450 mg/dose)

If concern for *Bartonella henselae* (treatment may shorten duration of adenopathy):
- Azithromycin 10 mg/kg/dose PO qDay (max 500 mg/dose) x 5 days
Acute bacterial conjunctivitis (AAO 2018)

For conjunctivitis in neonates, refer to the Children’s Mercy Evidence Based Practice algorithm.

Most cases of conjunctivitis, both viral and bacterial, are self-limiting and resolve without specific treatment.

Topical antibacterial therapy may result in earlier clinical and microbiological remission if given before day 6 of illness and may reduce transmissibility in children.

For moderate to severe bacterial conjunctivitis (i.e. copious purulent discharge, pain, and marked inflammation of the eye), systemic antimicrobial therapy and conjunctival cultures may be indicated. Possible etiologies may include gonococcal, chlamydial, or Staphylococcus aureus infections.

- **Duration:** 5 days

  - **Broad spectrum, nontoxic, inexpensive topical antibody therapies:**
    - Infants, especially < 2 months:
      - Erythromycin 5 mg/gm ophthalmic ointment: Apply 1 cm ribbon into affected eye 4 times daily
      - Polymyxin B-bacitracin ophthalmic ointment: apply 1.25 cm ribbon to affected eye 4 times daily
    - Children and adolescents
      - Polymyxin B-trimethoprim ophthalmic solution: Instill 1 drop in affected eye 4 times daily

- **Alternative topical therapies:**
  - Tobramycin 3% ophthalmic solution: Instill 1- 2 drops into the affected eye every 4 hours
    **NOTE:** Resistance seen with Streptococcus species, risk of toxicity to the corneal epithelium and reactive keratoconjunctivitis, especially > 7 days of use, limits utility.
  - Azithromycin 1% ophthalmic solution: Instill 1 drop in the affected eye twice daily (8 – 12 hrs apart) on days 1-2, then 1 drop in the affected eye daily on days 3 – 7
    **NOTE:** More expensive and challenging to find than other alternatives options. A different agent should be considered for patient < 1 year of age
• If corneal involvement or contact lenses wearer, consider one of the following more expensive alternatives with broader gram-negative coverage:
  o Ciprofloxacin 0.3% ophthalmic drops: instil 1–2 drops in affected eye 4 times daily
  o Ofloxacin 0.3% ophthalmic drops: Instil 1–2 drops in affected eye 4 times daily

NOTE: Ophthalmic ointments and solutions containing neomycin are usually avoided due to high incidence of allergic sensitization.
Influenza Treatment (AAP 2023 – 2024 Recommendations)\(^8\)

Influenza treatment recommendations are updated annually. Refer to CDC summary for clinicians and AAP recommendations for the most updated information.
Influenza Treatment (AAP 2023 – 2024 Recommendations)\(^8\)

Influenza treatment recommendations are updated annually. Refer to CDC summary for clinicians and AAP recommendations for the most updated information.

- Antiviral treatment options
  - Oseltamivir
    - 1 – 8 months of age: 3 mg/kg/dose PO BID x 5 days
    - Infants ≥ 9 months: 3.5 mg/kg/dose PO BID x 5 days
    - Children ≤ 15 kg: 30 mg PO BID x 5 days
    - Children > 15 to 23 kg: 45 mg PO BID x 5 days
    - Children > 23 to 40 kg: 60 mg PO BID x 5 days
    - Children > 40 kg: 75 mg PO BID x 5 days
  - Zanamivir – only for ≥ 7 years of age AND mild-to-moderate disease
    - Two inhalations (10 mg) twice daily x 5 days
      - **NOTE:** Inhalations on first day should be separated by ≥ 2 hours. Doses spaced by ~12 hours on subsequent days.
      - **NOTE:** Not recommended in patients with chronic respiratory diseases (e.g. asthma, chronic lung disease, etc)
  - Baloxavir marboxil – only for ≥ 5 years of age
    - < 20 kg: 2 mg/kg PO one time only
    - 20 – 80 kg: 40 mg PO one time only
    - > 80 kg: 80 mg PO one time only
Influenza Chemoprophylaxis (AAP 2023 – 2024 Recommendations)\(^8\)

Influenza chemoprophylaxis recommendations are updated annually. Refer to CDC summary for clinicians and AAP recommendations for the most updated information.

- Chemoprophylaxis is recommended after known or suspected influenza exposure in the following situations
  - Child at high risk of complications AND ≥ 1 of the following
    - Contraindication to influenza vaccine
    - < 2 weeks after influenza vaccination
    - May not respond with sufficient protective immune responses after influenza vaccination (e.g. immunocompromised)
    - Exposure is a household contact or close contact
  - Family members likely to have ongoing close exposures to vaccinated children at high risk or unvaccinated children ≤ 24 months old

- Antiviral agents for chemoprophylaxis
  - Oseltamivir
    - 3 – 8 months of age: 3 mg/kg/dose PO daily x 7 days
    - Infants ≥ 9 months: 3.5 mg/kg/dose PO daily x 7 days
    - Children < 15 kg: 30 mg PO daily x 7 days
    - Children > 15 to 23 kg: 45 mg PO daily x 7 days
    - Children > 23 to 40 kg: 60 mg daily x 7 days
    - Children > 40 kg: 75 mg PO daily x 7 days
  - Zanamivir - only for ≥ 5 years of age
    - Two inhalations (10 mg) once daily x 7 days
      - NOTE: Not recommended in patients with chronic respiratory diseases
  - Baloxavir marboxil – only for ≥ 5 years of age
    - < 20 kg: 2 mg/kg PO one time only
    - 20 – <80 kg: 40 mg PO one time only
    - ≥ 80 kg: 80 mg PO one time only
## Children's Mercy Hospitals & Clinics - 2022 Antibiogram
Department of Pathology & Laboratory Medicine - Microbiology Laboratory

### 2022 Gram Positive Antibiogram (% Susceptible)

<table>
<thead>
<tr>
<th>Organism</th>
<th># of isolates tested</th>
<th>Ampicillin</th>
<th>Cefotaxime</th>
<th>Chloramphenicol</th>
<th>Erythromycin</th>
<th>Gentamicin(^\d)</th>
<th>Linezolid</th>
<th>Meropenem</th>
<th>Nitrofurantoin(^\d)</th>
<th>Oxacillin</th>
<th>Penicillin</th>
<th>Penicillin (Ora)</th>
<th>Rifampin(^\d)</th>
<th>Tetracycline</th>
<th>Trim/Sulfa</th>
<th>Vancomycin</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Enterococcus faecalis</em></td>
<td>203</td>
<td>99</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>99</td>
<td>-</td>
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<td>-</td>
<td>-</td>
<td>-</td>
<td>100</td>
<td>-</td>
<td>100</td>
</tr>
<tr>
<td>All <em>Staphylococcus aureus</em></td>
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<td>-</td>
<td>-</td>
<td>80</td>
<td>54</td>
<td>-</td>
<td>100</td>
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<td>830</td>
<td>-</td>
<td>-</td>
<td>78</td>
<td>88</td>
<td>-</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>0</td>
<td>100</td>
<td>95</td>
<td>95</td>
<td>95</td>
<td>100</td>
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<td>0</td>
<td>100</td>
<td>94</td>
<td>88</td>
<td>100</td>
<td></td>
<td></td>
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<tr>
<td><em>Staphylococcus epidermidis</em></td>
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<td>33</td>
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<td>85</td>
<td>62</td>
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<tr>
<td><em>S. pneumoniae</em>(^*)</td>
<td>74</td>
<td>-</td>
<td>-</td>
<td>89</td>
<td>73</td>
<td>91</td>
<td>-</td>
<td>-</td>
<td>73(^+)</td>
<td>-</td>
<td>-</td>
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<td>-</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
</tbody>
</table>

- *Meningitis breakpoint*
- 86\(^+\)

- *Non-meningitis breakpoint*
- 97\(^+\)

\(^*\)Susceptible breakpoint for *S. pneumoniae* in patients with meningitis is ≤0.5 µg/mL for cefotaxime and ≤0.06 µg/mL for penicillin

\(^+\)Susceptible breakpoint for *S. pneumoniae* in patients with non-meningitis infections is ≤1 µg/mL for cefotaxime and ≤2 µg/mL for penicillin

\(^\d\)Used only in combination for synergy and is not adequate therapy by itself.

\(^\d\)Antibiotics tested on UTI isolates only: *E. faecalis* (169), *S. aureus* (49), *S. epidermidis* (68)

\((\cdot)\)No data available
## Gram Negative Antibiogram for Children’s Mercy - 2022 (All Sources)

<table>
<thead>
<tr>
<th>Organism</th>
<th># of isolates tested</th>
<th>Timnet-Sulfa</th>
<th>Ceftriaxone</th>
<th>Meropenem</th>
<th>Piprazido</th>
<th>Gentamicin</th>
<th>Chloramphenicol</th>
<th>Ceftriaxone</th>
<th>Gentamicin</th>
<th>Ampicillin</th>
<th>Ampicillin</th>
<th>Amikacin</th>
<th>ESBL (Non-Urine sources ONLY)</th>
<th>Proteus mirabilis (Non-Urine sources ONLY)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acinetobacter baumannii complex (includes ALL sources)</td>
<td>89</td>
<td>96</td>
<td>90</td>
<td>99</td>
<td>94</td>
<td>98</td>
<td>99</td>
<td>98</td>
<td>96</td>
<td>99</td>
<td>99</td>
<td>99</td>
<td>94</td>
<td>99</td>
</tr>
<tr>
<td>Citrobacter freundii (includes ALL sources)</td>
<td>30</td>
<td>100</td>
<td>100</td>
<td>95</td>
<td>98</td>
<td>97</td>
<td>97</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
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<td>-</td>
</tr>
<tr>
<td>Klebsiella aerogenes* (includes ALL sources)</td>
<td>28</td>
<td>98</td>
<td>97</td>
<td>96</td>
<td>99</td>
<td>97</td>
<td>96</td>
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<td>97</td>
<td>96</td>
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<td>96</td>
<td>97</td>
</tr>
<tr>
<td>Serratia marcescens (includes ALL sources)</td>
<td>84</td>
<td>98</td>
<td>98</td>
<td>96</td>
<td>99</td>
<td>98</td>
<td>97</td>
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<td>96</td>
<td>97</td>
<td>96</td>
<td>97</td>
<td>96</td>
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<tr>
<td>Enterobacter cloacae (Non-Urine sources ONLY)</td>
<td>92</td>
<td>100</td>
<td>99</td>
<td>96</td>
<td>99</td>
<td>97</td>
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<td>98</td>
<td>99</td>
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<tr>
<td>Pseudomonas aeruginosa (Non-Urine sources ONLY)</td>
<td>214</td>
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<td>96</td>
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<td>96</td>
<td>97</td>
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<td>97</td>
<td>96</td>
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<td>96</td>
<td>97</td>
</tr>
<tr>
<td>*Escherichia coli (Non-Urine sources ONLY)</td>
<td>134</td>
<td>96</td>
<td>97</td>
<td>97</td>
<td>96</td>
<td>97</td>
<td>96</td>
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<td>96</td>
<td>97</td>
<td>96</td>
<td>97</td>
<td>96</td>
<td>97</td>
</tr>
<tr>
<td>Klebsiella oxytoca (Non-Urine sources ONLY)</td>
<td>52</td>
<td>100</td>
<td>99</td>
<td>97</td>
<td>99</td>
<td>98</td>
<td>97</td>
<td>96</td>
<td>97</td>
<td>98</td>
<td>99</td>
<td>97</td>
<td>98</td>
<td>98</td>
</tr>
<tr>
<td>Klebsiella pneumoniae (Non-Urine sources ONLY)</td>
<td>63</td>
<td>100</td>
<td>96</td>
<td>98</td>
<td>99</td>
<td>97</td>
<td>98</td>
<td>97</td>
<td>98</td>
<td>99</td>
<td>97</td>
<td>98</td>
<td>98</td>
<td>99</td>
</tr>
</tbody>
</table>

*Please exercise discretion when data are reviewed for species with fewer than 30 isolates.

## Department of Pathology & Laboratory Medicine - Microbiology Laboratory

- **ESBL** positive isolates: *E. coli* (12), K. pneumoniae (4), *K. oxytoca* (1)
- **K. pneumoniae** and *P. mirabilis* breakpoints differ for urine cultures vs. cultures from all other sources. Please contact the Microbiology laboratory for more information.
<table>
<thead>
<tr>
<th>Organism</th>
<th># of isolates tested</th>
<th>Amoxiclav</th>
<th>Ampicillin</th>
<th>Cefazolin</th>
<th>Cefepime</th>
<th>Cefazolinid</th>
<th>Ceftriaxone</th>
<th>Ciprofloxacin</th>
<th>Gentamicin</th>
<th>Nitrofurantoin</th>
<th>Tobramycin</th>
<th>Trimethoprim</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Enterobacter cloacae</em></td>
<td>37</td>
<td>IR</td>
<td>IR</td>
<td>IR</td>
<td>-</td>
<td>89</td>
<td>86</td>
<td>100</td>
<td>100</td>
<td>46</td>
<td>100</td>
<td>91</td>
</tr>
<tr>
<td><em>Pseudomonas aeruginosa</em></td>
<td>59</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>93</td>
<td>97</td>
<td>-</td>
<td>92</td>
<td>-</td>
<td>-</td>
<td>98</td>
<td>-</td>
</tr>
<tr>
<td><em>Escherichia coli</em></td>
<td>1459</td>
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<td>83</td>
<td>96</td>
<td>-</td>
<td>98</td>
<td>98</td>
<td>92</td>
<td>94</td>
<td>98</td>
<td>94</td>
<td>79</td>
</tr>
<tr>
<td><em>Klebsiella oxytoca</em></td>
<td>44</td>
<td>IR</td>
<td>95</td>
<td>18</td>
<td>-</td>
<td>95</td>
<td>93</td>
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<td>98</td>
<td>95</td>
<td>98</td>
<td>80</td>
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<tr>
<td><em>Klebsiella pneumoniae</em></td>
<td>113</td>
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<td>95</td>
<td>33</td>
<td>96</td>
<td>83</td>
</tr>
<tr>
<td><em>Proteus mirabilis</em></td>
<td>84</td>
<td>86</td>
<td>94</td>
<td>98</td>
<td>-</td>
<td>100</td>
<td>100</td>
<td>99</td>
<td>98</td>
<td>IR</td>
<td>98</td>
<td>93</td>
</tr>
</tbody>
</table>

ESBL positive isolates: *E. coli* (55), *K. pneumoniae* (8), *K. oxytoca* (2)

IR = Intrinsic Resistance, (--) = No data available

*E. coli, K. pneumoniae and P. mirabilis* breakpoints differ for urine culture vs. cultures from all other sources. Please contact the Microbiology laboratory for more information.
### Dosing of Amoxicillin-Clavulanate

**NOTE:** Dosing of amoxicillin-clavulanate (Augmentin™) is based on amoxicillin component. “High dose” of amoxicillin-clavulanate is targeted at providing higher amoxicillin doses to overcome *Streptococcus pneumoniae* resistance while maintaining clavulanate exposure to ≤ 10 mg/kg/day.

<table>
<thead>
<tr>
<th>Indication</th>
<th>Formulation</th>
<th>&lt; 40 kg</th>
<th>≥ 40 kg</th>
</tr>
</thead>
<tbody>
<tr>
<td>Infection in &lt; 3 months of age</td>
<td><strong>Suspension:</strong>&lt;br&gt;250 mg-62.5 mg/5mL&lt;br&gt;<strong>OR</strong>&lt;br&gt;125 mg-31.25mg/5mL</td>
<td>Usual Dosing: 30 mg/kg/day divided twice daily</td>
<td>Not applicable</td>
</tr>
<tr>
<td>“Standard Dose” Less severe infections (&gt; 3 months of age)</td>
<td><strong>Suspension:</strong>&lt;br&gt;400 mg-57mg/5mL</td>
<td>Usual Dosing: 25 – 45 mg/kg/day divided twice daily</td>
<td>Tablet: 500mg-125mg&lt;br&gt;<strong>OR</strong>&lt;br&gt;875mg-125mg&lt;br&gt;Suspension: 400 mg-57mg/5mL</td>
</tr>
<tr>
<td>“High Dose” Otitis media, pneumonia, sinusitis (&gt; 3 months of age)</td>
<td><strong>ES Suspension:</strong>&lt;br&gt;600 mg-42.9mg/5mL</td>
<td>Usual Dosing: 80 – 100 mg/kg/day divided twice or three times daily</td>
<td>XR Tablet:&lt;br&gt;1000mg-62.5mg&lt;br&gt;<strong>OR</strong>&lt;br&gt;ES Suspension:&lt;br&gt;600 mg-42.9mg/5mL&lt;br&gt;2000 mg twice daily&lt;br&gt;1000 mg three times daily - <em>using oral suspension only</em></td>
</tr>
</tbody>
</table>

**Prescribing practices may deviate from these guidelines depending on clinical factors (e.g. location of infection, bacterial susceptibility, patient characteristics, etc). Please consult a pharmacist or Antimicrobial Stewardship for additional assistance in selecting formulations.**
Antibiotic Allergies: Beta-lactams

For all patients with an antibiotic allergy, recommend clarifying beta-lactam allergy and placing a referral to ID or allergy clinics for de-labeling if patient/family interested.

Beta-lactam antibiotics with similar or identical side chains may be more likely to cross react and should typically be avoided in patients with documented severe allergies (e.g. anaphylaxis).

<table>
<thead>
<tr>
<th>Selected Beta-lactams with Identical or Similar Side Chains Chart</th>
</tr>
</thead>
<tbody>
<tr>
<td>Penicillin</td>
</tr>
<tr>
<td>Penicillin G</td>
</tr>
<tr>
<td>Amoxicillin</td>
</tr>
<tr>
<td>Cefazolin</td>
</tr>
<tr>
<td>Cephalexin</td>
</tr>
<tr>
<td>Cefprozil</td>
</tr>
<tr>
<td>Cefuroxime</td>
</tr>
<tr>
<td>Ceftriaxone</td>
</tr>
<tr>
<td>Cefdinir</td>
</tr>
<tr>
<td>Cefixime</td>
</tr>
<tr>
<td>Cefpodoxime</td>
</tr>
</tbody>
</table>

(X) Risk of cross reactivity due to identical or similar side chains – DO NOT PRESCRIBE

References


Do not hesitate to reach out to infectious diseases in case of doubt!
Questions/comments, please email AntimicrobialStewards@cmh.edu
Last Updated 9/7/2023