COMMUNITY ACQUIRED PNEUMONIA (CAP)

Intended for patients age >60 days to <18 years with signs/symptom suggestive of pneumonia
(guidance can be extrapolated down to a healthy term newborn)

Exclusion Criteria:
- Immunocompromised
- Tracheostomy
- Chronic conditions including:
  - Cystic fibrosis
  - BPD on baseline supplemental oxygen
  - Sickle cell disease
  - Neuromuscular disease with baseline respiratory compromise
  - Unrepaired cyanotic heart disease
- Large/clinically significant[A] effusion/empyema/lung abscess

Signs/Symptoms of CAP [B]
(*highest predictive value)

- Fever >101° F
- Tachypnea for age*
  - 2-12 months: RR>50
  - 1-5 years: RR>40
  - 5 years-adolescents: RR>25
  - Adolescents: RR>20
- SpO2 <90%*
- Increased work of breathing: nasal flaring*, retractions, belly breathing, tracheal tugging, grunting, head bobbing
- Breath sound abnormalities: focal findings
- Chest pain
- Abdominal pain
- Preceding upper respiratory infection
- **Symptoms cannot be explained by bronchiolitis** (Signs/symptoms of bronchiolitis include age <2 years, variable and dynamic disease process, wheezing, upper respiratory infection followed by lower respiratory signs with peak on day 3-5)

Assess severity of symptoms

Mild Criteria (Outpatient criteria)
All of the following:
- Non-toxic appearing
- O2 sats ≥90% on room air
- Tolerating work of breathing[C]
- Able to maintain adequate hydration
- Able to tolerate enteral medications

→ See outpatient algorithm

Moderate Criteria (Acute care hospitalization criteria)
One or more of the following AND does not meet severe/critical care criteria:
- Need for supplemental O2 to maintain saturations ≥90%
- Not tolerating work of breathing[C]
- Need for IV fluids to maintain adequate hydration
- Inability to tolerate enteral meds

→ See hospital algorithm

Severe Criteria (Critical Care Criteria)
One or more of the following:
- Invasive mechanical ventilation
- CPAP/BiPAP requirement
- Oxygen requirement >10L oxymask

→ See hospital algorithm
Exit pathway, contact Critical Care as needed

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Process owner: CAP Pathway Team

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COMMUNITY ACQUIRED PNEUMONIA (CAP)

Outpatient Pathway

(including CMG/Outpatient/Urgent Care/ED)

Intended for patients age >60 days to <18 years with signs/symptom suggestive of pneumonia

(guidance can be extrapolated down to a healthy term newborn)

Exclusion Criteria:
- Immunocompromised
- Tracheostomy
- Chronic conditions including:
  - Cystic fibrosis
  - BPD on baseline supplemental oxygen
  - Sickle cell disease
  - Neuromuscular disease with baseline respiratory compromise
  - Unrepaired cyanotic heart disease
- Large/clinically significant[A] effusion/empyema/lung abscess

Mild criteria (outpatient/urgent care/ED)

All of the following:
- Non-toxic appearing
- O2 sats ≥90% on room air
- Tolerating work of breathing[C]
- Able to maintain adequate hydration
- Able to tolerate enteral medications

No →

Moderate criteria (hospitalized/ED)

>/= 1 of the following AND does not meet severe critical care criteria:
- Need for supplemental O2 to maintain saturations ≥90%
- Not tolerating work of breathing[C]
- Need for IV fluids to maintain adequate hydration
- Inability to tolerate enteral medications

Yes ↓

Consider hospitalization

- For questions regarding management or hospitalization at the Milwaukee campus→ call Physician Consult Center (414-266-2470)
- For questions regarding management or hospitalization in Fox Valley→page the FV Peds Hospitalist team (920-554-4502)
- See considerations for direct admission to acute care hospitalization

Yes ↓

Diagnostic testing

- Imaging: routine imaging not recommended
- Serum studies: routine CBC/inflammatory markers, blood culture not recommended
- Viral swabs: consider influenza/COVID 19 testing seasonally/as appropriate (Information for Health Professionals | CDC). Additional testing/Respiratory Pathogen Panel not generally recommended

↓

Treatment

- Amoxicillin 90 mg/kg/day divided TID, max 3 g daily
- 5 days duration
  - Consider 7 days if concern about barriers to follow up if needed
- See table for additional antibiotic considerations including allergy recommendations

Follow Up

- EDTC/UC: Patient to call PCP or specialist next business day to discuss follow-up plans
- CMG/Ambulatory: Follow up in 3-4 days; sooner if worsening. Follow up may be in-person, via phone or MyChart, or prn if not improving, based on provider's clinical judgment
- Patient may return to school or childcare when afebrile for 24 hours, adequately hydrated, and tolerating other symptoms. Cough may persist and does not require exclusion from school or childcare
- Repeat imaging rarely needed. Consider if extenuating circumstances (e.g. concern for scarring). If obtained, wait at least 4 weeks prior to repeating

Not improving →

Treatment failure recommendations (lack of clinical improvement after 72 hours of appropriate antimicrobial therapy)[E]

- Do not hospitalize solely for treatment failure if not also meeting moderate criteria for hospitalization
- If true treatment failure AND meeting moderate criteria for hospitalization, start IV ampicillin. Do not need broader coverage based solely on outpatient treatment failure regardless of what enteral antibiotic was used as IV route may be sufficient escalation of treatment.
- Consider possibility of viral pneumonia and reconsider need for ongoing antibiotics
- Ensure correct antibiotic and dose/frequency of antibiotic
- Ensure patient is taking antibiotic as prescribed
- In times of high community prevalence, consider alternative diagnoses such as pertussis or atypical pneumonia
- If persistent fevers, consider CXR to confirm diagnosis and assess for clinically significant effusion[A]
- Do not add azithromycin[F] or broaden coverage including amoxicillin/clavulanic acid or cephalosporin based solely on concern for treatment failure
- If questions regarding need for alternative antimicrobial management, consider contacting Antimicrobial Stewardship provider via EPIC Secure Chat (preferred) or page. For holidays/after-hours, page on-call ID provider[E]
- If questions regarding need for airway clearance or alternative diagnosis, contact on call pulmonary provider

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COMMUNITY ACQUIRED PNEUMONIA (CAP)

Hospitalized/ED Pathway

Intended for patients age >60 days to <18 years with signs/symptom suggestive of pneumonia
(guidance can be extrapolated down to a healthy term newborn)

Exclusion Criteria:
- Immunocompromised
- Tracheostomy
- Chronic conditions including:
  - Cystic fibrosis
  - BPD on baseline supplemental oxygen
  - Sickle cell disease
  - Neuromuscular disease with baseline respiratory compromise
  - Unrepaired cyanotic heart disease
- Large/clinically significant[A] effusion/empyema/lung abscess

Moderate criteria (acute care hospitalization/ED)

One or more of following AND does not meet severe critical care criteria:
- Need for supplemental O2 to maintain saturations ≥90%
- Not tolerating work of breathing[C]
- Need for IV fluids to maintain adequate hydration
- Inability to tolerate enteral medications

No →

Severe criteria (critical care hospitalization/ED)

One or more of the following:
- Invasive mechanical ventilation
- CPAP/BiPAP requirement
- Oxygen requirement >10L oxymask

Yes ↓

Diagnostic testing

- Imaging: CXR (PA and lateral)
- Serum studies: routine CBC/inflammatory markers, blood culture not recommended
- Viral swabs: consider influenza/COVID 19 testing seasonally/as appropriate (Information for Health Professionals | CDC). Additional testing/Respiratory Pathogen Panel not generally recommended

Treatment

- Ampicillin 50 mg/kg/dose q6h, max 8g daily
- Bronchial hygiene protocol[G]
- See table for additional antibiotic considerations

Improving ↓

Discharge criteria

- Non-toxic appearing
- O2 sats ≥ 90% on RA for at least 6 hours
- Improving fever curve
- Tolerating work of breathing[C]
- Able to maintain adequate hydration and tolerate oral/enteral medications

Discharge recommendations

- Amoxicillin 90 mg/kg/day divided TID, max 3 g daily
- Consider 7-day total antibiotic course for moderate-severe cases
- 5 days may be appropriate if mild/rapid improvement
- Follow up in 2-3 days
- Patient may return to school or childcare when afebrile for 24h, adequately hydrated, and tolerating other symptoms. Cough may persist and does not require exclusion from school or childcare
- Repeat imaging rarely needed. Consider if extenuating circumstances (e.g. concern for scarring). If obtained, wait at least 4 weeks prior to repeating

Yes ↓

Diagnostic testing

- Imaging: CXR (PA and lateral)
- Serum studies: recommend CBC and blood culture; consider ESR/CRP/procalcitonin
- Viral swabs: consider influenza/COVID 19 testing seasonally/as appropriate (Information for Health Professionals | CDC)
- MRSA nasal PCR if starting MRSA coverage (see treatment below)

Treatment

- Hemodynamically stable: Ceftriaxone +/- vancomycin or clindamycin based on clinical judgement. If MRSA coverage is started, de-escalate if either MRSA nasal PCR negative or ET tube culture negative for MRSA
- Hemodynamic instability: Ceftriaxone + vancomycin. De-escalate vancomycin when blood culture negative for MRSA and either MRSA nasal PCR negative or ET tube culture negative for MRSA
- Bronchial hygiene protocol[G]
- See table for additional antibiotic considerations

Not improving ↓

Treatment failure recommendations[E]

Failing ampicillin inpatient:
- Lack of clinical improvement at 48hrs: Obtain CRP or procalcitonin (if not already obtained). Consider obtaining Respiratory Pathogen Panel and continue current therapy
- Lack of clinical improvement at 72hrs: Obtain repeat CXR and repeat CRP or procalcitonin; if no clinical/lab improvement, consider escalation in therapy (ie: ceftriaxone)); if clinically significant effusion[A] -> off Pathway, see CAP with PE guideline if Respiratory Pathogen Panel positive for mycoplasma pneumonia, consider treatment with azithromycin[F]

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Process owner: CAP Pathway Team

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Antimicrobial considerations	
Aspiration Concern	• See CW aspiration pneumonitis vs pneumonia guideline for guidance if concern for aspiration pneumonia
Atypical pneumonia	• The use/addition of azithromycin is not routinely recommended for CAP[F]. Could consider if concern for atypical etiologies (>4 years old, slowly progressive symptoms, extrapulmonary findings including rash, GI symptoms). Atypical etiologies are unlikely in patients under 5 years.[B]
Ceftriaxone transition to enteral option	• If started for severe CAP/PICU→ most likely etiology is strep pneumonia. Can likely transition to amoxicillin. Consider amoxicillin/clavulanate if slow to improve and/or based on clinical judgement • If started for treatment failure after 72 hours of ampicillin→ amoxicillin/clavulanate • If started for low-risk penicillin allergy[H]→ 1st line: cefprozil or 2nd line: cefuroxime • If started for high-risk penicillin allergy[H]→ 1st line: cefuroxime or 2nd line: clindamycin • Local ID experts do not recommend use of cefdinir for the treatment of *CAP*[I]
Co-infections	Acute otitis media: • Concurrent acute otitis media may impact the recommended duration of treatment for pneumonia. Current AAP guidelines[7] for AOM recommend 10-day course for children younger than 2 years and all children with severe symptoms, 7-day course is recommended in children 2 years of age and older with mild or moderate AOM. If treating for concurrent acute otitis media and CAP, frequency should be TID dosing Conjunctivitis: • In the absence of acute otitis media, conjunctivitis with respiratory symptoms should raise suspicion for viral etiologies (e.g. adenovirus). • Do not need to routinely expand coverage based solely on concurrent conjunctivitis. Even with an increased risk of H. influenzae, 70% of H. influenzae locally are beta lactamase negative (i.e. amoxicillin will cover). Amoxicillin-clavulanate could be considered based on clinical judgement. Sinusitis • Amoxicillin is appropriate first-line treatment for mild to moderate sinusitis. Concurrent sinusitis may impact the recommended duration of treatment for pneumonia. See the Urgent Care and CMG sinusitis guideline for additional guidance on sinusitis management in those respective settings.
Immunization status	• No changes in diagnostics or treatment are indicated based solely on immunization status including pneumococcal status. Following the implementation of pneumococcal vaccination, invasive pneumococcal disease and complicated pneumococcal pneumonia have decreased substantially for all children regardless of vaccination status. Complicated pneumonia is more likely to be due to non-vaccine related strains. In addition, local sensitivity rates for strep pneumonia are very high (Children's Wisconsin Antibiogram). Local ID experts therefore do not recommend change in management based solely on immunization status.
Influenza positive	Mild/moderate pneumonia • Although there is an association between influenza and subsequent staph aureus pneumonia, the overall risk is still lower than strep pneumonia. Addition of clindamycin is not needed in mild/ moderate pneumonia solely based on recent influenza infection unless other clinical concerns. Severe pneumonia: • If severe pneumonia and influenza positive, local ID experts recommend ceftriaxone + vancomycin OR clindamycin. Can de-escalate vancomycin/clindamycin MRSA coverage when either MRSA nasal PCR negative or ET tube culture negative for MRSA.
MRSA coverage	• If antimicrobial coverage is escalated to include MRSA coverage (vancomycin/clindamycin), obtain MRSA nasal PCR for de-escalation if negative.

See next page for additional antimicrobial considerations

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Antimicrobial considerations (Continued)	

Penicillin allergies	Low-risk penicillin allergy[H]:
	• For hospitalized patients, if low-risk penicillin questionnaire (located in admission tab), can give ampicillin if family agreeable to penicillin challenge. The patient would then need to do the one dose oral trial of the medication they previously reacted to prior to discharge. Contact Antimicrobial stewardship team in EPIC Secure Chat if questions on penicillin oral challenge protocol.
	• For outpatient, can refer to the Penicillin Delabeling Clinic as applicable for future illnesses
	• IV: ceftriaxone or ampicillin if family agreeable to penicillin challenge
	• Enteral:
	  • 1st line: cefprozil (suspension or tablets)
	  • 2nd line: cefuroxime (tablets, suspension not available) Tablets may be crushed and added to food, but can cause bitter taste
	  • 3rd line: clindamycin (liquid or capsules) if above not available. Liquid clindamycin can be poorly tolerated due to taste. Consider prescribing capsules which can be opened and mixed in small amount of food to increase adherence
	  • See enteral antibiotic table for additional specifics on cephalosporin alternatives
	  • Local ID experts do not recommend use of cefdinir for the treatment of CAP[I]
	High-risk penicillin allergy[H]:
	• IV: ceftriaxone
	• Enteral
	  • 1st line: cefuroxime tablets (suspension not available). Tablets may be crushed and added to food, but can cause bitter taste
	  • 2nd line: clindamycin (liquid or capsules). Liquid clindamycin can be poorly tolerated due to taste. Consider prescribing capsules which can be opened and mixed in small amount of food to increase adherence
	  • See enteral antibiotic table for additional specifics on cephalosporin alternatives
	  • Local ID experts do not recommend use of cefdinir for the treatment of CAP[I]

Treatment Failure[E]: (lack of clinical improvement after 72h of appropriate antimicrobial therapy)	Outpatient amoxicillin treatment failure: • Do not hospitalize solely for treatment failure if not also meeting moderate criteria for hospitalization • If true treatment failure AND meeting moderate criteria for hospitalization, start IV ampicillin. Do not need broader coverage based solely on outpatient treatment failure regardless of what enteral antibiotic was used as IV route may be sufficient escalation of treatment • Consider possibility of viral pneumonia and reconsider need for ongoing antibiotics • Ensure using correct antibiotic and dose/frequency of antibiotic • Ensure patient is taking antibiotic as prescribed • In times of high community prevalence, consider diagnoses such as pertussis or atypical pneumonia • If persistent fevers, consider CXR to confirm diagnosis and assess for clinically significant effusion • Do not add azithromycin[F] or broaden coverage including amoxicillin/clavulanic acid or cephalosporin based solely on concern for treatment failure • If questions regarding need for alternative antimicrobial management, consider contacting Antimicrobial Stewardship provider via EPIC Secure Chat (preferred) or page. For holidays/after-hours, page on-call ID provider [E] • If questions regarding need for airway clearance or alternative diagnosis, contact on-call pulmonary
	Hospitalized ampicillin treatment failure: • Lack of clinical improvement at 48h: Obtain CRP or procalcitonin (if not already obtained), consider obtaining Respiratory Pathogen Panel and continue current therapy • Lack of clinical improvement at 72hrs: Obtain repeat CXR and repeat CRP or procalcitonin; if no clinical/lab improvement, consider escalation in therapy (ie: ceftriaxone); if clinically significant effusion[A] -> off Pathway, see CAP with PE guideline; if Respiratory Pathogen Panel positive for mycoplasma pneumonia, consider treatment with azithromycin[F] • If questions regarding need for alternative antimicrobial management, contact Antimicrobial Stewardship provider[E] • If questions regarding need for airway clearance or alternative diagnosis, contact on call pulmonary

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Parenteral antimicrobial dosing		
Medication	**Dose**	**Max dose**
Ampicillin	50 mg/kg/dose q6	Max 8 grams daily
Ceftriaxone	100 mg/kg/dose q24	Max 2 grams daily
Clindamycin	10 mg/kg/dose q6	Max 2.7 grams daily
Vancomycin	Pharmacy to dose; see Vancomycin Clinical Practice Guideline for more info	

Enteral antimicrobial dosing/logistical considerations			
Medication	**Dose**	**Max dose**	**Other**
First Line*			
Amoxicillin	90 mg/kg/day divided TID	See amoxicillin guideline for additional information on formulations and max dosing *TID dosing optimizes time of killing and is generally preferred. BID dosing may improve compliance and may be necessary in some social situations. In those instances: 90mg/kg/day divided BID	
Alternatives*			
Amoxicillin/ clavulanate (14:1)	90 mg/kg/day divided TID	See amoxicillin/clavulanate guideline for additional information on formulations and max dosing	
Cephalosporins	Cefprozil 30mg/kg/day divided BID	Max 1000mg daily	Local ID experts do not recommend use of cefdinir for the treatment of CAP[I] Cefprozil is covered by Medicaid, is typically most cost-effective, and has better pharmacokinetic than other cephalosporins so is preferred if available. It shares a side chain with amoxicillin so is not appropriate alternative for high-risk penicillin allergy [H]. Cefuroxime is an appropriate alternative if cefprozil is not available and for high-risk penicillin allergy [H] patients. It is only available in tablet form. Tablets can be crushed/mixed though can cause bitter taste. Ensure pharmacy has in stock and medication is not cost prohibitive. If issues finding cefprozil, see pharmacy consideration table.
	Cefuroxime 30mg/kg/day divided BID (only available in tablet form)	Max 1000mg daily	
Clindamycin	30 mg/kg/day divided q8	Max 1800mg daily	Liquid clindamycin can be poorly tolerated due to taste. Consider prescribing capsules which can be opened and mixed in small amount of food to increase adherence
**Strep pneumonia is the most common bacterial cause of CAP, it is resistant to 1% of amoxicillin, 1% of amoxicillin- clavulanate, 0-3% of levofloxacin, 9-15% of clindamycin, and 40% of azithromycin in the Childrens Wisconsin system.*			

EHR Tools	
Admission order set	"Gen peds pneumonia admission"
Discharge order set/AVS template	"Gen DC pneumonia"
Amoxicillin and Augmentin Dosing for Discharge Order set	"Amoxicillin and Augmentin High and Standard Dosing for Discharge" within discharge order sets
Outpatient antibiotic order panel	Community acquired pneumonia antibiotics smart order panel (search "pneumonia"). UC version is noted by "(urgent care only)"
Outpatient AVS (can start with .avs, .ucdc, or .pcav)	.avspneumoniabacterial, .avspneumoniaviral, .avspneumoniaatypical ; Spanish versions end in SP
CMG/Urgent Care sick visit plan block	Find in note template plan list as "pneumonia" or use smartphrase .planpneumonia

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Appendix A: Large/clinically significant^ effusion/empyema/lung abscess

- Large or clinically significant effusion (excluded from pathway – managed on CAP with PE guideline):
  - >10 mm on decubitus x-ray or chest ultrasound or greater than ¼ of hemithorax opacified AND requiring drainage or chest tube placement after discussion with Interventional Radiology (IR)
- Clinically insignificant effusion (included in pathway-no change in management from patients without effusion):
  - <10 mm on decubitus x-ray or chest ultrasound or less than ¼ of the hemithorax opacified AND not requiring drainage or chest tube placement*
  - *if question about the need for drainage, recommend discussion with IR
- Instructions for contacting IR:
  - Obtain 2 view AP/lateral chest x-ray. Decubitus imaging not required
  - Contact IR regarding chest tube placement and if additional imaging (US, CT) indicated prior to placement
  - IR may also choose to obtain US as part of chest tube placement. Additional US order not needed in those cases

Appendix B: Differentiating bacterial vs viral vs atypical pneumonia[2,3,9,10,12]

- Review of the literature showed variable evidence for the ability to differentiate bacterial versus viral versus atypical pneumonia based on clinical, radiographic, or laboratory findings with a lack of clear predictive factors.
- Patients with atypical pneumonia are typically older (> 4 years) and may more frequently demonstrate extrapulmonary findings such as rash or GI involvement.
- The presence of wheezing may be more suggestive of a viral etiology.
- Normal procalcitonin values may be less suggestive of a bacterial etiology. Elevated levels can be seen in bacterial, viral, and atypical causes. Routine labs are not recommended for mild to moderate pneumonia.

Appendix C: Signs that patient is not tolerating work of breathing

- Inability to coordinate suck/swallow/breathing for feeds
- Work of breathing prohibiting activities of daily living (eating, walking, talking)
- Persistent tachycardia despite adequate fluid resuscitation
- Change in mental status (inconsolable, lethargic)

Appendix D: Considerations for direct admit to Acute Care hospitalization

- For questions regarding management or hospitalization at the Milwaukee campus, please contact the Physician Consult Center (414-266-2470)
- For questions regarding management or hospitalization in Fox Valley, please page the FV Peds Hospitalist team ((920) 554-4502 need to confirm)
- **Direct Admit to CW main campus acute care vs ED transfer – consider the following:**
  - Patient must have one or more of the moderate/acute care criteria and none of the severe critical care criteria to be appropriate for direct admission to acute care
  - Referring provider must be able to titrate O2 to assess if meeting Acute vs Critical Care Criteria
  - Patient must not require rapid fluid resuscitation

Appendix E: Definition of Treatment Failure[11, 14]

- Lack of clinical improvement after 72h of appropriate antimicrobial therapy with appropriate antibiotic/dosing/frequency
- Concern if persistent fevers, hypoxia, not tolerating work of breathing, elevated inflammatory markers (labs not routinely recommended for uncomplicated CAP) after 72 hours of appropriate therapy
- Cough and radiographic findings of CAP can persist and should not be used in isolation to indicate concern for treatment failure
- See antimicrobial considerations for recommendations if concern for treatment failure
- If questions regarding antimicrobial therapy, page/Voalte Antimicrobial Stewardship. For holidays/after-hours, page the on-call ID provider
- If questions regarding need for airway clearance or alternative pulmonary diagnosis, page pulmonary

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Appendix F: Azithromycin[2,4,5,13]

- Antibiotics may not be needed for patients with mild atypical pneumonia because M. pneumoniae infections are frequently self-limited. Factors such as community prevalence and severity of symptoms can be considerations in antibiotic treatment decisions. See microbiology positivity report for current local rates.
- Azithromycin could be considered to cover for atypical pneumonia in hospitalized patients who are not improving after 72 hours of IV ampicillin and clinical concern for atypical pneumonia
- Mycoplasma testing can be considered for hospitalized patients if clinical concern. Testing is not recommended for outpatients
- If antibiotics indicated for bacterial pneumonia, it is more important to prescribe amoxicillin. 40% of strep pneumonia is resistant to azithromycin for outpatient/EDTC isolates
- There is lack of evidence supporting routine use of azithromycin. Symptomatic M. pneumoniae infection is often self-limited with insufficient evidence to support the efficacy of antibiotics including azithromycin.
- There is lack of evidence regarding the effect of treatment on transmissibility. Treatment may be appropriate for individuals who have vulnerable close contacts based on the provider's clinical judgment.
- M. pneumoniae is frequently detected in asymptomatic patients
- Azithromycin has a prolonged serum elimination half-life and prolonged exposure to organisms on the respiratory tract mucosa. This has been associated with the selection of resistant organisms on mucosal surfaces of treated patients and may represent a source of resistant organisms to others in the community, including resistance to other bacteria (e.g. gram negatives) and to other antibiotics. The risk of obesity increases with even a single exposure to macrolides due to significant impacts on the microbiome.

Appendix G: Bronchial hygiene protocol

- To order, enter Protocol Initiation HOSP RCS-Bronchial hygiene. It is part of the GEN PEDS Pneumonia Admission order set
- The bronchial hygiene protocol consists of assessment and treatments based on the bronchial hygiene protocol score with the indication of impaired mucociliary clearance, to treat clinically significant atelectasis, to improve an ineffective cough, to remove excessive secretions, and monitor patients that receive bronchial hygiene treatments at home. The protocol allows the Respiratory Care Provider to up-regulate and down-regulate the following treatments based on the patients score: Various positive expiratory pressure therapies, high-frequency vest/IPV, manual chest physiotherapy, mechanical cough assist, and basic bronchial hygiene therapy (incentive spirometry, ambulation, cough and deep breathing)

Appendix H: Penicillin allergy

- See Connect for additional information regarding oral penicillin challenge
- See Connect for additional information regarding beta-lactam side chain reactivity
- **High-risk**: Anaphylaxis; swelling (face, lips, throat); difficulty breathing; wheezing; skin peeling; mouth blisters; drop in blood pressure; syncope; seizures; serum sickness; fever; within one hour of medication: abdominal pain, rash, itching, multiple episodes of vomiting
- **Low-risk:** Rash or itching >1 hour from med administration, single episode of vomiting within an hour of med administration, dizziness, nausea, cough
- **Non-allergic symptoms (amoxicillin/ampicillin would be appropriate in these cases)**: Runny nose, diarrhea, headache, vomiting with med administration, family history of allergy. Can offer penicillin challenge in these situations if family requests though not required.

Appendix I: Cefdinir

- See Antimicrobial Stewardship Connect page on why cefdinir is not recommended for the treatment of pneumonia.

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References:.

1. Bradley JS, Byington CL, Shah SS, et al. 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(7):e25-e76. doi:10.1093/cid/cir531

2. Gardiner SJ, Gavranich JB, Chang AB. Antibiotics for community-acquired lower respiratory tract infections secondary to *Mycoplasma pneumoniae* in children. Cochrane Acute Respiratory Infections Group, ed. *Cochrane Database of Systematic Reviews*. 2015;2015(1). doi:10.1002/14651858.CD004875.pub5

3. Jiang W, Wu M, Zhou J, et al. Etiologic spectrum and occurrence of coinfections in children hospitalized with community-acquired pneumonia. *BMC Infect Dis*. 2017;17(1):787. doi:10.1186/s12879-017-2891-x

4. Kaplan SL, Barson WJ, Lin PL, et al. Invasive Pneumococcal Disease in Children's Hospitals: 2014-2017. *Pediatrics*. 2019;144(3):e20190567. doi:10.1542/peds.2019-0567

5. Kenyon C, Laumen J, Manoharan-Basil SS, Buyze J. Strong association between adolescent obesity and consumption of macrolides in Europe and the USA: An ecological study. *Journal of Infection and Public Health*. 2020;13(10):1517-1521. doi:10.1016/j.jiph.2020.06.024

6. Korpela K, Salonen A, Virta LJ, et al. Intestinal microbiome is related to lifetime antibiotic use in Finnish pre-school children. *Nat Commun*. 2016;7(1). doi:10.1038/ncomms10410

7. Lieberthal AS, Carroll AE, Chonmaitree T, et al. The Diagnosis and Management of Acute Otitis Media. *Pediatrics*. 2013;131(3):e964-e999. doi:10.1542/peds.2012-3488

8. Mandell LA, Wunderink RG, Anzueto A, et al. Infectious Diseases Society of America/American Thoracic Society Consensus Guidelines on the Management of Community-Acquired Pneumonia in Adults. *Clinical Infectious Diseases*. 2007;44(Supplement_2):S27-S72. doi:10.1086/511159

9. Meyer Sauteur PM, Krautter S, Ambroggio L, et al. Improved Diagnostics Help to Identify Clinical Features and Biomarkers That Predict Mycoplasma pneumoniae Community-acquired Pneumonia in Children. *Clinical Infectious Diseases*. 2020;71(7):1645-1654. doi:10.1093/cid/ciz1059

10. Olarte L, Barson WJ, Barson RM, et al. Pneumococcal Pneumonia Requiring Hospitalization in US Children in the 13-Valent Pneumococcal Conjugate Vaccine Era. *Clinical Infectious Diseases*. 2017;64(12):1699-1704. doi:10.1093/cid/cix115

11. Pernica JM, Harman S, Kam AJ, et al. Short-Course Antimicrobial Therapy for Pediatric Community-Acquired Pneumonia: The SAFER Randomized Clinical Trial. *JAMA Pediatr*. 2021;175(5):475. doi:10.1001/jamapediatrics.2020.6735

12. Søndergaard MJ, Friis MB, Hansen DS, Jørgensen IM. Clinical manifestations in infants and children with Mycoplasma pneumoniae infection. *PLoS One*. 2018;13(4):e0195288. doi:10.1371/journal.pone.0195288

13. Waites KB, Ratliff A, Crabb DM, et al. Macrolide-Resistant Mycoplasma pneumoniae in the United States as Determined from a National Surveillance Program. *J Clin Microbiol*. 2019;57(11):e00968-19. doi:10.1128/JCM.00968-19

14. Williams DJ, Creech CB, Walter EB, et al. Short- vs Standard-Course Outpatient Antibiotic Therapy for Community-Acquired Pneumonia in Children: The SCOUT-CAP Randomized Clinical Trial. *JAMA Pediatr*. 2022;176(3):253. doi:10.1001/jamapediatrics.2021.5547

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Version History and Summary of Changes

- Version 1.0 (12/2/2024) Go live
- Version 1.1 (12/27/2024) Updated max daily dosing for ampicillin and added clarification on management of treatment failure patients.
- Version 1.2 (2/5/2025) Added contact method for reaching Antimicrobial Stewardship team
- Version 1.3 (3/11/2025) Revised wording on high vs low risk allergy vs non-allergic symptoms
- Version 1.4 (4/9/2025) Revised wording on contact method for reaching Antimicrobial Stewardship team. Added guidance for management of concurrent sinusitis
- Version 1.5 (12/9/2025) Revised wording on duration of treatment for outpatient pneumonia. Made pharmacy list a separate document.
- Version 1.6 (03/31/2026) Minor updating of links

Medical Disclaimer

This Clinical Practice Guideline (CPG) is designed to provide a framework for evaluation and treatment. It is not intended to establish a protocol for all patients with this condition, nor is it intended to replace a clinician's judgement. Adherence to this CPG is voluntary. Decisions to adopt recommendations from this CPG must be made by the clinician in light of available resources and the individual circumstances of the patient. Medicine is a dynamic science; as research and clinical experience enhance and inform the practice of medicine, changes in treatment protocols and drug therapies are required. The authors have checked with sources believed to be reliable in their effort to provide information that is complete and generally in accord with standards accepted at the time of publication. However, because of the possibility of human error and changes in medical science, neither the authors nor Children's Hospital and Health System, Inc., nor any other party involved in the preparation of this work warrant that the information contained in this work is in every respect accurate or complete, and they are not responsible for any errors in, omissions from, or results obtained from the use of this information.

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