CLINICAL PATHWAY:
Community Acquired Pneumonia (CAP)

THIS PATHWAY SERVES AS A GUIDE AND DOES NOT REPLACE CLINICAL JUDGMENT.

Inclusion Criteria: ≥2 month old with suspected community acquired pneumonia (CAP)

Exclusion Criteria: <2 months old (see **Fever & Sepsis in Neonate 0-28 Days Clinical Pathway**, **Fever & Sepsis in Infant 29-60 Days Clinical Pathway**), signs of sepsis (see **Septic Shock Clinical Pathway**), immunocompromised, Cystic Fibrosis, non-Cystic Fibrosis bronchiectasis, Primary Ciliary Dyskinesia/Immotile Cilia Syndrome, sickle cell, concern for tuberculosis, tracheostomy in place, hospital acquired pneumonia, ventilator associated pneumonia

Initial Evaluation:

- CXR
- *If moderate-large effusion:* consider obtaining ultrasound to evaluate for size of effusion and loculated/septated effusion
- *If under immunized for Hib (i.e., did not receive at least 2 doses of Hib vaccine), progression of CAP despite appropriate therapy , severely ill, or complicated CAP (i.e., large effusion, any size loculated/septated effusion, empyema, abscess, necrotic lung, pneumatocele):*
  - Obtain CBC w diff, lytes, blood culture (aerobic), procalcitonin
  - *For complicated CAP*: add anaerobic blood cultures
- *Consider adding:* MRSA nasal swab if concern for MRSA pneumonia (abscess, cavitation, empyema, or necrosis), viral testing if virus is circulating (influenza, Sars-CoV-2 PCR, RSV; BIOFIRE only if concerned for pertussis, atypical pneumonia, or if result would change antibiotic management; see **Appendix A**)

Note: If signs of sepsis, exit pathway and follow Septic Shock Clinical Pathway.

Confirmed CAP?

- NO → Exit pathway. Consider alternative diagnosis.
- YES

Uncomplicated CAP

(including pneumonia with trace/small and moderate effusions)

Patient fully immunized (i.e., received at least 2 doses of Hib vaccine) or **progression of CAP despite appropriate therapy:**

- **Ampicillin IV** 200 mg/kg/day div q6hr (max 2 g/dose) **or Amoxicillin PO** 90 mg/kg/day div 2 doses (max 1 g/dose)
- *If PCN allergy:* Ceftriaxone IV 50 mg/kg daily (max 2 g/dose) or Clindamycin IV/PO 40 mg/kg/day div 3 doses (max 600 mg/dose)

Patient not fully immunized (i.e., did not receive at least 2 doses of Hib vaccine) or **aspiration pneumonia suspected:**

- **Ampicillin/sulbactam IV** 200 mg of ampicillin/kg/day div q6hr (max 3 g of unasyn/dose) **or**
- **Augmentin ES PO** (600 mg/5 ml) 90 mg amox/kg/day div 2 doses (max 1 g/dose) [Augmentin XR is not recommended]
- *If PCN allergy:* consult Infectious Diseases (ID) for allergy considerations
  - *If not fully immunized*: start only Ceftriaxone IV 75 mg/kg/day daily (max 2 g/dose)
  - *If aspiration pneumonia*: start only Clindamycin IV/PO 40 mg/kg/day div 3 doses (max 600 mg/dose)

Additional Considerations:

- If concern for atypical pneumonia, pertussis, COVID-19 or influenza: see **Appendix A**

Complicated CAP

(large effusion, any size loculated/septated effusion, empyema, abscess, necrotic lung, pneumatocele)

- *Preference:* **Ceftriaxone IV** 75 mg/kg daily (max 2 g/dose) **and Clindamycin IV/PO** 40 mg/kg/day div 3 doses (max 600 mg/dose)
  - *Alternative:* Ampicillin/sulbactam IV 300 mg of ampicillin/kg/day div q6hr (max 3 g of Unasyn/dose)
- *If additional alternatives needed*: Infectious Diseases (ID) will discuss on a case-by-case basis

Additional Considerations:

- If concern for MRSA (e.g., previously infected, recently colonized in last 6 months, nasal MRSA swab positive):
  - Obtain MRSA nasal probe if not done (*note: this test has a high negative predictive value*)
  - Consider adding Vancomycin IV:
    - <52 weeks PMA‡/about <3 mo old: 15 mg/kg q8hr or as determined by pharmacy based on estimated AUC; ≥52 weeks PMA‡/about ≥3 months old – 11 years old: 70 mg/kg/day div q6hr; ≥12 yrs old: 60 mg/kg/day div q8hr [‡PMA (Post-Menstrual Age) = gestational age + postnatal age]
    - *If serum creatinine higher than expected for age, or change is >0.3 mg/dL over 48 hrs:* substitute vancomycin with linezolid IV 10 mg/kg/dose q8hr (q12hr if ≥12 yrs old)
- If concern for atypical pneumonia, pertussis, COVID-19 or influenza: see **Appendix A**

Consultations:

- Consult Infectious Diseases (ID)
- Consult Surgery if large effusion or empyema
  - If drained, obtain aerobic and anaerobic fluid cultures (send in capped syringe)

Meets admission criteria?[1]

- No → Discharge home. See discharge medications[2] below.
- Yes

[1]Admission Criteria:

- Hypoxemia <90%
- Increased WOB/ respiratory distress/ tachypnea
- Lethargy
- Progression of CAP despite appropriate therapy
- Complicated CAP
- Concern for compliance

Ongoing Management

- Complete initial evaluation, if not already complete
- Continue antibiotics and change to PO antibiotics, if clinically appropriate
- Duration of antibiotics per discharge medication section below[2]
- **Uncomplicated CAP:**
  - *If blood culture was obtained and positive, or there is no clinical improvement:* consult Infectious Diseases
  - Consider stopping antibiotics for uncomplicated CAP after 5 days of therapy, if clinically improved
- **Complicated CAP:**
  - Consult Infectious Diseases (and surgery, if needed) if not already done
  - If MRSA coverage started, consider discontinuing if nasal MRSA screen, blood cultures and pleural cultures are negative. If patient is unstable or MRSA is detected, discuss continuation of vancomycin with Infectious Diseases.

[2]Discharge Medications:

Total duration of treatment: mild uncomplicated CAP: 5 days; moderate uncomplicated CAP: 5-7 days; complicated CAP: 10 days minimum (discuss with ID)

- **Uncomplicated CAP:**
  - Continue (or change to) appropriate PO options as listed above.
  - *If PCN allergy and placed on Ceftriaxone IV:* switch to Cefuroxime PO 30 mg/kg/day div 2 doses (max 500 mg/dose) [Note: ensure patient is able to receive the antibiotic for home prior to discharge]
    - *Alternatives:* Clindamycin PO 40 mg/kg/day div 3 doses (max 600 mg/dose) or Cefdinir PO 14 mg/kg/day div 2 doses (max 600 mg/day)
  - *If alternative antibiotics were selected with ID:* ID will select appropriate antibiotics for discharge
- **Complicated CAP:** ID will advise selection of antibiotics at discharge
- If atypical pneumonia: azithromycin (see **Appendix A**) x5 days total
- If influenza: oseltamivir (see **Appendix A**) x5 days total

Discharge Criteria:

- O2 >90% on RA x12-24 hr
- Decreased fevers for 24 hours
- Tolerating discharge antibiotics
- Increased activity/appetite
- Baseline mentation
- Compliance with treatment
- Appropriate follow up in place

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Special Considerations:

<3 month old with *Chlamydia trachomatis*:

- Consult Infectious Diseases (ID)
- Send diagnostic tests as directed by ID
- *If proven or strongly suspected*: **ADD** azithromycin IV/PO 20 mg/kg x3 days

Documented Pertussis at Any Age:

- Azithromycin IV/PO (monotherapy):
  - <6 mo old: 10 mg/kg x5 days
  - ≥6 mo old: 10 mg/kg (max 500 mg/dose) x1 day, then 5 mg/kg (max 250 mg/dose) to complete 5 days

If respiratory BIOFIRE was sent due to significant concern for atypical pneumonia, and resulted with a positive *Chlamydia pneumoniae*:

- **ADD** azithromycin IV/PO:
  - <6 mo old: 10 mg/kg x5 days
  - ≥6 mo old: 10 mg/kg (max 500 mg/dose) x1 day, then 5 mg/kg (max 250 mg/dose) to complete 5 days

If respiratory BIOFIRE was sent due to significant concern for atypical pneumonia, and resulted with a positive *Mycoplasma pneumoniae*:

- Consider adding azithromycin (the addition of azithromycin to antibiotic regimen may have no added benefit to patient's overall clinical course)
  - <6 mo old: 10 mg/kg x5 days
  - ≥6 mo old: 10 mg/kg (max 500 mg/dose) x1 day, then 5 mg/kg (max 250 mg/dose) to complete 5 days

Documented Influenza:

- **ADD** oseltamavir PO:
  - Preterm neonates ≤40 weeks PMA: discuss dosing with pharmacy
  - Preterm neonates >40 weeks and term neonates up to 9 months: 3 mg/kg BID
  - ≥9 months up to 12 months: 3.5 mg/kg BID
  - ≥12 months:
    - >15 kg – 23 kg: 45 mg BID
    - >23 kg – 40 kg: 60 mg BID
    - >40 kg: 75 mg BID

Suspect COVID-19:

- Place on Special Precautions
  - **ED/Inpatient COVID-19 Algorithm**
  - **Inpatient Therapies for COVID-19 Clinical Pathway**

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