Community-Acquired Pneumonia v5.2: ED Phase

Approval & Citation | Summary of Version Changes | Explanation of Evidence Ratings

Inclusion Criteria
- Suspected community-acquired pneumonia in patients > 60 days old

Exclusion Criteria
- Immunodeficiencies (HIV, SCID, etc.)
- Risk for aspiration pneumonia
- Known lung disease other than asthma (CF, BPD, etc.)
- Cancer
- Prior/current trach or vent dependent
- Neuromuscular disease
- Empyema and lung abscess

! **Obtain Hib and Pneumococcal Immunization Status**

! What to consider if severely ill

Provider Assessment

Mildly ill

Well-appearing to Mildly ill:
- No initial testing, including Chest X-ray

Treatment
- If suspected bacterial CAP, antibiotics:
  - Amoxicillin PO or Ampicillin IV for fully immunized
  - If allergy, cefpodoxime, cefdinir, or clindamycin PO
  - If not fully immunized, cefpodoxime PO
- Consider adding macrolide for atypical pneumonia only
- Specific recommendations for influenza and MRSA

Moderately ill

Moderately ill: Initial Testing
- PIV
- Sputum cx if >=5 yrs
- Respiratory viral PCR
- 2-view Chest X-ray

If Severely ill add
- Blood Culture (v)
- CBC with diff

Empyema Identified → **Off Pathway** Consider Empyema Pathway

Treatment

If suspected bacterial CAP, antibiotics:
- Moderate illness:
  - Ampicillin IV for fully immunized children
  - Clindamycin IV for penicillin allergy
  - Ceftriaxone IV for not fully immunized
- Severely ill or admission to PICU:
  - Vancomycin, ceftriaxone, and azithromycin IV
- Specific recommendations for influenza and MRSA
- O2 to keep saturations > 90%
- IV fluids, as needed

Floor Admit | Floor Admit | ICU Admit

Discharge Criteria (Meets all)
- Tolerating PO
- Not hypoxemic (> 90%)
- Mildly increased or normal work of breathing

Discharge Instructions
- Treat 7-10 days total
- PMD f/u in 2-3 days

Inpatient Admit Criteria
- Hypoxia (< 90% Sp 02)
- Inability to tolerate PO
- Increased work of breathing (grunting, retracting, tachypnea)
- 2-6 month olds with suspected bacterial CAP

PICU Admit Criteria
- Altered mental status
- Concern for respiratory failure, sepsis
- Failure to maintain 02 sat with Fi02 of < 50%
- Need for positive pressure ventilation

Go to Inpatient Phase

Last Updated: December 2018
Next Expected Review: Spring 2019

Community-Acquired Pneumonia v5.2: Inpatient Phase

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Empyema Identified

Empyema Identified

Off Pathway
Consider Empyema Pathway

Medical Unit Therapies
- Use pulse oximetry
- Continue antibiotics:
  - Ampicillin IV for fully immunized
  - If penicillin allergy, clindamycin IV
  - Ceftriaxone IV if not fully immunized
- Consider adding macrolide for atypical pneumonia only
- Specific recommendations for influenza and MRSA
- O2 to keep saturations > 90%
- IV fluids, as needed

Antibiotic recommendations on transfer from PICU to floor

PICU Diagnostics and Therapies
- Diagnostics at time of intubation
- Testing for atypicals
- Pleural fluid testing
- Vancomycin, ceftriaxone, and azithromycin IV
- Oseltamivir for suspected influenza
- IV fluids, as needed
- Respiratory support per PICU protocol
- Consider ABG

When to consider failing treatment

CRP and Chest PT not routinely indicated

Repeat Diagnostics
- Repeat chest x-ray if patient not improving as expected

Discharge Criteria
- Overall clinical improvement, including mental status and work of breathing
- Tolerating oral nutrition and a dose of oral antibiotics
- No fever for > 12 hours
- Pulse Ox > 90% on room air for > 12 hours

Discharge Instructions
- Total treatment 7-10 days for uncomplicated disease and 14 days for complicated disease
- F/U with PMD in 2-3 days after discharge

Last Updated: December 2018
Next Expected Review: Spring 2019

Introduction – Community Acquired Pneumonia

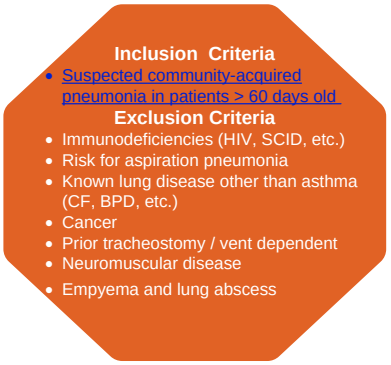
This clinical standard work pathway is meant to entail the diagnosis and management of patients with community-acquired pneumonia (CAP). About 200 patients with CAP are admitted to SCH annually, and 2-3 times that many are evaluated in the ED. The inclusion and exclusion criteria as are follows:

Inclusion Criteria

Suspected community-acquired pneumonia in patients > 60 days old

Exclusion Criteria

1. Immunodeficiencies (HIV, SCID, etc.)
2. Risk for aspiration pneumonia
3. Known lung disease other than asthma
4. Cancer
5. Prior tracheostomy / vent dependent
6. Neuromuscular disease
7. Empyema and lung abscess



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Definitions for Typical and Atypical Pneumonia

Pneumonia:

An infection of the lower airways, and can be caused by a variety of organisms such as viruses, bacteria, atypical bacteria (such as *Mycoplasma*), and rarely fungi. Clinical signs often encountered in pneumonia include fever, tachypnea, cough, hypoxia, and increased work of breathing (such as retractions and grunting). There is often evidence of radiologic abnormality in one or both lungs.

Atypical pneumonia:

Pneumonia caused by atypical bacteria (such as *Mycoplasma* or *Chlamydophila*) rather than viruses or typical bacteria (such as *Streptococcus pneumoniae*, *Haemophilus influenzae*, or *Moraxella catarrhalis*). Atypical pneumonia is more common in children over 5, but is possible in children of any age. Clinical signs often encountered in atypical pneumonia include a longer prodrome of cough symptoms and less tachypnea than is seen in typical pneumonia, a lack of focal findings on clinical exam or radiologic studies.

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Some factors useful to consider in differentiating viral, bacterial, and atypical pneumonia:

Viral	Bacterial	Atypical
• Children < 1 year old • Children with only mild temperature elevation (<39.5) • Children with non-focal physical examination of the lungs • Children with other signs of upper respiratory infection, such as rhinorrhea • More gradual onset of symptoms	• Children > 1 year old • Children with high temperature elevations (>39.5) • Children with focal findings on clinical or radiologic examinations • Ill, or Toxic-appearing children • More rapid onset of symptoms, or second phase of a biphasic illness • Focal chest pain	• Children > 5 years old • Symptoms that have lasted > 5-7 days • Mild symptoms • Children with non-focal physical examination of the lungs • Other non-specific symptoms such as malaise or headache • Wheezing or bronchospasm

[LOE: ✪✪✪○ Moderate quality] (Bradley, 2011; local consensus)

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Illness Severity

Mild Pneumonia:

Minimally increased work of breathing, no hypoxemia, able to tolerate PO

Moderate Pneumonia:

Hypoxemia, inability to tolerate PO, moderately increased work of breathing (grunting, retracting, tachypnea)

Severe Pneumonia:

Significantly increased work of breathing, altered mental status, concern for respiratory failure, sepsis, failure to maintain 02 sat with Fi02 of 50%, need for positive pressure ventilation

[LOE: ✪✪✪○ Moderate quality] (Bradley, 2011)

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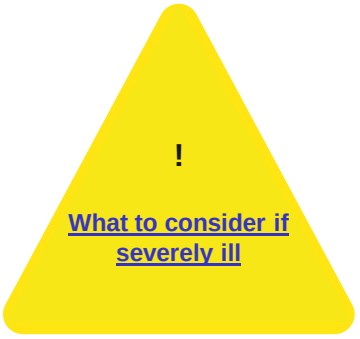
What to Consider if Severely Ill

For severely ill children, consider the following:

- The possibility of *S. aureus* (including MRSA) pneumonia
- Empyema
- Lung abscess
- Congenital heart disease
- Other congenital lung malformations
- Foreign body aspiration
- Pertussis (especially in the youngest patients)



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Pneumonia Recommendation Diagnostic Tests

Microbiologic Testing

- Blood cultures are no longer recommended in all children requiring hospitalization for presumed bacterial CAP that is moderate in severity. Internal surveillance data over a 3-year period (when blood cultures were previously mandated) found only 2 true positive blood cultures, and the results did not impact or change patient care.
- Clinicians might consider obtaining blood cultures in cases of severe pneumonia (PICU), particularly those with complicated pneumonia. However, blood cultures are expected to be positive in <10% of patients.
- A complete blood cell count (CBC) should be obtained only for patients with severe pneumonia (PICU), to be interpreted in the context of the clinical examination and other laboratory and imaging studies.
- Sputum samples for culture and Gram stain should be obtained in hospitalized children who can produce sputum, typically those >5 years of age. If patients are not producing copious sputum, additional measures to induce sputum may not be of added benefit.

[LOE: ✪✪✪○ Moderate quality] (Bradley, 2011; Harris, 2011; local consensus)

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Pneumonia Recommendation Diagnostic Tests (cont'd)

Microbiologic Testing

- Sputum samples for culture and Gram stain should be obtained in hospitalized children who can produce sputum, typically those >5 years of age. If patients are not producing copious sputum, additional measures to induce sputum may not be of added benefit.

[LOE: ✪✪✪○ Moderate quality] (Bradley, 2011; Harris, 2011; local consensus)

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Pneumonia Recommendation Diagnostic Tests (cont'd)

Microbiologic Testing

- Nasal swabs for PCR to detect respiratory viruses.
- If obtained, pleural fluid should be sent for microscopy, culture, and PCR.
- Acute-phase reactants, such as the erythrocyte sedimentation rate (ESR), C-reactive protein (CRP) concentration, or serum procalcitonin concentration, cannot be used as the sole determinant to distinguish between viral and bacterial causes of CAP.
- In patients with more serious disease, such as those requiring hospitalization or those with pneumonia-associated complications, acute-phase reactants may be used in conjunction with clinical findings to assess response to therapy.

[LOE: ✪✪✪○ Moderate quality] (Bradley, 2011; Harris, 2011)

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Pneumonia Recommendation Diagnostic Tests (cont'd)

Tuberculosis

- Discuss potential tuberculosis (TB) risk factors with each patient and family admitted for pneumonia.
- If TB is suspected, obtain TB screening:
  - For patients < 5 years old, perform PPD
  - For patients ≥ 5 years old, perform QuantiFERON gold
- If active pulmonary TB is suspected, obtain 3 first-morning gastric aspirates (OR sputum from those able to produce sputum) for AFB culture.
- Involve Infectious Diseases and Infection Prevention if active pulmonary TB is suspected.

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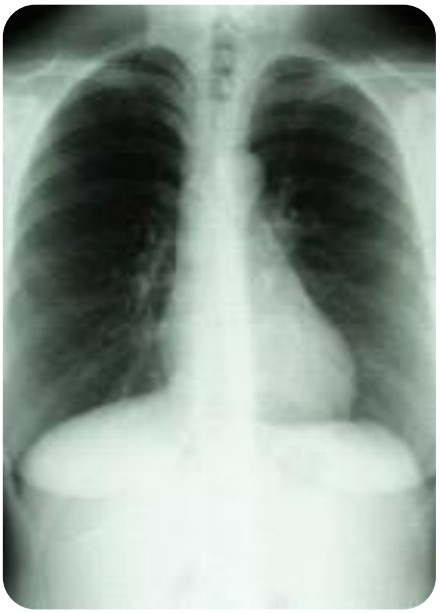
Diagnostic Tests: Chest X – Ray

Initial Presentation

Chest radiographs, posteroanterior and lateral, should be obtained in patients with suspected or documented hypoxemia or significant respiratory distress and in those with failed initial antibiotic therapy to verify the presence or absence of complications of pneumonia, including parapneumonic effusions, necrotizing pneumonia, and pneumothorax.



[LOE: ✪✪✪○ Moderate quality] (Bradley, 2011)

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Definitions: Fully Immunized – Pneumococcal

Age	Doses Received
<4 months	1 dose
<6 months	2 doses
6-12 months	3 doses of vaccine
≥ 12 months	3 or 4 total doses of vaccine, one of which was after 12 months of age
≥ 24 months	2 total doses of vaccine, one of which was after 24 months of age
Children at high risk of pneumococcal disease	4 doses of vaccine

[LOE: ✪✪✪○ Moderate quality] (ASA, 2011)

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Definitions: Fully Immunized – Hib

Age	No. doses of vaccine
<4 months	1 dose
<6 months	2 doses
6-12 months	3 doses
≥12 months	2 total doses of vaccine, the first of which was at 12-14 months of age
≥12 months	3 total doses of vaccine, the first at <12 months of age, the second at <15 months of age, and the third at ≥12 months of age
≥15 months	first dose of vaccine was at or after 15 months of age

[LOE: ✪✪✪○ Moderate quality] (ASA, 2011)

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Therapy: Ampicillin IV

Ampicillin or penicillin G should be administered to the fully immunized infant or school-aged child admitted to a hospital ward with CAP when local epidemiologic data document lack of substantial high-level penicillin resistance for invasive *S. pneumoniae.*

[LOE: ✪✪✪○ Moderate quality] (Bradley, 2011)

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Antibiotic Selection by Severity & Clinical Scenario

Severity level	Clinical scenario				
	No allergies	Not fully immunized	Penicillin allergy	Cephalosporin allergy	Atypical pneumonia
Mild	PO amoxicillin or IV ampicillin	PO cefpodoxime or IV ceftriaxone	PO cefpodoxime or PO/IV clindamycin or IV ceftriaxone	PO/IV clindamycin	Add PO/IV azithromycin to primary antibiotic
Moderate	IV ampicillin	IV ceftriaxone	IV ceftriaxone or IV clindamycin	IV clindamycin	Add IV azithromycin to primary antibiotic
Severe	IV ceftriaxone, IV vancomycin, AND IV azithromycin			Consult ID	IV ceftriaxone, IV vancomycin, AND IV azithromycin

Note: Cefdinir is not on formulary at SCH

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Antibiotic Selection on Transfer from ICU to Floor

- Consultation with Infectious Diseases may be required to select antibiotics for patients transferring from the ICU to the floor.
- Specifically, high-dose oral amoxicillin-clavulanate may often be considered as an oral transition from IV ceftriaxone, and oral clindamycin or linezolid can be considered as oral transitions from IV vancomycin.

[LOE: ○ ○ ○ ○ None] (local consensus)

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Macrolides – Outpatient & Discharge from ED

- Consider **adding** macrolide to amoxicillin at discharge from ED if the patient's clinical picture is difficult to distinguish between atypical pneumonia and routine CAP.
- Consider macrolide **alone** at discharge from ED if they have clear signs or symptoms of atypical pneumonia (typically, but not limited to, patients >5 years, prolonged symptoms >3 days, headache, non-focal exam, not ill-appearing, etc.), though monotherapy with macrolides is not recommended for typical CAP.

[LOE: ✪✪✪○ Moderate quality] (Bradley, 2011; Harris, 2011; local consensus)

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Macrolides – Inpatient

- Most patients do not require macrolide therapy, and *S. pneumoniae* tends to be more resistant to macrolides than penicillins.
- Do not add macrolide to ampicillin unless the patient has signs or symptoms of atypical pneumonia (typically, but not limited to, patients >5 years, prolonged symptoms >3 days, headache, non-focal exam, not ill-appearing, etc.) or for those with proven *Mycoplasma.*

[LOE: ✪✪✪○ Moderate quality] (Bradley, 2011; Harris, 2011; local consensus)

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Specific recommendations for influenza and MRSA

- Administer oseltamivir if documented or highly suspected influenza to patients being discharged from the ED or to those admitted.
- Administer amoxicillin-clavulanate [for those with mild disease or outpatients] or ampicillin-sulbactam [for those with moderate disease or inpatients] to children with known influenza virus infection in whom bacterial superinfection is suspected, given the known association between influenza and *Staphylococcus aureus* superinfection. Use clindamycin in place of the β-lactam antibiotic if patient is known to be colonized with or at risk for methicillin-resistant *Staphylococcus aureus* (MRSA).
- Provide clindamycin [for those with moderate disease] or vancomycin [for those with severe disease] in addition to β-lactam therapy if clinical, laboratory, or imaging characteristics are consistent with infection caused by *S. aureus*.

[LOE: ✪✪○○ Low quality] (Bradley, 2011; Harris, 2011; local consensus)

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PICU Admission Criteria

- Need for invasive ventilation via a nonpermanent artificial airway (e.g., endotracheal tube).
- Need for noninvasive positive pressure ventilation (e.g., continuous positive airway pressure or bilevel positive airway pressure).
- Respiratory failure is evidenced by:
    1. Increased work of breathing
    2. Retractions
    3. Recurrent apnea
    4. Grunting
    5. Hypoxemia
    6. Overall clinical appearance
    7. Decreased level of consciousness
- Sustained tachycardia, inadequate blood pressure, or need for pharmacologic support of blood pressure or perfusion.
- Pulse oximetry measurement is ≤ 90% with inspired oxygen of ≥ 50%.
- Illness severity scores alone do not establish the need for ICU.

[LOE: ✪✪✪○ Moderate quality] (Bradley, 2011)

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Inpatient Admission Criteria

Children who have moderate to severe CAP as defined by several factors, including respiratory distress and hypoxemia, should be hospitalized.

1. Sustained $SpO_2 < 90\%$
2. Cyanosis
3. Retractions and grunting (a sign of impending respiratory failure)
4. Nasal flaring and head bobbing
5. Dehydration, vomiting or failure to take oral medications
6. Presence of co-morbid conditions

Infants 2-6 months of age with suspected bacterial CAP are likely to benefit from hospitalization.

[LOE: ✪✪✪○ Moderate quality] (Bradley, 2011)

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Children's Oximetry Policy

Use supplemental oxygen for the following indications:

1. Hypoxemia.
2. Excessive work of breathing.
3. Excessive myocardial work.
4. Hypotension and/or Hemodynamic Instability.

[Children's Pulse oximetry policy, 2011]

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The Use of Chest Physiotherapy

- Chest physiotherapy (CPT) had no effect on length of hospital stay, fever, or radiographic findings. Some suggestion that CPT is counterproductive, with longer fever lengths. A supported sitting position may help to expand the lungs and improve respiratory symptoms in a child with respiratory distress.
- It is recommended that therapies directed toward airway clearance, such as postural drainage and CPT not be used for the patients with uncomplicated pneumonia.
- Early mobilization (movement out of bed with change from horizontal to upright positioning for at least 20 minutes in the first 24 hours of stay and subsequent increasing activity each additional day) alone may be more effective than usual care at reducing the mean length of stay. Bottle blowing plus encouragement to sit up 10 times a day and early mobilization may decrease length of stays.

[LOE: ✪✪○○ Low quality] (Gilchrist, 2008)

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SCH Oximetry Policy

Use supplemental oxygen for the following indications:

1. Hypoxemia.
2. Excessive work of breathing.
3. Excessive myocardial work.
4. Hypotension and/or Hemodynamic Instability.

[SCH Pulse oximetry policy, 2011]

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Diagnostic Tests: Chest X – Ray

Initial Presentation

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[LOE: ✪✪✪○ Moderate quality] (Bradley, 2011)

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Follow-up Radiographs

- Repeated chest radiographs are not routinely required in children who recover uneventfully from an episode of CAP.
- Repeated chest radiographs should be obtained in children who fail to demonstrate clinical improvement and in those who have progressive symptoms or clinical deterioration within 48-72 hours after initiation of antibiotic therapy.
- Follow-up chest radiographs should be obtained in patients with complicated pneumonia with worsening respiratory distress or clinical instability, or in those with persistent fever that is not responding to therapy over 48-72 hours.
- History and physical examination may be suggestive of parapneumonic effusion in children suspected of having CAP, but chest radiography should be used to confirm the presence of pleural fluid. If the chest radiograph is not conclusive, then further imaging with chest ultrasound or computed tomography (CT) is recommended.

[LOE: ✪✪✪○ Moderate quality] (Bradley, 2011)

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Diagnostic Tests: PICU

In addition to the diagnostics obtained for those admitted to the floor:

- Perform tracheal aspirate and bronchial brushing for Gram stain and culture at time of intubation.
- Bronchoalveolar lavage (BAL), percutaneous lung aspiration, or open lung biopsy should be reserved for the immunocompetent child with severe CAP if initial diagnostic tests are not positive.
- Perform Acute and convalescent serology for respiratory viruses, *Mycoplasma* and *Chlamydia.*
- If obtained, send pleural fluid for microscopy, culture, and bacterial PCR.

[LOE: ✪✪○○ Low quality](Bradley, 2011; Harris 2011)

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Discharge Criteria

Patients are eligible for discharge when they:

- Have documented overall clinical improvement, including level of activity, appetite, and decreased fever for at least 12 hours.
- Demonstrate consistent pulse oximetry measurements >90% in room air for at least 12 hours.
- Demonstrate stable and/or baseline mental status.
- Have tolerated a dose of oral antibiotics.

Patients are ***NOT eligible*** for discharge when they:

- Have substantially increased work of breathing or sustained tachypnea or tachycardia.

[LOE: ✪✪✪○ Moderate quality] (Bradley, 2011)

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Length of Treatment

- Total of 7-10 days, including both intravenous and oral antibiotics, for those with mild to moderate illness severity
- Total of 10-14 days, including both intravenous and oral antibiotics, for those with severe illness
- For patients with complicated illness, consult with ID or other SCH guidelines (e.g., empyema)

[LOE: ✪✪✪○ Moderate quality] (Bradley, 2011; local consensus)

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When to consider failing treatment:

- Children on adequate therapy should demonstrate clinical and laboratory signs of improvement within 48-72 hours.
  [LOE: ✪✪✪○ Moderate quality] (Bradley, 2011; strong recommendation)
- Children may remain febrile for the first 48-72 hours, even if on appropriate antimicrobial therapy.
  [LOE: ✪✪○○ Low quality] (local consensus, weak recommendation)
- For children whose condition deteriorates after admission and initiation of antimicrobial therapy or who show no improvement within 48-72 hours, further investigation should be performed.
  [LOE: ✪✪✪○ Moderate quality] (Bradley, 2011; strong recommendation)

When to consider failing treatment:

Children who are not responding to initial therapy after 48-72 hours should be managed by one or more of the following:

- Clinical and laboratory assessment of the current severity of illness and anticipated progression in order to determine whether higher levels of care or support are required.
  [LOE: ✪✪○○ Low quality] (Bradley 2011, strong recommendation)
- Imaging evaluation to assess the extent and progression of the pneumonic or parapneumonic process.
  [LOE: ✪✪○○ Low quality] (Bradley 2011, weak recommendation)
- Further investigation to identify whether the original pathogen persists, the original pathogen has developed resistance to the agent used, or there is a new secondary infecting agent.
  [LOE: ✪✪○○ Low quality] (Bradley 2011, weak recommendation)

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Evidence Ratings

We used the GRADE method of rating evidence quality. Evidence is first assessed as to whether it is from randomized trial, or observational studies. The rating is then adjusted in the following manner:

Quality ratings are *downgraded* if studies:
- Have serious limitations
- Have inconsistent results
- If evidence does not directly address clinical questions
- If estimates are imprecise OR
- If it is felt that there is substantial publication bias

Quality ratings can be *upgraded* if it is felt that:
- The effect size is large
- If studies are designed in a way that confounding would likely underreport the magnitude of the effect OR
- If a dose-response gradient is evident

Quality of Evidence:
✪✪✪✪ High quality
✪✪✪○ Moderate quality
✪✪○○ Low quality
✪○○○ Very low quality
Expert Opinion (E)

Reference: Guyatt G et al. J Clin Epi 2011: 383-394

To Bibliography

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Value Analysis: Pneumonia

STEP 2: APPLY CLINICAL EFFECTIVENESS VALUE ANALYSIS TOOL

DIMENSION	CARE OPTION A	CARE OPTION B	PREFERRED OPTION	ASSUMPTIONS MADE
DESCRIPTION OF CARE TREATMENT OPTION	Routine blood culture for all moderately to severely ill appearing patients with CAP	No routine blood culture unless concern for sepsis		
OPERATIONAL FACTORS				
Percent adherence to care (goal 80%)	64%	75%	OPTION B	All patients admitted wth CAP are moderately to severely ill
Care delivery team effects	If patient is not septic app	None	OPTION B	
BENEFITS / HARMS (QUALITY/OUTCOME)				
Degree of recovery at discharge			NEUTRAL	
Effects on natural history of the disease over equivalent time			NEUTRAL	
Potential to cause harm	Pain of second blood draw	May miss cases of bactere	NEUTRAL	
Palatability to patient/family		Preferred as no second bl	OPTION B	
Population-related benefits	If there is an increase in the rate of amp resistant org		OPTION A	
Threshold for population-related benefits reached				
COST (Arising from Options A or B) - express as cost per day				
"ROOM RATE" ($ or time to recovery)			NEUTRAL	
"Dx/Rx" costs ($)	$80/blood culture (Total $8,381 for FY14)		OPTION B LESS EXPENSIVE	
COST (Complications/adverse effects arising from Options A or B)- express as cost per day				
"ROOM RATE" ($ or time to recovery)			NEUTRAL	
"Dx/Rx" costs ($)			N/A	[estimate probability of complication]

STEP 3: APPLY VALUE ANALYSIS GRID

	BENEFIT (QUALITY & OUTCOMES)			
COST	**A > B**	**A = B**	**A < B**	**Unclear**
A costs more than B	Make value judgement	B	B	Do B and PDSA in 1 year
A and B costs are the same	A	A or B, operational factors may influence choice	B	A or B, operational factors may influence choice, PDSA in 1 year
B costs more than A	A	A	Make value judgement	Do A and PDSA in 1 year

STEP 4: CREATE VALUE STATEMENT

FINAL CSW VALUE STATEMENT	*Routine blood culture ordering has not resulted in clinically relevant information and is performed at the expense of increased pain to patient and cost to the system; therefore, the committee has decided to no longer recommend routine blood cultures for all pathway eligible patients admitted for community-acquired pneumonia. This recommendation is based on a retrospective chart review of 3 years of data since launch of the CSW Pneumonia pathway in 2012. A cost-effectiveness cost strategy approach was applied.*

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Pneumonia Approval & Citation

Approved by the CSW Pneumonia for September 2012

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Surgeon-in-Chief	Bob Sawin, MD

Retrieval Website: http://www.seattlechildrens.org/pdf/pneumonia-pathway.pdf
Please cite as:
Seattle Children's Hospital, O'Callaghan J, Slater A, Beardsley E, Kronman M, Ringer C. 2012 September. Pneumonia Pathway. Available from: http://www.seattlechildrens.org/pdf/pneumonia-pathway.pdf

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Summary of Version Changes

- **Version 1.0 (9/05/2012):** Go live
- **Version 2.0 (6/3/2014):** Changed flow of the inpatient phase algorithm and added two additional information slide for when to fail treatment
- **Version 3.0 (7/23/2015):** Changed the order of antibiotics listed for amp allergic patients. Changed the oral antibiotic options for unimmunized children
- **Version 4.0 (2/10/2016):** CSW Value Analysis completed, changes are to no longer recommend routine blood cultures for all pathway eligible patients admitted for community-acquired pneumonia
- **Version 5.0 (09/30/2016):**Updated algorithm and training module to align antibiotic recommendations in cases of PCN or cephalosporin allergies as provided in algorithm, training module and powerplan
- **Version 5.1 (11/25/16):** Updated approval page to include Laboratory
- **Version 5.2 (12/18/18):** Added link to empyema pathway where indicated.

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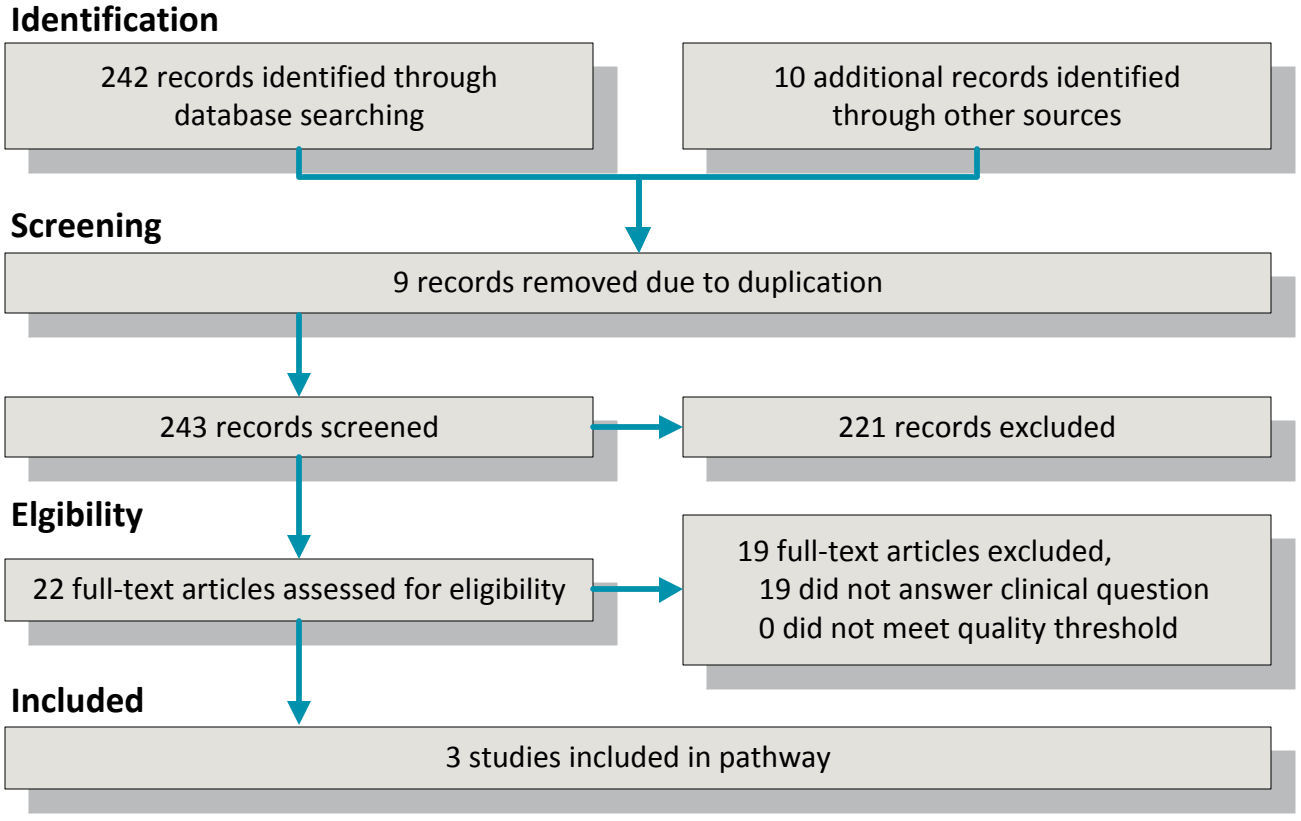
Bibliography

Literature Search

Search Methods, Pneumonia, Clinical Effectiveness

Studies were identified by searching electronic databases using a search strategy developed by a medical librarian. Searches were performed on March 27-29, 2012 in the following databases: on the Ovid platform – Medline (1996 to date), Cochrane Database of Systematic Reviews (2005 – June 2011); elsewhere the National Guidelines Clearinghouse, Clinical Evidence, TRIP, and EMBASE were searched. Retrieval was limited to English language, and articles in children 0-18. Per team's request, retrieval results excluded lung diseases, cystic fibrosis, leukemia, cancer or hosts who were immunocompromised. Additional citations were identified by the team and included during the review process. In Medline, appropriate Medical Subject Headings (MeSH) were used, along with text words, and the search strategy was adapted for other databases using their controlled vocabularies, where available, along with text words. Results were restricted to high levels of evidence where appropriate using the following publication limits; consensus development conference, consensus development conference (NIH), guideline, systematic review, meta-analysis or practice guideline.

Jamie Graham
June 28, 2012



Flow diagram adapted from Moher D et al. BMJ 2009;339:bmj.b2535

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