

# Pneumonia Care Map

---

Go directly to [Care Map Flowchart](#)



When accessing a document, please use the browser return arrow (upper left-hand corner) to return to the Care Map

## Care Map Symbols

Links to more information or returns to a previous page.

Start of a Care Map Segment

Decision Point

Stop and Evaluate

Care Map Step  
Blue underlined text is a hyperlink

Progression of care – Patient Improving



Source Reference



Education Module



Hospital Policy



Hospital Reference



Provider Information



Download File

# Pneumonia Care Map

Go directly to [Care Map Flowchart](#)

[Quick overview of the diagnosis and treatment of pneumonia](#)

[Pneumonia Care Map Dashboard](#)

## Suggested Inclusion Criteria for Pneumonia Care Map

- Age 3 month to 21 yrs
- Clinical exam is indicative of community acquired pneumonia (CAP)



This care map document does not supersede the clinical judgment of a provider regarding the care that is ultimately ordered for a given patient. [Click to see full disclaimer.](#)



[Executive Summary](#)



[ISDA Community Acquired Pneumonia Guidelines](#)



[Patient Pneumonia Education Booklet](#)



# Pneumonia Care Map

Go directly to [Care Map Flowchart](#)

[Quick overview of the diagnosis and treatment of pneumonia](#)

[Pneumonia Care Map Dashboard](#)

## Potential Reasons to Avoid Pneumonia Care Map

- Patients with the clinical presentation of Bronchiolitis
- Patients with suspected asthma
- Co – morbid conditions predisposing to severe or recurrent respiratory illness:
  - Cystic Fibrosis
  - Chronic Lung Disease
  - Neuromuscular Disease
  - Tracheostomy Patients
  - Sickle Cell Disease.



This care map document does not supersede the clinical judgment of a provider regarding the care that is ultimately ordered for a given patient. [Click to see full disclaimer.](#)



[Executive Summary](#)



[ISDA Community Acquired Pneumonia Guidelines](#)



[Patient Pneumonia Education Booklet](#)

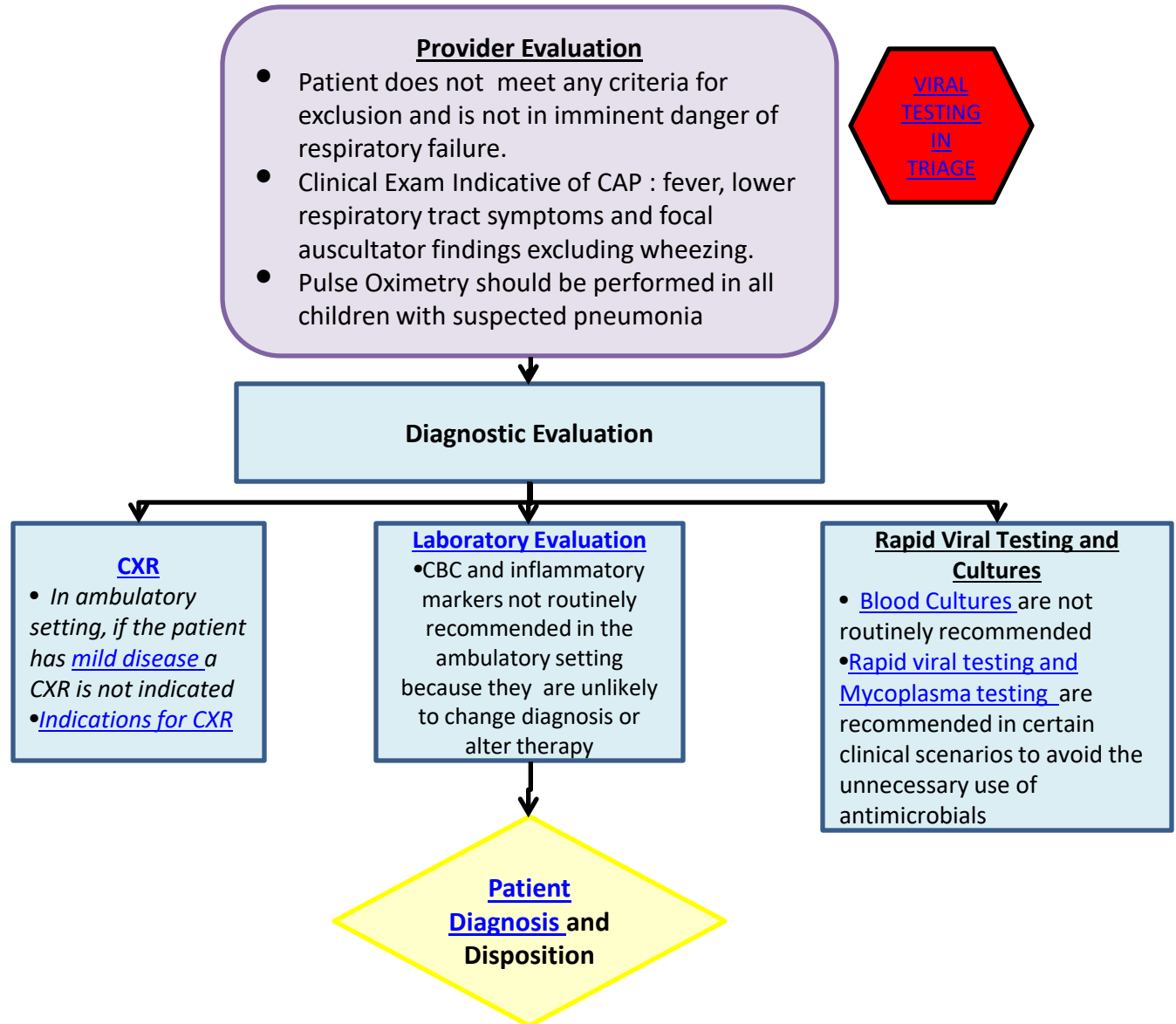


# Emergency Department Care: Clinical Exam is indicative of Community Acquired Pneumonia



Diagnostic testing & therapies not routinely recommended:

- **Chest XR:** not necessary for the confirmation of suspected CAP in patients well enough to be treated in the outpatient setting (after evaluation in the office, clinic, or emergency department setting).
- **Blood Cultures**
- **Sputum Cultures**



# Emergency Department Care: Patient Disposition

Continued from previous [page](#)

Reassess  
clinical  
status

## Discharge Criteria ( Meets all):

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

## Admission Criteria to Inpatient Unit

- Moderate to severe CAP
- Children/infants suspected of pneumonia with *Staphylococcus aureus* as a pathogen
- Hypoxic
- Not tolerating PO
- Failed outpatient therapy

Complicated  
Pneumonia Off  
Pathway

## Ambulatory Management:

- Antibiotic Selection and LOT
- F/U recommendations within 72 hours
- F/U CXRs are not routinely required in those who recover uneventfully from an episode of CAP

## Admission Criteria to PICU

- severe CAP with impending respiratory failure
- Need for pharmacologic support of blood pressure or perfusion
- Remains hypoxic with an FiO<sub>2</sub> of > 50%
- Altered mental status

## Discharge Checklist

1. F/U recommendations made and available
2. Assure ability to fill and take prescription
3. Discharge instructions include treatment guidelines and indications for return

Diagnostic testing & therapies not routinely recommended:

- Chest XR: not necessary for the confirmation of suspected CAP in patients well enough to be treated in the outpatient setting (after evaluation in the office, clinic, or emergency department setting).
- **Blood Cultures**
- **Sputum Cultures**

# Inpatient Care

Initial Inpatient assessment

- [Antibiotic therapy](#)
- [Appropriate order for pulse ox monitoring and vital signs](#)
- [Age appropriate activity level and incentive spirometry to improve pulmonary toilet](#)
- [Appropriate Isolation](#)

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

- Assess current disease severity through clinical and laboratory evaluation to determine if higher level of care needed
- Repeat imaging to evaluate the extent and progression of disease
- Further investigation of potential pathogen

- Discharge Criteria**
- 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.

## Discharge Checklist

1. F/U recommendations made and available within 72 hours
2. Assure ability to fill and take prescription
3. [Discharge instructions include treatment guidelines and indications for return](#)

Diagnostic testing & therapies not routinely recommended:

- [Repeat Chest XR](#): Not needed unless clinical worsening or failure to respond in 48-72 hours.
- [Repeat CBC and inflammatory markers](#) are not needed unless failure to respond in 48-72 hours.
- [CPT is not recommended in the treatment of CAP](#)

# Canned ED and Inpatient Discharge Text

## ED

- Your child was diagnosed with Pneumonia, an infection of the lungs caused by bacteria. We recommend you give your child the antibiotic \_\_\_\_\_ for a total of 7 days to treat this infection. It is important you give this medication as prescribed and for the entire duration.
- Encourage your child to sit up frequently, get out of bed at least three times a day, and walk as often as he/she is able.
- Encourage your child to blow bubbles, blow up balloons, blow into a straw to speed up his/her recovery and to keep him/her from worsening.
- Encourage small, but frequent amount of fluids to keep your child well hydrated. Once your child starts to feel better, his/her appetite should improve.
- Your child needs to be seen by his/her regular doctor in 2-3 days for a recheck. Your child should be kept out of school or daycare until seen by your regular doctor.
- Return to the Emergency Department if your child is
  - Having difficulty breathing (fast breathing, chest retractions, nasal flaring), shortness of breath, color changes, vomiting following coughing spells
  - Decreased drinking, decreased urine output, lethargy
  - Develops new fevers while on antibiotics
  - If you have any concerns that he/she has worsened or developed any new or worsening symptoms

## Inpatient

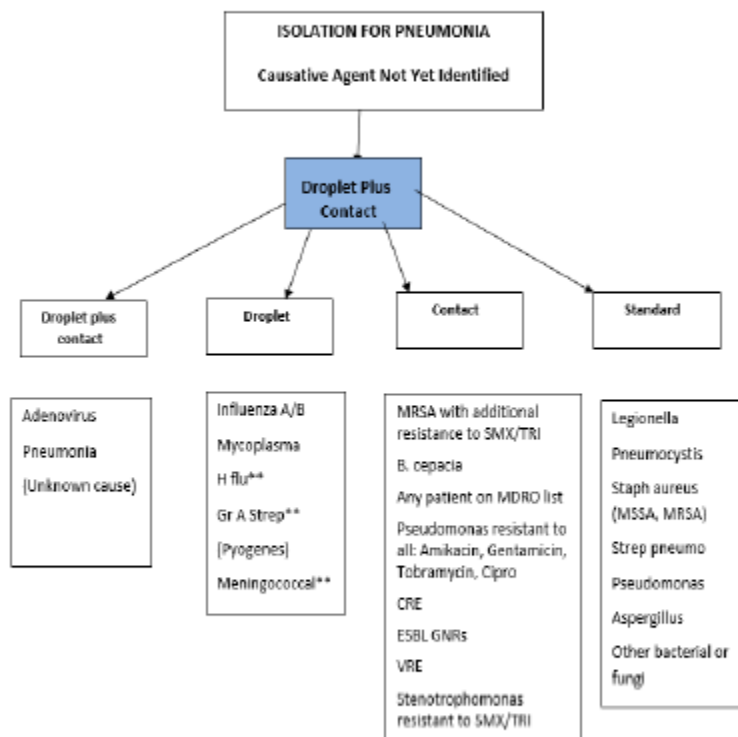
- Follow-up with Primary Care Provider in 2 to 3 days.
- Return to the Emergency Department if :
  - ✓ your child is having trouble breathing, chest pain, shortness of breath, coughing followed by vomiting
  - ✓ not drinking well, not urinating
  - ✓ having new fevers while on antibiotics, or other worrisome signs/symptoms.
- The American Academy of Pediatrics says that cough and cold medications should not be recommended or prescribed for respiratory illnesses in children under 4 years of age. These medicines offer little benefit to young children and can have serious side effects.
- Also, in most cases, it is not necessary for your child to have a repeat XRAY if they continue to improve as expected.
- Encourage your child to drink liquids frequently. Appetite for solid foods will increase as your child gets better.
- A complete list of medications will be provided at discharge. Take all medications as prescribed and for the full course.

Return to Page 6: [Pneumonia Care Map](#)

Return to Page 7: [Pneumonia Care Map](#)

## TITLE: ISOLATION PRECAUTIONS QUICK REFERENCE POLICY

### APPENDIX C: ISOLATION QUICK REFERENCE DISEASE SPECIFIC FLOW CHARTS



\*See appendix A for guidelines for specific pathogens identified by current testing means

\*\* Bacterial pneumonia may change to standard precautions once received 24 hours of treatment with clinician's approval (Except Mycoplasma). Pathogen identification is not necessary if clinically consistent. Note: If viral infection identified or suspected, must remain on appropriate level as identified above.

Return to Page 7: [Pneumonia Care Map](#)

# Clinical findings suggestive of complicated pneumonia

- > 3yr of age with one or more of the following:
  - Prolonged fever > 7days
  - Dullness to percussion
  - Decreased/diminished breath sounds
  - Change in quality of breath sounds and transmitted speech
  - Failure to respond in 48-72 hours to adequate antibiotic therapy

Byington, Spencer et al. 2002; Schultz, Fan et al. 2004; Bradley, Byington et al. 2011; Bradley, Byington et al. 2011; Harris, Clark et al. 2011

Return to Page 6: [Pneumonia Care Map](#)

# Indications for moderate to severe disease

## Criteria for Respiratory Distress/ severe disease in Children With Pneumonia

### 1. Tachypnea, respiratory rate, breaths/min

Age 0–2 months: >60

Age 2–12 months: >50

Age 1–5 Years: >40

Age .5 Years: >20

### 2. Dyspnea

### 3. Retractions (suprasternal, intercostals, or subcostal)

### 4. Grunting

### 5. Nasal flaring

### 6. Apnea

### 7. Altered mental status

### 8. Pulse oximetry measurement ,90% on room air

Return to Page 5: [Pneumonia Care Map](#)

# Indications/Caveats for CXR

- ❑ Severe disease requiring hospitalization
- ❑ Confirmation of the diagnosis when clinical findings are inconclusive
- ❑ Exclusion of alternate explanations for respiratory distress (eg, foreign body aspiration, heart failure), particularly in patients with underlying cardiopulmonary or medical conditions
- ❑ Assessment of complications, particularly in children whose pneumonia is prolonged and unresponsive to antimicrobial therapy
- ❑ There are a number of caveats to consider when deciding whether to obtain radiographs and whether radiographs will alter management. These include:
  - Radiographic findings are poor indicators of the etiologic diagnosis and must be used in conjunction with other clinical features to make therapeutic decisions
  - Radiographic findings may lag behind the clinical findings
  - Patients who are hypovolemic may have normal-appearing chest radiography before volume repletion
  - There is variation in intraobserver and interobserver agreement
  - Radiographic interpretation may be influenced by the clinical information that is provided to the radiologist
  - Obtaining outpatient chest radiographs does not affect outcome

Return to Page 5: [Pneumonia Care Map](#)

Return to Page 6: [Pneumonia Care Map](#)

Return to Page 7: [Pneumonia Care Map](#)

# Ancillary Diagnostic Therapy

## 1. Complete Blood Count :

- Routine measurement of the complete blood cell count is not necessary in all children with suspected CAP managed in the outpatient setting, but in those with more serious disease it may provide useful information for clinical management in the context of the clinical examination and other laboratory and imaging studies. (weak recommendation; low-quality evidence)
- A complete blood cell count should be obtained for patients with severe pneumonia, to be interpreted in the context of the clinical examination and other laboratory and imaging studies. (weak recommendation; low-quality evidence)

## 2. Acute-Phase Reactants :

- 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. (strong recommendation; high-quality evidence)
- Acute-phase reactants need not be routinely measured in fully immunized children with CAP who are managed as outpatients, although for more serious disease, acute-phase reactants may provide useful information for clinical management. (strong recommendation; low-quality evidence)
- 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. (weak recommendation; low-quality evidence)

Return to Page 5: [Pneumonia Care Map](#)

# Criteria for Blood Cultures

- <6 months with fever or not fully immunized
- The presence of a central line
- Immunocompromised
- Toxic appearing or admitted to the intensive care unit
- Effusion or empyema on chest radiograph.

Return to Page 5: [Pneumonia Care Map](#)

# Rapid Viral Testing and Mycoplasma testing

- During the appropriate season to limit antimicrobial the use rapid viral testing maybe considered for influenza or other respiratory pathogens when the clinical presentation is difficult to distinguish.
- In children > 5 with signs and symptoms suspicious for Mycoplasma pneumoniae consider testing to help guide antibiotic selection. (weak recommendation; moderate-quality evidence)
- Pediatric patients suspected of lower respiratory tract infections caused by Mycoplasma pneumonia are typically school aged children (age 5-18 years). Treatment recommendations for this patient population include the use of macrolides based on retrospective and adult studies as well as the effectiveness of this antibiotic class against this pathogen (Bradley, Byington et al. 2011).

Return to Page 5: [Pneumonia Care Map](#)

# Diagnostic Criteria

## Some factors useful to consider in differentiating viral, bacterial, and atypical pneumonia \*

Viral	Bacterial	Atypical
<ul style="list-style-type: none"><li>• All children but most common in &lt; 1 year old</li><li>• Children with only mild temperature elevation</li><li>• Children with non-focal physical examination of the lungs</li><li>• Children with other signs of upper respiratory infection such as rhinorrhea</li><li>• More gradual onset of symptoms</li></ul>	<ul style="list-style-type: none"><li>• All children but most common in &gt; 1 year old</li><li>• Children with high temperature elevations</li><li>• Children with focal findings on clinical or radiologic examinations</li><li>• Ill, or toxic-appearing children</li><li>• More rapid onset of symptoms , or second phase of a biphasic illness</li><li>• Focal chest pain</li></ul>	<ul style="list-style-type: none"><li>• Children &gt; 5 years old</li><li>• Symptoms that have lasted &gt; 5-7 days</li><li>• Mild symptoms</li><li>• Children with non-focal physical examination of the lungs</li><li>• Other non-specific symptoms such as malaise or headache</li><li>• Wheezing or bronchospasm</li></ul>

\* Adapted from Seattle Children's Clinical Care Guideline

Return to Page 5: [Pneumonia Care Map](#)

# Outpatient treatment\*

Indication for Treatment	Infant / Preschool-Aged	School-Aged Children and Adolescents
First-line for presumed <b>viral CAP</b>	No antibacterial agent; consider treatment for influenza as appropriate	No antibacterial agent; consider treatment for influenza as appropriate
First-line for presumed <b>bacterial CAP</b>	Amoxicillin 80-100 mg/kg BID/TID for 7 days. Max dose is 880 mg/ dose	Amoxicillin 80-100 mg/kg BID/TID for 7 days Max dose is 880 mg/ dose
<b>First-line if not fully immunized for age</b>	Cefdinir 14mg/kg/day Cefuroxime 30mg/kg/day BID . Max dose is 1 gm	Cefdinir 14mg/kg/day Cefuroxime 30mg/kg/day BID . Max dose is 1 gm
Alternative if <b>allergy to first-line</b>	Clindamycin 10mg/kg/dose TID	Clindamycin 10mg/kg/dose TID
Suspicion of <b>atypical bacterial cause</b>	Self-limited disease, does not need treatment	Azithromycin( 1 <sup>st</sup> dose 10mg/kg, Day 2-5 5mg/kg), clarithromycin ( 15mg/kg/BID), Doxycycline (for children >7 years old with suspected atypical cause)

\* Recommendations are based on ISDA guidelines and our current [antibiogram](#)

Return to Page 6: [Pneumonia Care Map](#)

# Inpatient Treatment\*

Indication for Treatment	Infant / Preschool-Aged	School-Aged Children and Adolescents
First-line for presumed <b>viral CAP</b>	No antibacterial agent; consider treatment for influenza as appropriate	No antibacterial agent; consider treatment for influenza as appropriate
First-line for presumed <b>bacterial CAP</b>	Ampicillin 75 mg/kg/dose q 6hr Max dose is 2 gram ( 8 gm /day)	Ampicillin 75 mg/kg/dose q 6hr Max dose is 2 gram ( 8 gm /day)
Suspicion of <b>atypical bacterial cause</b>	If high suspicion of atypical bacterial cause consider infectious disease consult	Azithromycin 10 mg/kg day 1 and 5mg/kg D2-5, clarithromycin 15mg/kg/day BID, doxycycline (for children >7 years old with suspected atypical cause) 2-4 mg/kg/day BID . Max 100 mg BID
Alternative if <b>allergy to first-line or not fully immunized for age</b>	Ceftriaxone 75 mg/ day q 24 hrs Max dose is 4 gm	Ceftriaxone 75 mg/ day q 24 hrs Max dose is 4 gm
Alternative if <b>allergy to alternative</b>	Clindamycin 40mg/kg/day/q6 or q8 Levofloxacin 8-10 mg/kg/dose q 12h ( max dose 750 mg/day) Consider an infectious disease consult for patients with moderate to severe disease and significant allergies	Clindamycin 40mg/kg/day/q6 or q8 Levofloxacin 10mg/kg/dose daily ( max dose 750 mg day) Consider an infectious disease consult for patients with moderate to severe disease and significant allergies

\* Recommendations are based on ISDA guidelines and our current [antibiogram](#)

Return to Page 7: [Pneumonia Care Map](#)

# Total Length of Therapy

- Mild to Moderate Disease: 7 days, including both intravenous and oral antibiotics
- Severe Disease: 10-14 days, including both intravenous and oral antibiotics
- For patients with complicated illness consider ID consult.

Return to Page 6: [Pneumonia Care Map](#)

# Antibiotic Stewardship

- ❑ Antibiotic exposure selects for antibiotic resistance; therefore, limiting exposure to any antibiotic, whenever possible, is preferred. (strong recommendation; moderate-quality evidence).
- ❑ Limiting the spectrum of activity of antimicrobials to that specifically required to treat the identified pathogen is preferred. (strong recommendation; low-quality evidence)
- ❑ Using the proper dosage of antimicrobial to be able to achieve a minimal effective concentration at the site of infection is important to decrease the development of resistance. (strong recommendation; low-quality evidence)
- ❑ Treatment for the shortest effective duration will minimize exposure of both pathogens and normal microbiota to antimicrobials and minimize the selection

Return to Page 6: [Pneumonia Care Map](#)

# Activity and Incentive spirometry orders

## Edit Order

Order	Start/Stop	Status
Activity Other	Tue Jun 19 15:17	New

May INT for up to

\*Comment Walking in hall with mask at least twice daily if able and/or up in chair 2 to 3 times a day

Order	Start/Stop	Status
Incentive Spirometer (age appropriate) Q2H while awake	Tue Jun 19 15:17	New

# 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. The Use of Chest Physiotherapy [LOE:  $\square\square\square\square$  Low quality] (Gilchrist, 2008)

Return to Page 7: [Pneumonia Care Map](#)

# References

- IDSA Guidelines 2011
- [Narrow vs Broad Spectrum Antimicrobial Therapy For Children Hospitalized with Pneumonia. Williams et al Pediatrics Vo 132, No 5, Nov 2013](#)
- Comparative effectiveness of empiric antibiotics for community-acquired pneumonia . Queen MA, Myers, AL, et al. *Pediatrics* 2014;133:e23;originally published online December 9, 2013.
- [A cost Effectiveness Analysis of obtaining Blood Cultures in Children Hospitalized for CAP Andrews et al. J Pediatrics. 2015 Dec;167\(6\): 1280-6](#)
- [Antibiotic treatment for Children Hospitalized With CAP After Oral Therapy . Pediatric Pulmonology 50:495–502 \(2015\)](#)
- [Community-Acquired Pneumonia Requiring Hospitalization among U.S. Children. Jain et al. n engl j med 372;9 nejm.org february 26, 2015](#)
- [Treatment of mycoplasma pneumonia: a systematic review. Pediatrics. 2014 Jun; 133\(6\): 1081-90.](#)

# Physician Disclaimers: Pneumonia Care Map

## Medical Disclaimer

Medicine is an ever-changing science. As new research and clinical experience broaden our knowledge, changes in treatment and drug therapy are required.

The authors of this Care Map have checked with sources believed to be the most current and reliable in their efforts to provide information that is complete and generally in accord with the standards accepted at the time of publication.

However, in view of the possibility of human error or changes in medical sciences, neither the authors nor East Tennessee Children's Hospital warrants that the information contained herein is in every respect accurate or complete, and they are not responsible for any errors or omissions, or for the results obtained from the use of such information. Readers should make every effort to confirm the information contained herein with other sources, and are encouraged to consult with other health care providers in the making of clinical care decisions.

References to specific products, processes, websites, or services within this Care Map neither constitute nor imply corporate recommendation or endorsement by East Tennessee Children's Hospital.

Return to Page 3: [Pneumonia Care Map](#)

Return to Page 4: [Pneumonia Care Map](#)

# Contact and Revisions Number

- **For questions concerning this care map, contact: [CareMap@etch.com](mailto:CareMap@etch.com)**
- **Last Update: 6/14/17**