IMPROVING COMMUNITY-ACQUIRED PNEUMONIA (ICAP) PROJECT CHANGE PACKAGE (QUALITY IMPROVEMENT TOOLKIT)
The specific aim of the project is to improve the care of children with community-acquired pneumonia (CAP) by increasing compliance with evidence-based practices for CAP diagnosis and treatment, including the 2011 IDSA/PIDS clinical practice guideline on community-acquired pneumonia as well as other key evidence-based CAP research.

A change package or quality improvement toolkit is meant to be a source of ideas that may help your quality improvement team progress towards your goals. Local adaptation of ideas will always be necessary to ensure the success of changes selected from the quality improvement toolkit.

The elements from evidence-based research and the guidelines that the ICAP project will address, as well as the specific aims of the project, are incorporated in the quality improvement toolkit grid that follows.

A collection of a few key references related to quality improvement tools for CAP are included.
OVERVIEW OF ICAP CHANGE PACKAGE

This Change Package (Quality Improvement Toolkit) is designed to provide your quality improvement team with ready-made material that your team can use to initiate improvement efforts as part of the Improving Community-Acquired Pneumonia (ICAP) Project. Over the course of the project, your team and the other teams in the collaborative will be encouraged to refine and repurpose the tools and resources in this Toolkit based on further review of the evidence and your own experiences testing and implementing the changes.

This Change Package is based on evidence-based research focused on diagnosis and treatment of CAP, 2011 IDSA/PIDS clinical practice guidelines on community-acquired pneumonia, and the local experience of the ICAP Expert Group members. The Expert Group has chosen a subset of recommendations from the guidelines and other relevant literature, for which we have set specific goals in order to offer a framework for your local project. Depending on the particular circumstances in your hospital, you may also need to implement other practices or modify your goals in order to successfully improve outcomes.

The aims and measures in this collection are not necessarily the only ones required to achieve the improved outcomes you are targeting. This project is not exhaustive, exclusive, or all-inclusive. Changes in practice will require testing and adaptation to your particular circumstances and context in order to achieve measured improvements in outcomes. As you test and implement new processes, you will monitor the results closely to ensure that you are obtaining the desired outcome, that no harm is being done, and that no unanticipated results or consequences emerge. In addition to the evidence-based measures, we have also provided some balancing measures to assess in order to help with the process of avoiding unanticipated consequences. Establishing sustainability efforts in order to promote continuous quality improvement (CQI) will be crucial for success as well.

Model for Improvement
One theoretical basis for promoting change in healthcare is the Model for Improvement. We recommend the Model for Improvement\(^1\) as a framework for your efforts. The three key questions of the Model for Improvement are:

1. **What are we trying to accomplish?**
   - AIM

2. **How will we know that a change is an improvement?**
   - MEASURES

3. **What changes can we make that will result in an improvement?**
   - IDEAS

Quality Improvement Elements
For the ICAP project, the following four items will be quality improvement elements which we will support: 1) clearly identified aims; 2) targeted measures; 3) planned changes; and 4) cycles of action - Plan-Do-Study-Act (PDSA)

Thank you for your participation in this important systemic change to improve the treatment of CAP in the pediatric hospital setting.

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## ICAP CHANGE PACKAGE GRID

<table>
<thead>
<tr>
<th>ICAP Metric &amp; Related PIDS/IDSA Guideline Elements (if applicable)</th>
<th>Strategies and Tools for Change</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1. Narrow spectrum antibiotics - Increase overall usage of narrow-spectrum antibiotics for inpatients with uncomplicated CAP to 80% for eligible population.</strong>&lt;br&gt;<strong>Related Guideline:</strong> 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. <em>(strong recommendation; moderate-quality evidence)</em></td>
<td><strong>Clinical Pathways</strong>&lt;br&gt;• A clinical pathway is used to remind providers of the current state of the evidence.&lt;br&gt;• Clinical pathways are intended to reduce variability in clinical practice.&lt;br&gt;<strong>Examples</strong>&lt;br&gt;a) <a href="#">CAP Clinical Pathway 1</a>&lt;br&gt;b) <a href="#">CAP Clinical Pathway 2</a>&lt;br&gt;c) <a href="#">CAP Clinical Pathway 3 (website)</a>&lt;br&gt;d) <a href="#">Antibiotic Selection Guideline</a></td>
</tr>
<tr>
<td><strong>2. Macrolide Use - Decrease overall usage of macrolides for inpatients with uncomplicated CAP to:</strong>&lt;br&gt;  - less than 5% for children under age 5&lt;br&gt;  - less than 25% for children age 5-18&lt;br&gt;<strong>Related Guideline:</strong> Empiric combination therapy with a macrolide (oral or parenteral), in addition to a β-lactam antibiotic, should be prescribed for the hospitalized child for whom <em>M. pneumoniae</em> and <em>C. pneumonia</em> are significant considerations. <em>(weak recommendation; moderate-quality evidence)</em></td>
<td><strong>Order Sets</strong>&lt;br&gt;• An order set is a standardized list of orders for a specific diagnosis based on current evidence.&lt;br&gt;<strong>Examples</strong>&lt;br&gt;a) <a href="#">CAP Order Set 1</a>&lt;br&gt;b) <a href="#">CAP Order Set 2</a></td>
</tr>
<tr>
<td><strong>3. CBC Use - Decrease overall usage of complete blood counts for inpatients with uncomplicated CAP to less than 10%</strong>&lt;br&gt;<strong>Related Guidelines:</strong> 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. <em>(weak recommendation; low-quality evidence)</em></td>
<td><strong>Antibiotic Stewardship Programs (ASP)</strong>&lt;br&gt;• Antibiotic stewardship involves optimal selection, dosage, and duration of antimicrobial treatment that results in the best clinical outcome for the treatment or prevention of infection with minimal toxicity to the patient and minimal impact on subsequent resistance&lt;br&gt;<strong>Tools (Web sites)</strong>&lt;br&gt;a) <a href="#">CDC Assessment Tool</a> – Useful for assessing key elements for ensuring optimal antibiotic prescribing and appropriate use.&lt;br&gt;b) <a href="#">CDC Core Elements of Hospital Antibiotic Stewardship Programs</a> - Summarizes core elements of successful hospital ASP. It complements existing guidelines on ASPs from organizations including the IDSA in conjunction with the SHEA, ASHP, and The Joint Commission. Experience demonstrates that ASP can be implemented effectively in a wide variety of hospitals and that success is dependent on defined leadership and a coordinated multidisciplinary approach.&lt;br&gt;c) <a href="#">Examples of Existing Programs</a></td>
</tr>
<tr>
<td><strong>4. Radiologic Imaging - Decrease overall usage of more than one inpatient chest radiograph for patients with uncomplicated CAP to less than 10%</strong>&lt;br&gt;  4a. Increase usage of ultrasound to 10%&lt;br&gt;  4b. Decrease usage of CT to 5%&lt;br&gt;<strong>Related Guidelines:</strong> Chest radiographs (posteroanterior and lateral) should be obtained in all patients hospitalized for management of CAP to document the presence, size, and character of parenchymal infiltrates and identify complications of pneumonia that may lead to interventions beyond antimicrobial agents and supportive medical therapy. <em>(strong recommendation; moderate-quality evidence)</em>&lt;br&gt;  Repeated chest radiographs are not routinely required in children who recover uneventfully from an episode of CAP. <em>(strong recommendation; moderate-quality evidence)</em>&lt;br&gt;  If the chest radiograph is not conclusive [for parapneumonic effusion], then further imaging with chest ultrasound or computed tomography (CT) is recommended. <em>(strong recommendation; high-quality evidence)</em></td>
<td></td>
</tr>
<tr>
<td><strong>5. Concurrent Asthma Therapy - Measure the rate of concurrent inpatient treatment for asthma in patients admitted with uncomplicated CAP and decrease this treatment to less than 10%</strong></td>
<td></td>
</tr>
</tbody>
</table>
Other Tools and References

- Infectious Diseases Society of America and the Society for Healthcare Epidemiology of America guidelines for developing an institutional program to enhance antimicrobial stewardship.

- A simple intervention to improve hospital antibiotic prescribing.

- 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.

- Favorable impact of a multidisciplinary antibiotic management program conducted during 7 years.

- Comparative effectiveness of empiric antibiotics for community-acquired pneumonia.
  Queen MA, Myers, AL, et al. Comparative effectiveness of empiric antibiotics for community-acquired pneumonia. *Pediatrics* 2014;133;e23; originally published online December 9, 2013.

- Influence of hospital guidelines on management of children hospitalized with pneumonia.
Clinical Pathway Example 1

Community-Acquired Pneumonia: ED Phase v.2.0

**Inclusion Criteria**
- Suspicion of 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

**Provider Assessment**

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

- Moderately ill:
  - Proceed to Infectious Disease Consult

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

**Discharge Criteria (Meets all)**
- Tolerating PO
- No hypoxemia (> 93%)
- Mildly increased or normal work of breathing

**Discharge Instructions**
- Discharged to home
- PMD visit in 2-3 days

**Inpatient Admission Criteria**
- Hyoxia (< 90% Sp O2)
- Inability to tolerate PO
- Increased work of breathing (grunting, retracting, tachypnea)
- ≥ 6 month olds with suspected bacterial CAP

**ICU Admission Criteria**
- Altered mental status
- Concern for respiratory failure, sepsis
- Failure to maintain O2sat with FiO2 of < 50%
- Need for positive pressure ventilation

**For questions concerning this pathway, contact: pneumonia@seattlechildrens.org**

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Last Updated: June 2014
Valid Updated: September 2015
Community-Acquired Pneumonia – Anti-Infective Selection from IDSA & BTS Guidelines

Date: June 22, 2012

Title: Anti-Infective Treatment for Pediatric Community-Acquired Pneumonia (CAP) – Inpatient and Outpatient

Purpose of GREAT:
The purpose of this document is to highlight recent evidence-based recommendations for anti-infective selection in infants and children with community acquired pneumonia from the Infectious Diseases Society of America and the British Thoracic Society (BTS) guidelines (BTS 2011 / CCHMC [Sf], IDSA 2011 / CCHMC[Sa]). Adoption of this evidence will guide practice change at the point of care.

CCHMC Clinical Question:
In children 3 months to 18 years of age, does the selection of antibiotic differ by age or care location for the management of community-acquired pneumonia?

Target Population:
Inclusion:
- otherwise healthy children from 3 months to 18 years of age who present with simple community-acquired pneumonia

Exclusions:
- children requiring intensive care on admission
- pneumonia began within 48 hours after a hospital admission
- likely aspiration of a foreign body or stomach contents
- medical condition that uniquely alters pathophysiology and/or care options related to pneumonia, including:
  - congenital, acquired, or drug induced immunocompromise
  - chronic lung disease such as cystic fibrosis

Recommendations: (See CCHMC, BTS, and IDSA Tables of Recommendation Strengths)

Outpatients:
1. It is recommended that amoxicillin be used as first-line therapy for previously healthy, appropriately immunized children 3 months to 18 years of age with mild to moderate CAP suspected to be of bacterial origin. Amoxicillin provides appropriate coverage for Streptococcus pneumoniae (S. pneumoniae), the most prominent invasive bacterial pathogen (BTS 2011 / CCHMC [Sf], IDSA 2011 / CCHMC[Sa]) (IDSA [strong/moderate and BTS [B]). See Table 1: Outpatient Anti-infective Treatment Recommended by Age and Indication for Treatment.

   Note 1: Anti-infective therapy is not routinely required for children < 2 years of age (BTS 2011 / CCHMC [Sf]) or preschool-aged children with mild symptoms of lower respiratory tract infection, because viral pathogens are responsible for the great majority of clinical disease but review is prudent if symptoms persist (BTS 2011 / CCHMC [Sf], IDSA 2011 / CCHMC[Sa]).

   Note 2: Atypical bacterial pathogens (e.g., M. pneumoniae), and less common lower respiratory tract bacterial pathogens, may also need to be considered in management decisions (BTS 2011 / CCHMC [Sf], IDSA 2011 / CCHMC[Sa]).
### Table 1: Outpatient Anti-infective Treatment Recommended by Age and Indication for Treatment

<table>
<thead>
<tr>
<th>Indication for Treatment</th>
<th>Infant / Preschool-Aged Children</th>
<th>School-Aged Children and Adolescents</th>
</tr>
</thead>
<tbody>
<tr>
<td>First-line for presumed viral CAP</td>
<td>No antibacterial agent; consider treatment for influenza as appropriate</td>
<td>No antibacterial agent; consider treatment for influenza as appropriate</td>
</tr>
<tr>
<td>First-line for presumed bacterial CAP</td>
<td>Amoxicillin</td>
<td>Amoxicillin</td>
</tr>
<tr>
<td>First-line for non-immunized</td>
<td>3rd generation cephalosporin or amoxicillin-clavulanate</td>
<td>3rd generation cephalosporin or amoxicillin-clavulanate</td>
</tr>
<tr>
<td>Suspicion of atypical bacterial cause</td>
<td>If high suspicion of atypical bacterial cause consider infectious disease consult</td>
<td>Azithromycin, clarithromycin, doxycycline (for children &gt;7 years old with suspected atypical cause), (levofloxacin or moxifloxacin if &lt;8 years old and allergic to macrolides)</td>
</tr>
<tr>
<td>Alternative if allergy to first-line</td>
<td>6 months to 5 years – 3rd generation cephalosporin, clindamycin</td>
<td>3rd generation cephalosporin, clindamycin,</td>
</tr>
<tr>
<td>Alternative if allergy to alternative</td>
<td>Levofloxacin</td>
<td>Levofloxacin</td>
</tr>
</tbody>
</table>

(Adapted from British Thoracic Society (BTS) and Infectious Diseases Society of America (IDSA) guidelines [BTS 2011 / CCHMC [Sa], IDSA 2011 / CCHMC [Sa]])

**Inpatients:**

2. It is recommended that ampicillin or penicillin G be administered to the fully immunized infant or school-aged child admitted to a hospital with CAP when local epidemiologic data document lack of substantial high-level penicillin resistance for invasive *S. pneumoniae* (IDSA 2011 / CCHMC [Sa]) (IDSA [strong/moderate]). See Table 2 Inpatient Anti-infective Treatment Recommended by Age and Indication for Treatment.

### Table 2: Inpatient Anti-infective Treatment Recommended by Age and Indication for Treatment

<table>
<thead>
<tr>
<th>Indication for Treatment</th>
<th>Infant / Preschool-Aged Children</th>
<th>School-Aged Children and Adolescents</th>
</tr>
</thead>
<tbody>
<tr>
<td>First-line</td>
<td>Amoxicillin/ampicillin (intravenous)</td>
<td>Amoxicillin/ampicillin (intravenous)</td>
</tr>
<tr>
<td>First-line for non-immunized and those with life threatening infections</td>
<td>3rd generation cephalosporin</td>
<td>3rd generation cephalosporin</td>
</tr>
<tr>
<td>Atypical bacterial infection</td>
<td>Azithromycin <em>In addition</em> to beta-lactam therapy if atypical bacteria are significant considerations. <em>Instead of</em> beta-lactam if findings are characteristic of atypical infection.</td>
<td>Azithromycin <em>In addition</em> to beta-lactam therapy if atypical bacteria are significant considerations. <em>Instead of</em> beta-lactam if findings are characteristic of atypical infection.</td>
</tr>
<tr>
<td><em>Staphylococcus aureus</em> (<em>S. aureus</em>)</td>
<td>Vancomycin or clindamycin <em>In addition</em> to beta-lactam therapy if clinical, laboratory, or imaging characteristics are consistent with infection caused by <em>S. aureus</em></td>
<td>Vancomycin or clindamycin <em>In addition</em> to beta-lactam therapy if clinical, laboratory, or imaging characteristics are consistent with infection caused by <em>S. aureus</em></td>
</tr>
<tr>
<td>Alternative if allergy to first-line</td>
<td>3rd generation cephalosporin, clindamycin</td>
<td>3rd generation cephalosporin, clindamycin</td>
</tr>
<tr>
<td>Alternative if allergy to alternative</td>
<td>Levofloxacin</td>
<td>Levofloxacin</td>
</tr>
</tbody>
</table>

(Adapted from BTS and IDSA guidelines [BTS 2011 / CCHMC [Sa], IDSA 2011 / CCHMC [Sa]].)
Date____________________  Time______  Weight______kg   Attending_______________________

Team___________________________________________ (Residents: R3___________________________, R1___________________________)

Allergies______________________________________  Reaction____________________________

Admitting Diagnosis
Community acquired pneumonia (CAP) and age 3 months or older
☐ Other_______________________________________

Nursing/RT Orders (for all patients)
Heart rate, respiratory rate, temperature, and capillary refill time every 4 hours or every _________ hours
Blood pressure every 12 hours or every _________ hours
Pulse oximetry
Oxygen per nasal cannula to keep O₂ sats > 88%
Activity as tolerated—promote frequent ambulation
Is and Os—calculate urine output every 4 hours
Droplet precautions
WebKids immunization record to be placed in the chart (if not up to date, contact PCP office for faxed copy)

Additional Nursing/RT Orders
☐ CR monitor
☐ Incentive spirometer q 2 hours while awake; mode per RT recommendation
☐ Other_______________________________________
☐ Other_______________________________________

Contact Physician/LIP for…

<table>
<thead>
<tr>
<th>Age</th>
<th>Heart Rate</th>
<th>Respiratory Rate</th>
<th>Systolic BP</th>
<th>Temperature (°C)</th>
</tr>
</thead>
<tbody>
<tr>
<td>≥ 3 months to &lt; 1 year</td>
<td>&lt; 75 or &gt; 190</td>
<td>&lt; 30 or &gt; 60</td>
<td>&lt; 70</td>
<td>&lt; 36° or &gt; 38.5°</td>
</tr>
<tr>
<td>≥ 1 year to &lt; 2 years</td>
<td>&lt; 75 or &gt; 190</td>
<td>&lt; 30 or &gt; 60</td>
<td>&lt; 74</td>
<td>&lt; 36° or &gt; 38.5°</td>
</tr>
<tr>
<td>≥ 2 years to &lt; 4 years</td>
<td>&lt; 60 or &gt; 140</td>
<td>&lt; 24 or &gt; 40</td>
<td>&lt; 78</td>
<td>&lt; 36° or &gt; 38.5°</td>
</tr>
<tr>
<td>≥ 4 years to &lt; 6 years</td>
<td>&lt; 60 or &gt; 140</td>
<td>&lt; 22 or &gt; 34</td>
<td>&lt; 82</td>
<td>&lt; 36° or &gt; 38.5°</td>
</tr>
<tr>
<td>≥ 6 years to &lt; 10 years</td>
<td>&lt; 60 or &gt; 140</td>
<td>&lt; 18 or &gt; 30</td>
<td>&lt; 86</td>
<td>&lt; 36° or &gt; 38.5°</td>
</tr>
<tr>
<td>≥ 10 years to &lt; 13 years</td>
<td>&lt; 60 or &gt; 100</td>
<td>&lt; 18 or &gt; 30</td>
<td>&lt; 90</td>
<td>&lt; 36° or &gt; 38.5°</td>
</tr>
<tr>
<td>≥ 13 years to &lt; 18 years</td>
<td>&lt; 60 or &gt; 100</td>
<td>&lt; 12 or &gt; 16</td>
<td>&lt; 90</td>
<td>&lt; 36° or &gt; 38.5°</td>
</tr>
</tbody>
</table>

☐ Capillary refill time more than 3 seconds or flash return
☐ Urine output less than 1 mL/kg/hr over 4 hours
☐ Assess for ability to tolerate PO medications and contact physician for oral medication orders
☐ Other_______________________________________

Diet
☐ Breastfeed ad lib  ☐ Lactation consult
☐ Formula ad lib______________________________________________
☐ Regular diet
☐ NPO
☐ Other_____________________________________________________
Laboratory Studies and Imaging (obtain if not already collected in ED or immediately prior to admit)

<table>
<thead>
<tr>
<th>Blood</th>
<th>Viral Testing</th>
<th>Imaging</th>
</tr>
</thead>
<tbody>
<tr>
<td>☐ Complete Blood Count with Manual Differential (CBCDN for PCMC; CBCD for all other Intermountain facilities)</td>
<td>☐ Rapid RSV (RSVX)</td>
<td>☐ Chest x-ray (if not done already)</td>
</tr>
<tr>
<td>☐ Complete Blood Count with Auto Differential (CBCAD)</td>
<td>☐ DFA (RVST)</td>
<td>Indication ____________________</td>
</tr>
<tr>
<td>☐ Basic Metabolic Panel (BMP)</td>
<td>☐ Influenza A/B (FLUPCR)</td>
<td>☐ 2 views ☐ Portable</td>
</tr>
<tr>
<td>☐ Complete Metabolic Panel (CMP)</td>
<td>Indication for admissions during flu season.</td>
<td>☐ Other ________________</td>
</tr>
<tr>
<td>☐ Blood Culture (BCS) prior to starting antibiotics</td>
<td>☐ Resp viral panel by FilmArray® (RFAPCR)</td>
<td></td>
</tr>
<tr>
<td>☐ C-Reactive Protein (CRP)</td>
<td>☐ Other ________________</td>
<td></td>
</tr>
<tr>
<td>☐ Other ________________</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

☐ AM labs

IV Fluids (choose only one)

☐ IV fluid D5W 0.45 NaCl + KCl 20 mEq/liter at ________________ mL/hour

☐ IV fluid D5W 0.9 NaCl + KCl 20 mEq/liter at ________________ mL/hour if concerns for SIADH

☐ IV fluids + PO total = ____________________________

☐ Other ________________ at ________________ mL/hour

Medications

Recommended antibiotic therapy for bacterial or atypical pneumonia

<table>
<thead>
<tr>
<th>Medication</th>
<th>Available Oral Suspensions, Tablets, or Capsules</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Full Immunized</td>
</tr>
<tr>
<td>Amoxicillin</td>
<td>125 mg/5 mL; 250 mg/5 mL; 400 mg/5 mL; 250 mg; 500 mg; 875 mg</td>
</tr>
<tr>
<td>Amoxicillin/Clavulanate</td>
<td>ES (600/42.9 mg/5 mL); 250/125 mg; 500/125 mg; 875/125 mg; 1000/62.5 mg ER</td>
</tr>
<tr>
<td>Clindamycin</td>
<td>75 mg/5 mL; 75 mg; 150 mg; 300 mg</td>
</tr>
<tr>
<td>Azithromycin</td>
<td>100 mg/5 mL; 200 mg/5 mL; 250 mg; 500 mg</td>
</tr>
</tbody>
</table>

☐ Amoxicillin (30 mg/kg/dose; max 1000 mg/dose) _____ mg PO TID

☐ Ampicillin (50 mg/kg/dose; max 2000 mg/dose) _____ mg IV every 6 hours

☐ Amoxicillin/Clavulanate ES (45 mg/kg/dose; max 2000 mg/dose) _____ mg PO BID

☐ Ceftriaxone (75 mg/kg/dose; max 2000 mg/dose) _____ mg IV every 24 hours

☐ Azithromycin (10 mg/kg/dose; max 500 mg/dose) _____ mg PO every day x 3 days

☐ Clindamycin (13 mg/kg/dose; max 600 mg/dose) _____ mg ☐ PO TID ☐ IV every 8 hours

☐ Oseltamivir (3 months to < 12 months; 3 mg/kg/dose) _____ mg PO BID

☐ Oseltamivir (15 kg or less) 30 mg PO BID

☐ Oseltamivir (16 to 23 kg) 45 mg PO BID

☐ Oseltamivir (24 to 40 kg) 60 mg PO BID

☐ Oseltamivir (41 kg or greater) 75 mg PO BID

☐ Acetaminophen (15 mg/kg/dose; max 650 mg/dose) _____ mg ☐ PO ☐ PR every 4-6 hours PRN if temperature > 38.5°C

☐ Other ________________

MD/LIP Signature ____________________________ Date ________________ Time ________________

ADMISSION ORDERS: PEDIATRIC COMMUNITY

ACQUIRED PNEUMONIA PAGE 2 OF 2

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Order Set Example 2 (Epic)

INPATIENT PNEUMONIA (AGE >56 DAYS) ADMISSION PATHWAY

Children's Hospital of Philadelphia (Epic 2012) - SmartSet/Order Set

For use in patients with community-acquired pneumonia only.

Admission

- Admit to Service: General Pediatrics
- IP Pneumonia Pathway Order Set Started

Vital Signs/ Nursing

Continuous CR & Pulse Ox, Infant < 6 months

- Continuous ECG, Resp Rt, Pulse Ox- Heart (bpm) high: 180, low: 100; Resp Rate high: 70, low: 20; Apnea (seconds): 15; Pulse Ox (%) high: 101, low: 90
- Continuous ECG, Resp Rate Monitoring- Heart (bpm) high: 180, low: 100; Resp Rate high: 70, low: 20; Apnea (seconds): 15
- Continuous Pulse Oximetry Alarms- Pulse Ox (%) high: 101, low: 90

Continuous CR & Pulse Ox, Infant 6 months - 1 year

- Continuous ECG, Resp Rt, Pulse Ox- Heart (bpm) high: 180, low: 80; Resp Rate high: 60, low: 20; Apnea (seconds): 15; Pulse Ox (%) high: 101, low: 90
- Continuous ECG, Resp Rate Monitoring- Heart (bpm) high: 180, low: 80; Resp Rate high: 60, low: 20; Apnea (seconds): 15
- Continuous Pulse Oximetry Alarms: Pulse Ox (%) high: 101, low: 90

Continuous CR & Pulse Ox, Child

- Continuous ECG, Resp Rt, Pulse Ox- Heart (bpm) high: 120, low: 60; Resp Rate high: 30, low: 15; Apnea (seconds): 20; Pulse Ox (%) high: 101, low: 90
- Continuous ECG, Resp Rate Monitoring- Heart (bpm) high: 120, low: 60; Resp Rate high: 30, low: 15; Apnea (seconds): 20
- Continuous Pulse Oximetry Alarms: Pulse Ox (%) high: 101, low: 90

Continuous CR & Pulse Ox, Adult

- Continuous ECG, Resp Rt, Pulse Ox- Heart (bpm) high: 100, low: 55; Resp Rate high: 30, low: 12; Apnea (seconds): 20; Pulse Ox (%) high: 101, low: 90
- Continuous ECG, Resp Rate Monitoring: Heart (bpm) high: 100, low: 55; Resp Rate high: 30, low: 12; Apnea (seconds): 20
- Continuous Pulse Oximetry Alarms: Pulse Ox (%) high: 101, low: 90

Vital Signs/ Nursing

- Vital Signs
  - EVERY 4 HOURS
- Intake and Output
  - EVERY 8 HOURS
- Weight On Admission
  - ON ADMISSION
- Activity As Tolerated
  - UNTIL DISCONTINUED

Respiratory

Continuous monitoring is indicated for patients requiring oxygen.

- Oxygen Therapy

Pharmacy

IV Fluids
<table>
<thead>
<tr>
<th>Drug</th>
<th>Dosage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dextrose 5% and 0.22% NaCl infusion (with Potassium Chloride 10 mEq)</td>
<td>Continuous</td>
</tr>
<tr>
<td>Dextrose 5% and 0.45% NaCl 1,000 mL with KCL 20 mEq infusion</td>
<td></td>
</tr>
<tr>
<td>Sodium chloride 0.9% (BOLUS) injection</td>
<td></td>
</tr>
<tr>
<td><strong>Antipyretics</strong></td>
<td></td>
</tr>
<tr>
<td>Acetaminophen suspension (57 Days to 5 Months)</td>
<td>15, Every 6 hours PRN</td>
</tr>
<tr>
<td>Acetaminophen suspension (6 Months and Older)</td>
<td>15, Every 4 hours PRN</td>
</tr>
<tr>
<td>Ibuprofen suspension (6 Months and Older)</td>
<td>10, Every 6 hours PRN</td>
</tr>
<tr>
<td><strong>Pharmacy: Antibiotics</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Typical Pneumonia</strong></td>
<td></td>
</tr>
<tr>
<td>Amoxicillin inj</td>
<td>300, Intravenous, Every 6 hours</td>
</tr>
<tr>
<td><strong>Typical Pneumonia, with Type 1 Penicillin Allergy</strong></td>
<td></td>
</tr>
<tr>
<td>Choose one medication</td>
<td></td>
</tr>
<tr>
<td>Clindamycin inj</td>
<td>40, Intravenous, Every 8 hours</td>
</tr>
<tr>
<td>Levofloxacin inj (6 months to &lt; 5 years)</td>
<td>10, Intravenous, Every 12 hours</td>
</tr>
<tr>
<td>Levofloxacin inj (&gt; = 5 years)</td>
<td>10, Intravenous, Daily</td>
</tr>
<tr>
<td><strong>Atypical Pneumonia</strong></td>
<td></td>
</tr>
<tr>
<td>Please select BOTH the Single Dose and Daily Dose of desired form.</td>
<td></td>
</tr>
<tr>
<td>Azithromycin susp (Single Dose)</td>
<td>10, Oral, Once</td>
</tr>
<tr>
<td>Azithromycin susp (Daily Dose)</td>
<td>5, Oral, Daily</td>
</tr>
<tr>
<td>Azithromycin tab(s) (Single Dose)</td>
<td>10, Oral, Once</td>
</tr>
<tr>
<td>Azithromycin tab(s) (Daily Dose)</td>
<td>5, Oral, Daily</td>
</tr>
<tr>
<td><strong>Pneumonia with Effusion</strong></td>
<td></td>
</tr>
<tr>
<td>Please order BOTH medications.</td>
<td></td>
</tr>
<tr>
<td>Clindamycin inj</td>
<td>40, Intravenous, Every 8 hours</td>
</tr>
<tr>
<td>CefTRIAxone inj</td>
<td>100, Intravenous, Every 24 hours</td>
</tr>
<tr>
<td><strong>Pneumonia with Effusion and Type 1 Penicillin Allergy</strong></td>
<td></td>
</tr>
<tr>
<td>Clindamycin inj</td>
<td>40, Intravenous, Every 8 hours</td>
</tr>
<tr>
<td><strong>Pneumonia with Impending or Existing Respiratory Failure, with or without Effusion</strong></td>
<td></td>
</tr>
<tr>
<td>Please order BOTH medications and trough.</td>
<td></td>
</tr>
<tr>
<td>Vancomycin inj</td>
<td>15, Intravenous, Every 6 hours</td>
</tr>
</tbody>
</table>
Vancomycin Trough Level
  cefTRIAXone inj
  100, Intravenous, EVERY 24 HOURS

Pneumonia with Impending or Existing Respiratory Failure, with or without Effusion, with Type 1 Penicillin Allergy
Please order BOTH medications and trough.
  vancomycin inj
  15, Intravenous, EVERY 6 HOURS
  Vancomycin Trough Level
  levofoxacin inj (6 months to < 5 years)
  10, Intravenous, EVERY 12 HOURS
  levofoxacin inj (> = 5 years)
  10, Intravenous, DAILY

Breast Milk and Infant Formulas

Breast Milk Options
  Skimmed Human Milk
    Flush: [FLUSH TYPE:850008::“n/a”]
  Human Milk
    Flush: [FLUSH TYPE:850008::“n/a”]
  Human Milk, Banked Donor Milk
    Flush: [FLUSH TYPE:850008::“n/a”]
  Human Milk, Fortified Premie
    Flush: [FLUSH TYPE:850008::“n/a”]
  Human Milk, Fortified Full Term
    Flush: [FLUSH TYPE:850008::“n/a”]
  Human Milk, Banked Fortified Premie
    Flush: [FLUSH TYPE:850008::“n/a”]
  Human Milk, Banked Fortified Full Term
    Flush: [FLUSH TYPE:850008::“n/a”]

Full Term Lactose Free Formulas
  Similac Sensitive

Full Term Milk Based Formulas
  ENFAmil Infant
  Gerber Good Start Gentle
  Glatt Kosher Similac Advance
  Similac Advance

Full Term Soy Based Formulas
  Gerber Good Start Soy
  Similac Soy Isomil
  ENFAmil Prosobee

Malabsorption Formulas
### Cow’s Milk Protein Allergy Formulas
- ELEcare Infant
- Similac Expert Care Alimentum
- NeoCATE Infant
- Nutramigen
- Pregestimil

### Premature Infant Formulas
- ENFamil PremATURE
- Gerber Good Start Premature 24
- Similac Special Care with Iron

### Transitional Premature Formulas
- ENFamil ENFAcare
- Gerber Good Start Nourish
- Similac Expert Care NeoSURE

### Diets
- Diet NPO
- Clear Liquid Diet
- Pedialyte Fruit
- Pedialyte Unflavored
- Full Liquid Diet
- Baby Food
- Regular Diet Consistency: Soft
- Regular Diet

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