

# Clinical Practice Guidelines\* for the Diagnosis and Management of Acute Bacterial Lower Respiratory Tract Infection in Nursing Home Residents

*(Excludes residents with respiratory failure on mechanical ventilation or with a tracheostomy)*

October 1, 2016

## Context

- On average, about 1 in 10 nursing home (NH) residents is receiving antibiotics on any given day [1]
- Antibiotic use is highly variable across NH; antibiotic-related adverse events are significantly more common in NH with the highest antibiotic use [2]
- Presumed respiratory infections are a common reason for starting antibiotics in the NH [3,4]
- Studies estimate that 20-66% of antimicrobial use for presumed respiratory infections in NH may be inappropriate [5]
- Successful examples of antimicrobial stewardship interventions targeting antibiotic use in NH respiratory infections have been published [4, 6-9]

## Objectives

- Support providers in decision making about antibiotic initiation in NH residents with presumed respiratory infections
- Develop a clinical, evidence-based guideline to educate and encourage appropriate use of antibiotics for bacterial lower respiratory infections in the NH

## Goals

- Increase appropriate antibiotic prescribing for NH-acquired pneumonia and COPD exacerbation
- Reduce NH-acquired *C. difficile* infection
- Reduce the use of quinolones for treatment of respiratory illness in the NH

\*These guideline were developed by the Rochester Long Term Care Collaborative and are intended to serve as a reference tool during the care of a nursing home resident with suspicion of bacterial respiratory infection; it is not intended to be a set of rigid criteria to replace clinical judgment regarding each patient's particular circumstances, clinical presentation, and other factors.

**Table 1. Primary AND Secondary Findings are Necessary to Initiate Antibiotics for Bacterial Pneumonia (PNA)\* or COPD exacerbation**

Primary Finding	Secondary Findings	
<p><b>Fever &gt; 100° F</b></p> <p align="center">--OR--</p> <p><b>&gt; 2.4° F above baseline</b></p>	<p><b>AND</b></p>	<p><b>At least 1 of the following respiratory symptom:</b></p> <ul style="list-style-type: none"> <li>• New or increase cough</li> <li>• New or increase sputum production</li> <li>• Pleuritic chest pain</li> <li>• Respiratory rate &gt; 25 breaths/min</li> <li>• Consolidation (on physical exam)</li> <li>• Hypoxia (oxygen saturation &lt; 90%)</li> </ul> <p><b>Other non-respiratory findings might be present :</b></p> <ul style="list-style-type: none"> <li>• Delirium</li> <li>• Acute functional decline</li> <li>• Total WBC &gt;14,000</li> </ul>
<p><b>Afebrile, respiratory illness suspected</b></p>	<p><b>AND</b></p>	<ul style="list-style-type: none"> <li>• <b>New productive cough</b></li> </ul> <p><b>At least 1 of the following:</b></p> <ul style="list-style-type: none"> <li>• Respiratory rate &gt; 25 breaths/min</li> <li>• Delirium</li> </ul>
<p><b>Afebrile respiratory illness with COPD</b></p>	<p><b>AND</b></p>	<ul style="list-style-type: none"> <li>• <b>Increased sputum purulence</b></li> </ul> <p><b>At least 1 of the following</b></p> <ul style="list-style-type: none"> <li>• Increased dyspnea</li> <li>• Increased sputum volume</li> </ul>
<p><b>New infiltrate on CXR</b></p>	<p><b>AND</b></p>	<p><b>At least 1 of the following:</b></p> <ul style="list-style-type: none"> <li>• New productive cough</li> <li>• Fever &gt; 100° F</li> <li>• Respiratory rate &gt; 25 breaths/min</li> </ul> <p><b>At least 2 of the following:</b></p> <ul style="list-style-type: none"> <li>• Dyspnea</li> <li>• Delirium</li> <li>• Hypoxia</li> <li>• Pleuritic chest pain</li> <li>• Consolidation (on physical exam)</li> <li>• Total WBC &gt;14,000</li> </ul>

\*No validated clinical criteria to predict pneumonia exist in the nursing home population

## Action

### **IF Primary AND Secondary findings are PRESENT:**

- 1. Start antibiotics (consult Table 1 and 2 for agent choice)**
2. Consider urine testing for Legionella, especially if resident's symptoms are moderate to severe (see note)<sup>†</sup>
3. Consider additional tests: pulse oximetry, CBC, CXR
4. Consider reassessing need for continued antibiotics at 48-72 hours after initiation

### **IF Secondary findings are ABSENT:**

- 1. Do not start antibiotics; reassess in 24 hours**
2. Evaluate for non-infectious causes of pulmonary infiltrate or consider alternate infection source
3. Consider viral upper respiratory infection (URI) in the differential diagnosis, especially if a new, productive cough is absent
4. Order influenza and RSV testing if seasonally appropriate

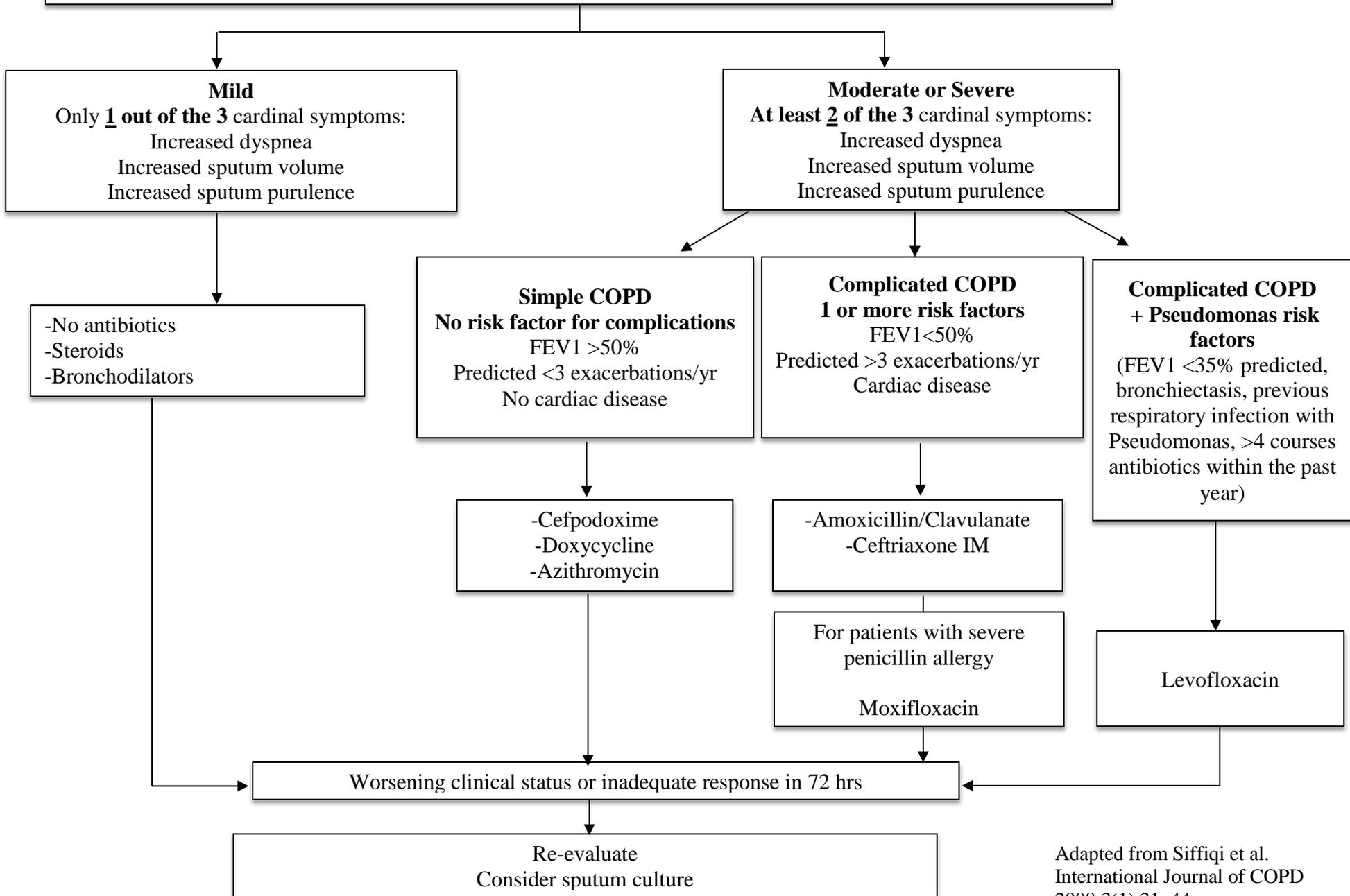
<sup>†</sup> In patients or residents for whom the clinical suspicion of Legionella is low, and the risks and burden of adequate sputum and urine acquisition for testing are high (e.g. residents with advanced dementia and urinary incontinence, patients with ineffective cough and sputum production), testing may be limited to what can be reasonably obtained voluntarily by the resident or patient. Urinary catheterization, induced sputum production, or nasotracheal suctioning are techniques that need not occur without a high suspicion for Legionella and the consent of the patient or resident.

**Table 2. Recommended Antibiotics for Treatment of Bacterial Pneumonia among Nursing Home Residents**

Mild – Moderate Pneumonia Symptoms				
	Context	Preferred Agent	Dosing	Comments
<b>1<sup>st</sup> line</b>	Uncomplicated bacterial PNA	<b>Cefpodoxime</b>	200 mg PO twice a day x 5d (give q24h for CrCl <30; 3x/wk post HD in ESRD)	<ul style="list-style-type: none"> <li>Cefpodoxime may be given safely to patients with mild penicillin allergy (i.e. rash), cross reactivity is low</li> </ul>
	Bacterial PNA, aspiration risk	<b>Amoxicillin/Clavulanate</b>	500/125 mg PO 3 times a day x 5d (give q12h for CrCl 10-30; give q24h for CrCL<10; give q24h for ESRD with an extra dose post each HD)	<ul style="list-style-type: none"> <li>Alternative dosing of Amoxicillin/clavulanate 875 mg BID</li> <li>Penicillin resistance of invasive pneumococcus is ~ 10% in Monroe County</li> </ul>
	Uncomplicated Bacterial PNA – Alternative Therapy	<b>Doxycycline</b>	100 mg PO twice a day x 5d (no renal adjustment needed)	<ul style="list-style-type: none"> <li>Caution with skin exposure to direct sunlight</li> </ul>
<b>2<sup>nd</sup> line</b>	Bacterial PNA, severe contraindications to 1 <sup>st</sup> Line therapy	<b>Levofloxacin</b>	750 mg PO Q24h x 5d (give q48h for CrCl 20-49; 750mg x 1, then 500mg q48h for CrCl <20 and ESRD)	<ul style="list-style-type: none"> <li>Quinolone antibiotics pose a higher risk of <i>C. difficile</i> infection</li> <li>Caution with anti-arrythmic medications and prolonged QTc</li> </ul>
		<b>Moxifloxacin</b>	400 mg PO Q24 x 5d (no renal adjustment needed)	
Severe Pneumonia Symptoms, or Failure to Respond to Initial Therapy				
<b>1<sup>st</sup> line</b>	Ceftriaxone IM + Doxycycline	Ceftriaxone 1000 mg IM Q24H (no renal adjustment needed) Doxycycline dosing as above		<ul style="list-style-type: none"> <li>May be given safely to patients with mild penicillin allergy (i.e. rash), cross reactivity is low</li> <li>Assess for de-escalation to oral regimen daily</li> </ul>
<b>2<sup>nd</sup> Line*</b>	Levofloxacin	Levofloxacin dosing as above		<ul style="list-style-type: none"> <li><u>*may be used as 1<sup>st</sup> line agent for any patients with risk factors for Pseudomonas infection such as any of the following:</u> recent (within 90 days) intravenous antibiotic exposure, very severe underlying COPD (FEV1 &lt;35% predicted), known bronchiectasis, previous respiratory infections with Pseudomonas</li> </ul>

\*Treatment duration is 5 days. Before stopping therapy, the patient should be afebrile for 48 to 72 hours, breathing without supplemental oxygen (unless required for preexisting disease), and have no more than one clinical instability factor (defined as HR >100 beats/min, RR >24 breaths/min, and SBP ≤90 mmHg)

**Antibiotic treatment for Acute COPD Exacerbation in NH** (refer to Table 3 for dosage)



Adapted from Siffiqi et al.  
International Journal of COPD  
2008;3(1) 31–44

**Table 3. Guidelines for use of Antibiotics for Treatment of Acute COPD Exacerbation in Nursing Home Residents**

Context	Preferred Agent	Dosing	Comments
COPD Exacerbation <u>NOT Requiring antibiotics</u>	<b>Non-antibiotic management steroids bronchodilators</b>	As per current clinical management guidelines	Antibiotics are APPROPRIATE for patients likely to have bacterial infections (see algorithm above)
<u>Simple exacerbation</u>	<b>Cefpodoxime</b>	200 mg PO twice a day x 5d (give q24h for CrCl <30; 3x/wk post HD in ESRD)	<ul style="list-style-type: none"> <li>Cefpodoxime may be given safely to patients with mild penicillin allergy (i.e. rash), cross reactivity is low</li> </ul>
	<b>Doxycycline</b>	100 mg PO twice a day x 5d (no renal adjustment needed)	<ul style="list-style-type: none"> <li>Caution with skin exposure to direct sunlight</li> </ul>
	<b>Azithromycin</b>	500 mg PO on day 1 followed by 250 mg once daily on days 2 to 5 (no renal adjustment needed)	<ul style="list-style-type: none"> <li>QTc prolongation</li> </ul>
<u>Complicated exacerbation</u>	<b>Amoxicillin/Clavulanate</b>	500/125 mg PO 3 times a day x 5d (give q12h for CrCl 10-30; give q24h for CrCl<10; give q24h for ESRD with an extra dose post each HD)	<ul style="list-style-type: none"> <li>Alternative amoxicillin/clavulanate dose is 875mg twice a day</li> <li>Penicillin resistance of invasive pneumococcus is ~ 10% in Monroe County, NY</li> </ul>
	<b>Ceftriaxone IM</b>	Ceftriaxone 1000 mg IM Q24H (no renal adjustment needed) X 5days	<ul style="list-style-type: none"> <li>May give Ceftriaxone may be given safely to patients with mild penicillin allergy (i.e. rash), cross reactivity is low</li> </ul>
	<b>Moxifloxacin (only for patients with severe allergy to above treatment)</b>	400 mg PO Q24 hrs for 5 days (no renal adjustment)	<ul style="list-style-type: none"> <li>Quinolone antibiotics pose a higher risk of C. difficile infection</li> <li>Caution with anti-arrythmic medications and prolonged QTc</li> </ul>
<u>Complicated exacerbation with risk for pseudomonas</u>	<b>Levofloxacin</b>	750 mg PO Q24h x 5d (give q48h for CrCl 20-49; 750mg x 1, then 500mg q48h for CrCl <20 and ESRD)	<ul style="list-style-type: none"> <li>Quinolone antibiotics pose a higher risk of C. difficile infection</li> <li>Caution with anti-arrythmic medications and prolonged QTc</li> </ul>

## CLINICAL FAQ:

### **Onset of New Respiratory Symptoms (e.g. a new cough, shortness of breath, productive sputum) in NH Residents**

#### **1. Is it Pneumonia???**

A diagnosis of pneumonia generally requires a combination of

- **Respiratory symptoms** (e.g. new productive cough, or new purulent sputum, or decreased O<sub>2</sub> saturation, or change in lung exam, or pleurisy, or new infiltrate)  
AND
- **Constitutional symptoms** (e.g. fever, elevated total WBC count, or left shift, or mental status change, or decreased function) [10-12]

#### **2. What else could it be?**

- *COPD exacerbation* – increased cough and sputum purulence in patient with known COPD
- *Asthma exacerbation or bronchitis in a patient without COPD* – wheezing and dry cough
- *URI* – common cold (sore throat, rhinorrhea, dry cough)
- *Influenza or other viral infections such as RSV* – constitutional symptoms are most prominent
- *Non-infectious causes* of respiratory symptoms (CHF, PE, effusions, neoplasm)

#### **4. Should I order a CXR to rule out pneumonia?**

- Pneumonia is primarily a **clinical diagnosis** (See #1 above). A CXR can be obtained if hypoxemia (decreased O<sub>2</sub> saturation) is documented to evaluate etiology of severely impaired gas exchange (e.g. CHF, effusions, mass lesions). Because many older adults have abnormal CXRs at baseline, obtaining a CXR may not always be helpful in diagnosing acute pneumonia. [13]

#### **5. What other tests should I order?**

- Pulse oximetry, nasal swab for influenza and viral testing if appropriate [10,14]
- CBC if pneumonia is suspected, BMP and creatinine
- Consider serum procalcitonin level (can help in differentiating between bacterial and viral respiratory infection) [10]
- Legionella Urine Antigen and Sputum Legionella culture should be sent per NYSDOH guidelines, in moderate/severe pneumonia for patients with organ transplants, active malignancies, ESRD, diabetes, chronic lung disease, HIV, and active smokers [15]

#### **6. When are Antibiotics needed?**

- Antibiotics are only required if **bacterial** pneumonia or a significant COPD exacerbation are strongly suspected. See Table [10-12] below for examples of clinical scenarios where initiation of antibiotics is appropriate.

### **7. When do I start antibiotics? What do I start?**

- Once the diagnosis of pneumonia or COPD exacerbation is strongly suspected
- Most cases of pneumonia or COPD exacerbation in nursing home residents can be treated with a single oral antibiotic targeted towards **community-acquired pneumonia pathogens** (see Antibiotic Tables below) [16, 17]
- *IM agents, quinolones, and agents for Pseudomonas should be reserved for special circumstances*

### **8. Do I need to reassess resident for necessity of continuing antibiotics at 48-72 hours post initiation?**

- Antibiotic reviews (also called “**antibiotic time out**”) provide clinicians with an opportunity to reassess the ongoing need for and choice of an antibiotic when the clinical picture is clearer and more information (e.g. CBC and procalcitonin results, viral PCR, CXR) is available [4].
- Relationship between antibiotic doses and risk of *C. difficile* is incremental – **every dose matters** [18]

### **7. Should I transfer the patient to the hospital for intravenous antibiotics?**

- Most cases of pneumonia or COPD exacerbation in NH residents do not require transfer to acute care or intravenous antibiotics. Follow your institution’s guidelines for appropriate patient transfers to acute care.

### **8. When should I consider testing and treating for legionella?**

- It is not necessary to test for legionella for every case of pneumonia.
- It is important for you to know your facility legionella water surveillance and your facility specific circumstances that mandate legionella testing
- Consider legionella testing and treatment:
  - If other cases have been identified at your facility
  - In case of moderate to severe pneumonia not improving on antibiotics
  - Residents with organ transplants, active malignancies, ESRD, diabetes, chronic lung disease, HIV, and active smokers

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