



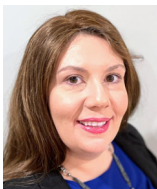
COUGH to Determine a Gram-Negative Pneumonia

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No Disclosures



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Learning Objectives

- At the completion of this educational activity, the learner will be able to:
 - Apply the C.O.U.G.H. acronym when evaluating a patient admitted with pneumonia
 - Describe the rationale for recommendations on selected diagnostic and treatment strategies for adult patients with gram-negative (GN) pneumonia (PNA)
 - Identify a query opportunity the cystic fibrosis (CF) patient admitted with PNA
 - Describe an opportunity for collaboration to increase capture of patients with gram-negative pneumonia

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Why Query to Specify a Gram-negative Pneumonia as the Principal Diagnosis?

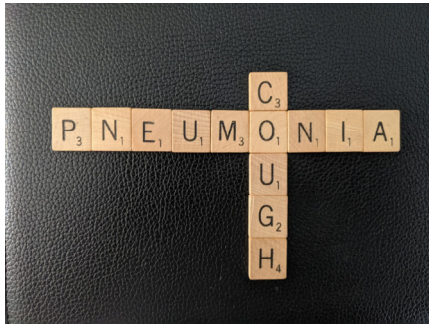
Scenario One	Scenario Two
<p>81-year-old female with a history of CAD, HTN and GERD. Now admitted to the hospital with pneumonia being treated with Ceftriaxone and Azithromycin.</p>	<p>81-year-old female with a history of CAD, HTN, GERD and COPD with recent exacerbation requiring intubation 2 weeks ago. Now admitted to the hospital with a gram-negative pneumonia being treated with Piperacillin / Tazobactam (Pip/Tazo).</p>
<p>DRG: 195: Simple Pneumonia without CC/MCC</p> <p>Weight: 0.6658 ALOS: 2.9 GMLOS: 2.5 Severity of Illness: 1 Risk of Mortality: 2</p>	<p>DRG 179: Respiratory Infections and Inflammation without CC/MCC</p> <p>Weight: 0.8727 ALOS: 3.66 GMLOS: 3.07 Severity of Illness: 1 Risk of Mortality: 2</p>

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What Is One of the Main Symptoms of Pneumonia?

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What Is One of the Main Symptoms of Pneumonia?



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When Reviewing a Possible Gram-negative Pneumonia Case, Work Through the C.O.U.G.H...

Comorbidities
Organisms
Use of antibiotics
Guidelines for treatment
Hospitalizations/**H**oses

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C-Comorbidities

- Chronic heart, lung , liver, or renal disease; diabetes mellitus; malignancy; or asplenia
 - Ex. COPD, Cystic Fibrosis, ESRD on HD
- According to the Clinical Practice Guideline of the American Thoracic Society and Infectious Diseases Society of America (IDSA):

“Patients with comorbidities should receive broader-spectrum treatment for two reasons. First, such patients are likely more vulnerable to poor outcomes if the initial empiric antibiotic regimen is inadequate. Second, many such patients have risk factors for antibiotic resistance by virtue of previous contact with the healthcare system and/or prior antibiotic exposure (see Recommendation 10) and are therefore recommended to receive broader-spectrum therapy to ensure adequate coverage. In addition to H. influenzae and M. catarrhalis (both of which frequently produce β -lactamase), S. aureus and gram-negative bacilli are more common causes of CAP in patients with comorbidities, such as COPD.”

<https://www.idsociety.org/practice-guideline/community-acquired-pneumonia-cap-in-adults/>

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O-Organisms

- Look at respiratory cultures: BAL, endotracheal aspirate, induced sputum etc.
 - Current cultures
 - Past cultures (including possible colonization)
 - Viral respiratory panels
 - Urine antigen testing
- IMPORTANT: Respiratory cultures without growth does NOT mean a patient does not have a GN PNA. Respiratory cultures with growth help guide treatment when available but are not required for diagnosis.
- Challenges with respiratory cultures:
 - Difficult to obtain good culture
 - Need to obtain before starting antibiotics

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What Are Some Common GN Organisms That Cause Pneumonia?

Community-acquired Pneumonia

- *Klebsiella pneumoniae*
- *Haemophilus influenzae*
- *Moraxella catarrhalis*
- Rare:
 - *Pseudomonas aeruginosa*
 - *Escherichia coli*
 - *Acinetobacter baumannii*

Hospital-acquired & Ventilator-associated Pneumonia

- *Pseudomonas aeruginosa*
- Gram-negative enteric bacilli:
 - *Klebsiella pneumoniae*
 - *Enterobacter* spp
 - *Escherichia coli*
- *Acinetobacter baumannii*
- *Stenotrophomonas maltophilia*

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Other Common Organisms That Can Cause PNA

- Atypical bacteria: *Mycoplasma pneumoniae* “walking pneumonia”; *Chlamydia pneumoniae*; *Legionella pneumophila*, *Chlamydia psittaci*
- Gram positive organisms: *Streptococcus pneumoniae* (most common cause of CAP) and *Staphylococcus aureus*, Group A streptococci
- Viruses: Influenza, SARS-CoV-2 (COVID-19), Rhinoviruses, Adenovirus, Parainfluenza Virus, Respiratory Syncytial Virus
- Fungi: *Pneumocystis jirovecii*, *Aspergillus* species (especially *A. fumigatus*), and *Cryptococcus neoformans*

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U-Use of Antibiotics

- Currently prescribed antibiotics
 - If indicated – do they provide GN coverage?
- Recent antibiotic use for any condition/infection
- Recent antibiotic treatment failure for pneumonia

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G-Guidelines/CMS *Conditions of Participation*

- Hospitals are required to comply with the federal requirements set by the Medicare *Conditions of Participation (CoP)* in order to receive Medicare/Medicaid payment.

§482.42 Condition of Participation: Infection Prevention and Control and Antibiotic Stewardship Programs: The hospital must have active hospital-wide programs for the surveillance, prevention, and control of HAIs and other infectious diseases, and for the optimization of antibiotic use through stewardship. The programs must demonstrate adherence to nationally recognized infection prevention and control guidelines, as well as to best practices for improving antibiotic use where applicable, and for reducing the development and transmission of HAIs and antibiotic resistant organisms. Infection prevention and control problems and antibiotic use issues identified in the programs must be addressed in collaboration with the hospital-wide quality assessment and performance improvement (QAPI) program.

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G-Guidelines

- Your institution may already have empiric antibiotics guidelines that you can use to help identify query opportunity or avoid unnecessary queries
- Identify the CMS antimicrobial stewardship chapter author for guidance and collaboration with your CDI department
- Learn about restricted use antibiotics at your organization
 - There may be an opportunity to query if a restricted antibiotic is ordered

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G-Guidelines

Pulmonary				
1. Community-Acquired Pneumonia (CAP) – Low risk for antibiotic resistant pathogens	Streptococcus pneumoniae (40% resistant to azithromycin), Haemophilus influenzae (20% resistant to amoxicillin), Atypical pathogens (Mycoplasma pneumoniae, Chlamydia pneumoniae, Legionella species)	(Ceftriaxone 1-2gm IV Q24hr PLUS Azithromycin 500mg PO Q24hr) OR Levofloxacin 750mg PO Q24hr Patients admitted to the ICU may require broader treatment (see CAP High Risk section below).	NOTES: 1. Appropriate diagnostics for CAP include: sputum gram stain and culture, urine Legionella and urine Pneumococcal antigen testing. Consider testing for respiratory viruses as well as viruses may account for 250% of community-acquired pneumonias. 2. Azithromycin and levofloxacin both treat atypical pathogens. Atypical pathogens, however, account for <5% of CAP cases in hospitalized patients. May consider withholding in patients with mild disease. 3. Doxycycline 100mg PO BID is an alternative to azithromycin for co-administration with ceftriaxone. 4. Oral step-down therapy for ceftriaxone: amoxicillin/clavulanate or levofloxacin.	5 days
2. Community Acquired Pneumonia (CAP) – High risk for antibiotic resistant pathogens (septic shock, need for mechanical ventilation, IV antibiotics in last 90 days, cystic fibrosis, bronchiectasis, known colonization with Pseudomonas or MDR pathogen)	Above pathogens and Pseudomonas, MDR GNRS	Cefepime 2gm IV Q8hr OR Piperacillin/tazobactam 4.5gm IV Q8hr PLUS Levofloxacin 750 mg PO/IV OR azithromycin 500 mg PO/IV * If septic shock, known MRSA colonization, necrotizing pneumonia, or new need for mechanical ventilation.	NOTES: 1. Appropriate diagnostics for CAP include: sputum gram stain and culture, urine Legionella and urine Pneumococcal antigen. Consider testing for respiratory viruses as well. Viruses may account for 250% of community-acquired pneumonias. 2. Narrow therapy once organism and	5 days
3. Aspiration Pneumonia	Gram-negative enteric pathogens, oral anaerobes	Ceftriaxone 1-2gm IV Q24hr OR Levofloxacin 750mg PO Q24hr Only add Metronidazole 500mg PO QIDhr if abscess	Add Vancomycin 30-45 mg/kg/day IV divided Q8-12hr (goal trough 15-20 mcg/mL) OR Linezolid 600mg IV/PO Q12h susceptibility results are known. 3. If vancomycin or linezolid is started, stop at 48hrs if no MRSA cultured.	If rapid clinical improvement, consider aspiration pneumonia and stop antibiotics early. If slow to improve, then 5 days.
4. Hospital-Acquired Pneumonia (HAP) (risk factors for MDR: IV antibiotics within the past 90 days)	Overlap with CAP in terms of common pathogens for patients with early onset HAP (<5 days from admission). Aerobic gram-negative bacilli including Pseudomonas aeruginosa more common with prolonged hospitalization/ventilation. Staphylococcus aureus more common in patients with known MRSA colonization, necrotizing pneumonia, empyema, septic shock, or recent influenza.	Gram-negative: Cefepime 2gm IV Q8hr OR Piperacillin/tazobactam 4.5gm IV Q8hr (give over 3 hours) OR Meropenem 1gm IV Q8h - If septic shock, known MRSA colonization, necrotizing pneumonia, or new need for mechanical ventilation add MRSA treatment: Vancomycin 30-45 mg/kg/day IV divided Q8-12hr (goal trough 15-20 mcg/mL) OR Linezolid 600mg IV/PO Q12h AND If septic shock add second Gram-negative agent: Levofloxacin 750 mg IV or gentamicin or tobramycin 7 mg/kg (re-dose per pharmacy)	NOTES: 1. Send respiratory sample for gram stain and culture for all patients. 2. Consider urine legionella antigen testing. 3. Deescalate therapy once organism and susceptibility results are known. 4. If vancomycin or linezolid is started, stop at 48hrs if no MRSA cultured.	7 days

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G-Guidelines

- CAP guidelines:
<https://www.idsociety.org/practice-guideline/community-acquired-pneumonia-cap-in-adults/>
- HAP/VAP guidelines:
https://www.idsociety.org/practice-guideline/hap_vap/
- Johns Hopkins Antibiotic Guide:
https://www.unboundmedicine.com/ucentral/index/Johns_Hopkins_ABX_Guide/All_Topics/A

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IDSA/ATS CAP Treatment Guidelines

Table 4. Initial Treatment Strategies for Inpatients with Community-acquired Pneumonia by Level of Severity and Risk for Drug Resistance

	Standard Regimen	Prior Respiratory Isolation of MRSA	Prior Respiratory Isolation of <i>Pseudomonas aeruginosa</i>	Recent Hospitalization and Parenteral Antibiotics and Locally Validated Risk Factors for MRSA	Recent Hospitalization and Parenteral Antibiotics and Locally Validated Risk Factors for <i>P. aeruginosa</i>
Nonsevere inpatient pneumonia ^a	β -Lactam + macrolide [†] or respiratory fluoroquinolone [‡]	Add MRSA coverage [§] and obtain cultures/nasal PCR to allow deescalation or confirmation of need for continued therapy	Add coverage for <i>P. aeruginosa</i> and obtain cultures to allow deescalation or confirmation of need for continued therapy	Obtain cultures but withhold MRSA coverage unless culture results are positive. If rapid nasal PCR is available, withhold additional empiric therapy against MRSA if rapid testing is negative or add coverage if PCR is positive and obtain cultures	Obtain cultures but initiate coverage for <i>P. aeruginosa</i> only if culture results are positive
Severe inpatient pneumonia ^a	β -Lactam + macrolide [†] or β -lactam + fluoroquinolone [‡]	Add MRSA coverage [§] and obtain cultures/nasal PCR to allow deescalation or confirmation of need for continued therapy	Add coverage for <i>P. aeruginosa</i> and obtain cultures to allow deescalation or confirmation of need for continued therapy	Add MRSA coverage [§] and obtain nasal PCR and cultures to allow deescalation or confirmation of need for continued therapy	Add coverage for <i>P. aeruginosa</i> and obtain cultures to allow deescalation or confirmation of need for continued therapy

<https://www.idsociety.org/practice-guideline/community-acquired-pneumonia-cap-in-adults/>

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IDSA/ATS HAP/VAP Treatment Guidelines

Table 4. Recommended Initial Empiric Antibiotic Therapy for Hospital-Acquired Pneumonia (Non-Ventilator-Associated Pneumonia)

Not at High Risk of Mortality* and no Factors Increasing the Likelihood of MRSA†	Not at High Risk of Mortality* but With Factors Increasing the Likelihood of MRSA†	High Risk of Mortality or Receipt of Intravenous Antibiotics During the Prior 90 d†
One of the following:	One of the following:	Two of the following, avoid 2 β -lactams:
Piperacillin-tazobactam [§] 4.5 g IV q6h	Piperacillin-tazobactam [§] 4.5 g IV q6h	Piperacillin-tazobactam [§] 4.5 g IV q6h
OR	OR	OR
Cefepime [§] 2 g IV q8h	Cefepime [§] or ceftazidime [§] 2 g IV q8h	Cefepime [§] or ceftazidime [§] 2 g IV q8h
OR	OR	OR
Levofloxacin 750 mg IV daily	Levofloxacin 750 mg IV daily	Levofloxacin 750 mg IV daily
	Ciprofloxacin 400 mg IV q8h	Ciprofloxacin 400 mg IV q8h
	OR	OR
Imipenem [§] 500 mg IV q6h	Imipenem [§] 500 mg IV q6h	Imipenem [§] 500 mg IV q6h
Meropenem [§] 1 g IV q8h	Meropenem [§] 1 g IV q8h	Meropenem [§] 1 g IV q8h
	OR	OR
	Aztreonam 2 g IV q8h	Amikacin 15–20 mg/kg IV daily
		Gentamicin 5–7 mg/kg IV daily
		Tobramycin 5–7 mg/kg IV daily
		OR
		Aztreonam [§] 2 g IV q8h
	Plus:	Plus:
	Vancocycin 15 mg/kg IV q8–12h with goal to target 15–20 mg/mL trough level (consider a loading dose of 25–30 mg/kg \times 1 for severe illness)	Vancocycin 15 mg/kg IV q8–12h with goal to target 15–20 mg/mL trough level (consider a loading dose of 25–30 mg/kg IV \times 1 for severe illness)
	OR	OR
	Linezolid 600 mg IV q12h	Linezolid 600 mg IV q12h
		If MRSA coverage is not going to be used, include coverage for MSSA. Options include: Piperacillin-tazobactam, cefepime, levofloxacin, imipenem, meropenem. Oxacillin, nafcillin, and cefazolin are preferred for the treatment of proven MRSA, but would ordinarily not be used in an empiric regimen for HAP.
		If patient has severe penicillin allergy and aztreonam is going to be used instead of any β -lactam-based antibiotic, include coverage for MSSA.

https://www.idsociety.org/practice-guideline/hap_vap/

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H-Hospitalizations



- Look for hospitalizations or admissions to a healthcare center (rehab, nursing home, etc.) within the past 3 months
- Also think about....**H-Hoses** = respiratory equipment (ex. recent intubation, CPAP, tracheostomy, bronchoscopy, etc.)

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Cystic Fibrosis and Pneumonia

Cystic Fibrosis (CF)

- Pulmonary disease remains the leading cause of morbidity and mortality in patients with CF
- Chronic airway obstruction caused by viscous secretions, leads to progressive pulmonary colonization with pathogenic bacteria
- Patients with CF are particularly prone to chronic infection with *P. aeruginosa*
- Hypoxia causes changes in *P. aeruginosa* (and some other GN bacteria), including loss of motility and causes alginate production
 - Alginate, or alginic acid, is a component of the biofilm
 - Biofilm bacteria share nutrients and are protected from harmful factors in the environment, Ex: antibiotics; the host body's immune system
 - Biofilm and *P. aeruginosa* have a high resistance to antibiotics
 - Once biofilm production, aka development of "bacterial macrocolonies" occurs, eradication of the organism/infection is nearly impossible

Cystic Fibrosis (CF)

- Treatment of exacerbations with systemic antibiotics is a mainstay of CF care and is recommended in virtually all consensus guidelines
- Patients with persistent *P. aeruginosa* infection, are typically treated with chronic inhaled Tobramycin
- Most patients with CF have chronic bacterial infection of the airways with one or more of these organisms:
 - *Pseudomonas aeruginosa*
 - *Staphylococcus aureus* (methicillin-sensitive or methicillin-resistant species)
 - *Burkholderia cepacia* complex
 - Nontypeable *Haemophilus influenzae*
 - *Stenotrophomonas maltophilia*
 - *Achromobacter* species
 - Nontuberculous mycobacteria

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Cystic Fibrosis (CF)

- So, when do you query for GN PNA in a patient with CF?
- ANYTIME a CF patient is admitted with a possible pneumonia!

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General Reminders

Reminder...

Check antibiotic order for indications

Components

Component	Order Dose	Admin Dose
piperacillin-tazobactam 4.5 gram Solr	4.5 g	4.5 g
sodium chloride 0.9% Pgbk	100 mL	100 mL

Order Questions

Question	Answer	Comment
Indication	Definitive (documented infection)	
Infection Source	Pneumonia	

Remember to Check Allergies

- Documented allergies may be the reason a patient is not on the standard antibiotics. Check notes/documentation to assure query is appropriate.

ALLERGIES

Penicillin G

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When Should You Consider Querying for Gram-negative Pneumonia?

Patient with a positive respiratory culture growing Gram Negative (GN) organism

OR

Patient with a co-morbidities ex. COPD, CF, asplenia and/or recent treatment with a vent....

also being treated with:

Cefepime 2gm IV Q8hr OR Piperacillin/tazobactam 4.5gm IV Q6hr

PLUS

Levofloxacin 750 mg PO/IV OR azithromycin 500 mg PO/IV

OR treatment with...

Meropenem 1gm IV Q8h or Imipenem/cilastatin

Or

Ceftazidime or aztreonam

Or

Gentamicin or tobramycin or ciprofloxacin

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When Not to Query a Gram-negative Pneumonia?

Patient on standard CAP treatment

Example treatment:

Ceftriaxone 1-2gm IV Q24hr **PLUS** Azithromycin 500mg PO Q24hr
OR
 Levofloxacin 750mg PO Q24hr
(Or moxifloxacin 400 mg PO/IV q24hr depending on your organization)

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Case Study 1

64 year old female with a history of HTN, CAD, GERD, stage 3 COPD (not on home oxygen), osteoarthritis of the L knee s/p L TKR in 2016 presenting with 4 days of cough and shortness of breath.

H&P: No recent travel or sick contacts. She routinely takes lisinopril, tiotropium and fluticasone/salmeterol, and has been using her rescue albuterol inhaler "a lot more than normal". Treated outpatient with azithromycin for CAP about 3 weeks ago, felt better until 4 days ago.

Review of systems: Respiratory rate 20, fever T=101.2F, HR 88; BP 140/82

- Reports chills, productive cough and dyspnea (more than baseline). Denies HA, pain, dysuria, n/v/d.

- Oxygen saturation 86% on RA, 97% on 3LNC

Exam:

Neuro: A&Ox3

Resp: Coarse breath sounds, rhonchi and wheezes heard throughout, worse in the LLL

Abd: Soft, not tender, no distention, +BS x4

Ext: No edema

Skin: Intact

CXR: Focal consolidation in the left lower lobe, suggestive of pneumonia.

Rapid Covid-19, Influenza A&B, RSV and parainfluenza-all negative

Assessment and plan:

#Pneumonia - treat with Meropenem and Vancomycin

#Possible COPD exacerbation iso PNA – Duonebs, tiotropium and fluticasone/salmeterol, antibiotics as above. Consider steroids if no improvement. Continuous pulse ox monitoring. Chest physiotherapy. Wean oxygen as tolerated.

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Case 1 applying COUGH

- C=COPD
- O=No cultures available
- U=Meropenem and Vancomycin now; recent CAP tx with Azithromycin
- G=Review your antibiotic guidelines
- H=No hospitalization or “hoses”

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Case Study 1 – Query Opportunity

Question: Please specify the type of pneumonia being treated with Meropenem and Vancomycin?

*Please note, negative or inconclusive sputum cultures **do not** preclude a diagnosis of a specific bacterial pneumonia in patients with the clinical evidence of this condition. Your **impression** is adequate.*

Response option: “Treating for gram-negative pneumonia”

Risk Factors: 64F with history of stage 3 COPD, treated for CAP 3 weeks ago with azithromycin

Clinical Indicators: #Pneumonia #Possible COPD exacerbation

CXR: Focal consolidation in the left lower lobe, suggestive of pneumonia.

Treatment: Meropenem and Vancomycin

Case Study 2

H&P: 40M with cystic fibrosis, severe lung disease, chronically infected with *Pseudomonas aeruginosa*, on chronic supplemental O₂, chronic hypercapnia on nocturnal BiPAP, poor medication and follow-up compliance who presents with increased SOB c/f Acute CF exacerbation.

Review of systems: RR 22, T 98.8, HR 108; BP 134/82

- Reports progressive shortness of breath and hypoxia over the past 1 year.
- Endorses SOB with minimal activity (putting on shoes, etc.).
- Has been de-satting with minimal movements to mid 70s.
- Has had to increase O₂ from prior baseline for 2-3 L to 4 - 5L.
- Denies orthopnea or PND.
- No leg swelling or chest pain.
- Has had a cough for the past year that is minimally productive.
- No hemoptysis. No night sweats or weight loss. Endorses wheezing.
- No sore throat, rhinorrhea, fevers or chills. No abdominal pain, nausea or vomiting.
- Has home nocturnal BiPAP but doesn't use it regularly due to getting skin irritation from masks and he feels the mask fits properly.
- No sick contacts. COVID vaccinated x 2.
- Oxygen saturation 96% on 4LNC

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Case Study 2

Exam:

General Appearance: Alert, cooperative, no distress, sleeping

Lungs: decreased breath sounds bilaterally, respirations unlabored

CV: Regular rate and rhythm, S1,S2 normal, no murmur, rub or gallop

Abdomen: Soft, non-tender, bowel sounds active, no masses, nor rebound tenderness, abdomen moderately distended

Extremities: Extremities normal. Atraumatic, no cyanosis or edema

Skin: No rashes, lesions or erythema

Neuro: Nonfocal exam

CXR: Severe diffuse bronchiectasis (comparable to prior) with similar partial collapse of LUL. RLL with focal consolidation (new compared to prior) concerning for pneumonia.

Rapid Covid-19, Influenza A&B, RSV and parainfluenza-all negative

Induced sputum culture this admission: *Pseudomonas aeruginosa* sensitive to Levaquin and Pip/Tazo

Assessment and plan:

- #Acute CF exacerbation and pneumonia- treating with Pip/Tazo and Levofloxacin
- #Chronic respiratory failure on supplemental O₂ at baseline – Prednisone, continue baseline NC 4-5L oxygen and home nocturnal bipap, continue home Trikafta, continue home pulmozyme (increased to 5mg BID), symbicort BID, standing duonebs, pt doesn't tolerate hypertonic saline. HOLD home Spiriva daily while on duonebs as can be drying
 - Chest PT

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Case Study 2 applying COUGH

- C=CF, severe lung disease
- O=chronically colonized with resistant *P. aeruginosa*; current cx growing *P. aeruginosa*
- U=Pip/Tazo and Levofloxacin
- G=Review antibiotic guidelines
- H=BiPAP at night. No recent hospitalizations.

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Case Study 2 – Query Opportunity

Question: Please specify the type of pneumonia being treated with Levaquin and Pip/Tazo?

Please note, negative or inconclusive sputum cultures **do not** preclude a diagnosis of a specific bacterial pneumonia in patients with the clinical evidence of this condition. Your **impression** is adequate.

Response option: “Treating for gram-negative pneumonia”

Risk Factors: 45M with history of CF, chronic respiratory failure on home oxygen and nocturnal bi-pap

- History of respiratory culture with resistant *Pseudomonas aeruginosa*

Clinical Indicators: # Acute CF exacerbation and pneumonia

- Respiratory cx this admission *Pseudomonas aeruginosa* sensitive to Levaquin and Pip/Tazo

- CXR Severe diffuse bronchiectasis (similar to CXR 1 year ago) with similar partial collapse of LUL. RLL with focal consolidation (new compared to prior) concerning for pneumonia.

Treatment:

- Pip/Tazo IV and Levofloxacin IV

In Closing

- Remember C.O.U.G.H. to determine if there is an opportunity to query for GN PNA
 - Comorbidities
 - Organism
 - Use of antibiotics
 - Guidelines (antimicrobial)
 - Hospitalization/"Hoses"
- Anytime a CF patient is being treated with antibiotics for PNA, assure coverage for GN PNA and send a query to clarify the GN PNA
- Collaborate with the ID pharmacist or ID physician at your organization that reviews antibiotic restrictions and prescribing guidelines

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A SPECIAL THANK YOU...

**David W. Kubiak, PharmD,
BCPS, BCIDP, FIDSA**



BWH/BWFH CDI Team



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Thank you. Questions?

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In order to receive your continuing education certificate(s) for this program, you must complete the online evaluation. The link can be found in the continuing education section of the program guide.

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