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IMAGINE

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COUGH to determine a gram-negative pneumonia

Adriana Cecchini, MSN, RN, CIC

Clinical Documentation Specialist

Brigham and Women's Faulkner Hospital

Boston, MA

Presented By



- Adriana Cecchini, MSN, RN, CIC
- Adriana is a CDI specialist at Brigham and Women's Faulkner Hospital in Boston, Massachusetts. Adriana has been a nurse for more than 15 years. Adriana's prior clinical experience includes acute care, infectious disease, and public health. She holds a certification in infection control and epidemiology. She has been working in CDI since 2019.

No disclosures



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Learning Objectives

- At the completion of this educational activity, the learner will be able to:
 - Apply the COUGH 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)
 - Evaluate a query opportunity in the Cystic Fibrosis (CF) patient with PNA or pulmonary exacerbation
 - Identify opportunities for collaboration at their own facility to increase capture of patients with gram-negative pneumonia

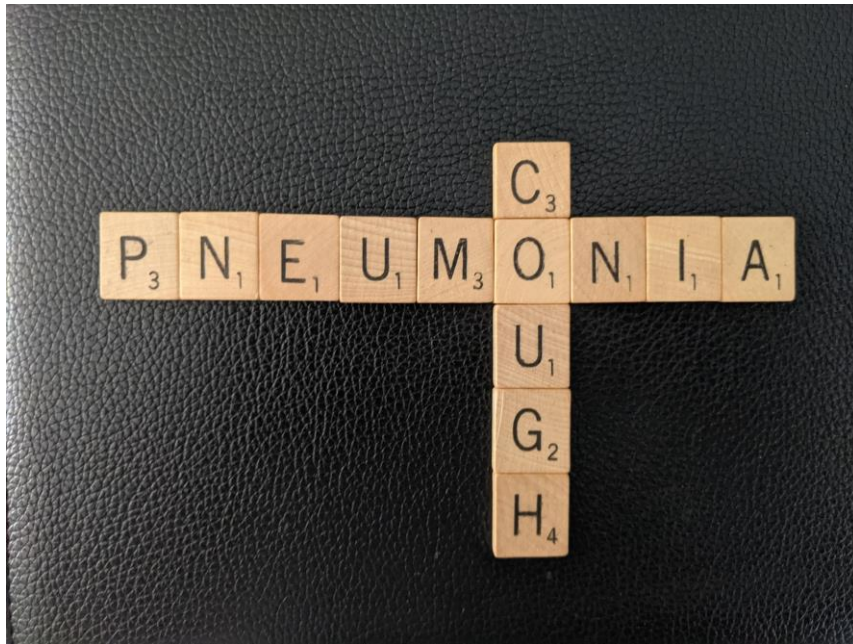
Why query to specify a gram-negative pneumonia as the Principle Diagnosis?

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: 1</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: 1</p>

What is one of the main symptoms of Pneumonia?

What is one of the main symptoms of Pneumonia?

- Cough



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When you are reviewing a possible gram-negative pneumonia case,
work through the COUGH...

C-comorbidities

O-organisms

U-use of antibiotics

G-guidelines for treatment

H-hospitalizations

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/>

- Gram negative Pneumonia is more common in HAP/VAP
https://www.idsociety.org/practice-guideline/hap_vap/

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

What are some examples of common GN organisms that can cause pneumonia?

Community-Acquired Pneumonia

- *Klebsiella pneumoniae*
- *Haemophilus influenzae*
- *Moraxella catarrhalis*
- Atypical (GN) bacteria
 - *Mycoplasma pneumoniae*
 - *Chlamydia pneumoniae*
 - *Legionella pneumophila*
 - *Chlamydia psittaci*
- Rarely:
 - *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*

Other common organisms that can cause PNA

- 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*

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

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.

G-Guidelines (continued)

- 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

G-Guidelines (continued)

Pulmonary				
<p>1. Community-Acquired Pneumonia (CAP) – Low risk for antibiotic resistant pathogens</p>	<p><i>Streptococcus pneumoniae</i> (40% resistant to azithromycin), <i>Haemophilus influenzae</i> (20% resistant to amoxicillin), Atypical pathogens (<i>Mycoplasma pneumoniae</i>, <i>Chlamydia pneumoniae</i>, <i>Legionella</i> species)</p>	<p>(Ceftriaxone 1-2gm IV Q24hr PLUS Azithromycin 500mg PO Q24hr) OR Levofloxacin 750mg PO Q24hr</p> <p>Patients admitted to the ICU may require broader treatment (see CAP High Risk section below).</p>	<p>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 ≥50% 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</p>	<p>5 days</p>
<p>2. Community Acquired Pneumonia (CAP) – High risk for antibiotic resistant pathogens</p> <p>(septic shock, need for mechanical ventilation, IV antibiotics in last 90 days, cystic fibrosis, bronchiectasis, known colonization with <i>Pseudomonas</i> or MDR pathogen)</p>	<p><i>Above pathogens and Pseudomonas, MDR GNRs</i></p>	<p>Cefepime 2gm IV Q8hr OR Piperacillin/tazobactam 4.5gm IV Q6hr PLUS Levofloxacin 750 mg PO/IV OR azithromycin 500 mg PO/IV</p> <p>* If septic shock, known MRSA colonization, necrotizing pneumonia, or new need for mechanical ventilation:</p>	<p>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 ≥50% of community-acquired pneumonias. 2. Narrow therapy once organism and</p>	<p>5 days</p>

G-Guidelines (continued)

		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.	
3. Aspiration Pneumonia	Gram-negative enteric pathogens, oral anaerobes	Ceftriaxone 1-2gm IV Q24hr OR Levofloxacin 750mg PO Q24hr Only add Metronidazole 500mg PO Q8hr if abscess	Clindamycin 600mg IV Q8hr or 450mg PO Q6hr	If rapid clinical improvement, consider aspiration pneumonitis and stop antibiotics early. If slow to improve, then 5 days
4. Hospital-Acquired Pneumonia [HAP] (risk factors for MDRO: 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 <i>Pseudomonas aeruginosa</i> more common with prolonged hospitalization/ventilation. <i>Staphylococcus aureus</i> 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 Q6hr (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

G-Guidelines (continued)

- Other resources and 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)
https://www.unboundmedicine.com/ucentral/index/Johns_Hopkins_ABX_Guide/All_Topics/A

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*	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*	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/>

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 ^a and no Factors Increasing the Likelihood of MRSA ^{b,c}	Not at High Risk of Mortality ^a but With Factors Increasing the Likelihood of MRSA ^{b,c}	High Risk of Mortality or Receipt of Intravenous Antibiotics During the Prior 90 d ^{a,c}
One of the following:	One of the following:	Two of the following, avoid 2 β -lactams:
Piperacillin-tazobactam ^d 4.5 g IV q6h	Piperacillin-tazobactam ^d 4.5 g IV q6h	Piperacillin-tazobactam ^d 4.5 g IV q6h
OR	OR	OR
Cefepime ^d 2 g IV q8h	Cefepime ^d or ceftazidime ^d 2 g IV q8h	Cefepime ^d or ceftazidime ^d 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 ^d 500 mg IV q6h	Imipenem ^d 500 mg IV q6h	Imipenem ^d 500 mg IV q6h
Meropenem ^d 1 g IV q8h	Meropenem ^d 1 g IV q8h	Meropenem ^d 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 ^e 2 g IV q8h
	Plus: Vancomycin 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)	Plus: Vancomycin 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 MSSA, 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.		

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) continued

- 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

Cystic Fibrosis (CF) continued

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

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General Reminders

Reminder...

Check antibiotic order for indications

Components

Component	Order Dose	Admin Dose
cefepime 2 gram Solr	2,000 mg	2,000 mg
sodium chloride 0.9% Pgbk	100 mL	100 mL

[Component Details](#)

Order Questions

Question	Answer	Comment
Indication	Empiric	
Infection Source	Pneumonia	

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

When should you consider querying for Gram Negative Pneumonia?

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

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*

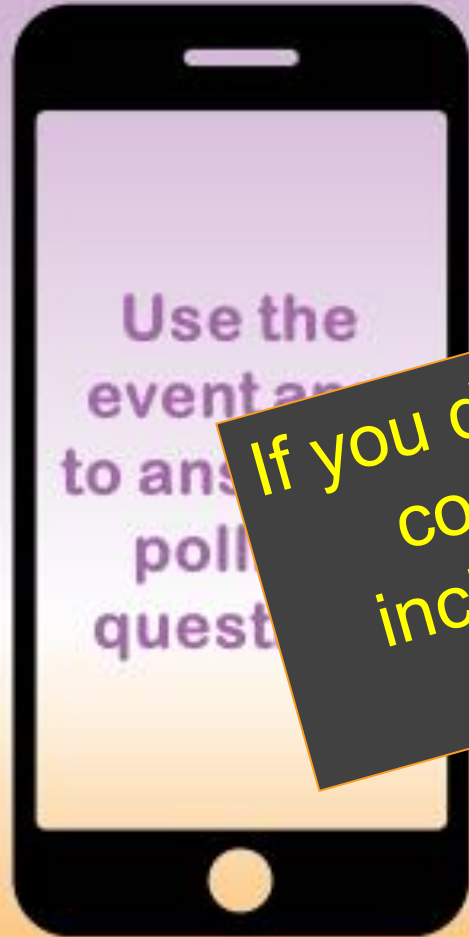
When not to query a GN pneumonia?

- **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)*

Steps for Attendees to Answer/View POLLING QUESTIONS



If you decide to include polling questions to be conducted using the event app, please include this instruction slide (as is) before your first question (only).

1. Navigate to the menu.
 2. Tap on the menu to view your poll.
- Submit.

Steps for Attendees to Answer/View POLLING QUESTIONS



1. Navigate to the **Schedule** in the main menu.
2. Tap the **name of the current session** to view the session details page.
3. Scroll down the page to **Live Polls**.
4. Tap the **name of the poll**.
5. Tap your **answer** choice(s) and then tap **Submit**.

Polling Question 1 Using Event App

Question 1: Should you query for GN PNA on this patient?

- **Patient admitted for:** CAP
Antibiotic Treatment: Ceftriaxone and doxycycline
- **Allergies:** Levaquin
- **Risks:** Recent hospitalization after a fall, but no mention of intubation
 - Chose one answer:
 - 1.) YES
 - 2.) NO

POLLING RESULTS

Question 1

Patient admitted for: CAP

Antibiotic Treatment: Ceftriaxone and doxycycline

Allergies: Levaquin

Risks: Recent hospitalization after a fall, but no mention of intubation

Correct Answer: 2. No, query is not indicated. Patient does not have risk factors for a GN PNA.

Polling Question 2 Using Event App

Question 2: Should you query for GN PNA on this patient?

- **Patient admitted for:** Pneumonia
Antibiotic Treatment: Pip/Tazo
- **Allergies:** None
- **Risks:** Recent Hospitalization for COPD exacerbation
 - Chose one answer:
 - 1.) YES
 - 2.) NO

POLLING RESULTS

Question 2

Patient admitted for: Pneumonia

Antibiotic Treatment: Pip/Tazo

Allergies: None

Risks: Recent Hospitalization for COPD exacerbation

Correct answer: 1. Yes, high potential for GN PNA. Pip/Tazo will provide sufficient empiric of GN and GP organisms

Polling Question 3 Using Event App

Question 3: Should you query for GN PNA on this patient?

- **Patient admitted for:** Septic shock and PNA
Antibiotic Treatment: Vanco, Cefepime, Azithromycin
- **Allergies:** None
- **Risks:** COPD (uses 2L oxygen at night)
 - Chose one answer:
 - 1.) YES
 - 2.) NO

POLLING RESULTS

Question 3

Patient admitted for: Septic shock and PNA

Antibiotic Treatment: Vanco, Cefepime, Azithromycin

Allergies: None

Risks: Mild COPD (uses 2L oxygen at night)

Correct answer: 1. Yes, high potential for GN PNA. Above meds provide broad empiric treatment for GN, GP, and atypical pathogens. Risk factors: COPD.

Polling Question 4 Using Event App

Question 4: Should you query for GN PNA on this patient?

- **Patient admitted for:** PNA
Antibiotic Treatment: Meropenem and Vancomycin
- **Allergies:** None
- **Risks:** Stage III Severe COPD and recent treatment for CAP
 - Chose one answer:
 - 1.) YES
 - 2.) NO

POLLING RESULTS

Question 4

Patient admitted for: PNA

Antibiotic Treatment: Meropenem and Vancomycin

Allergies: None

Risks: Stage III Severe COPD and recent treatment for CAP

Correct answer: 1. Yes, high potential for GN PNA. Meropenem provides coverage of GN and GP organisms, and vancomycin provides additional GP against MRSA. Risk factors include COPD and recent CAP.

Polling Question 5 Using Event App

Question 5: Should you query for GN PNA on this patient?

- **Patient admitted for:** CF exacerbation and PNA
Antibiotic Treatment: Ceftazidime and Meropenem
Allergies: None
- **Risks:** PMH- Cystic Fibrosis and history of respiratory colonization with drug-resistant *Pseudomonas aeruginosa*
 - Chose one answer:
 - 1.) YES
 - 2.) NO

POLLING RESULTS

Question 5

Patient admitted for: CF exacerbation and PNA

Antibiotic Treatment: Ceftazidime, Meropenem, and inhaled tobramycin

Allergies: None

Risks: PMH- Cystic Fibrosis and history of respiratory colonization with drug-resistant *Pseudomonas aeruginosa*

Correct answer: 1. Yes, *high potential for GN PNA. Ceftazidime, Meropenem, and inhaled tobramycin provide broad empiric treatment against GN organisms. Including drug-resistant pseudomonas*

Polling Question 6 Using Event App

Question 6: Should you query for GN PNA on this patient?

- **Patient admitted for:** PNA
Antibiotic Treatment: Initially treated with IV Ceftriaxone and Azithromycin, now being discharged home on PO Levofloxacin
Allergies: None
- **Risks:** PMH- mild Asthma, no recent antibiotics
 - Chose one answer:
 - 1.) YES
 - 2.) NO

POLLING RESULTS

Question 6

Patient admitted for: CAP PNA

Antibiotic Treatment: Initially treated with IV Ceftriaxone and Azithromycin, now being discharged home on PO Levofloxacin

Allergies: None

Risks: PMH- mild Asthma, no recent antibiotics

Correct answer: 2. No, although current antibiotics do provide some GN treatment, the most common bacterial pathogen in CAP is GP (*Streptococcus pneumoniae*) and the current regimen is highly active vs *Streptococcus pneumoniae* and atypical organisms - GN pathogens are less of a concern in this situation as patient. Patient lacks additional risk factors to support a query.

Polling Question 7 Using Event App

Question 7: Should you query for GN PNA on this patient?

- **Patient admitted for:** PNA
Antibiotic Treatment: Ceftriaxone and doxycycline
Allergies: azithromycin
- **Risks:** Positive respiratory culture for *Streptococcus pneumoniae*
- Chose one answer:
 - 1.) YES
 - 2.) NO

POLLING RESULTS

Question 7

Patient admitted for: PNA

Antibiotic Treatment: PO amoxicillin-clavulanate

Allergies: azithromycin

Risks: Positive respiratory culture for *Streptococcus pneumoniae*

Correct answer: 2. No, *Streptococcus pneumoniae* is a GP organism. Patient lacks risk factors for GN PNA.

Polling Question 8 Using Event App

Question 8: Should you query for GN PNA on this patient?

- **Patient admitted for:** Multifocal PNA w/new O2 requirement
Antibiotic Treatment: Pip/Tazo and Azithromycin
Allergies: None
- **Risks:** Asthma, Bronchiectasis, Recurrent respiratory infection w/multidrug resistant *Stenotrophomonas*
- Chose one answer:
 - 1.) YES
 - 2.) NO

POLLING RESULTS

Question 8

Question 8: Should you query for GN PNA on this patient?

Patient admitted for: Multifocal PNA w/new O2 requirement

Antibiotic Treatment: Pip/Tazo

Allergies: Lisinopril and HCTZ

Risks: Asthma, Bronchiectasis, Recurrent respiratory infection w/ multi-drug resistant *Stenotrophomonas*

Correct answer: 2. Yes, *Patient has a history of recurrent infection with a GN organism (Stenotrophomonas) and Pip/Tazo will provide sufficient empiric of GN and GP organisms.*

In closing

- Remember COUGH to determine if there is an opportunity to query for GN PNA
 - Comorbidities, Organism, Use of antibiotics, Guidelines (antimicrobial) and Hospitalization/“Hoses”
- Anytime a CF patient is being treated with IV antibiotics for PNA or CF exacerbation, 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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Thank you. Questions?

ACecchini@BWH.Harvard.edu

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