

Emergency Medicine/Urgent Care Small Group Activity (Facilitator Notes)

Curriculum for Antimicrobial Stewardship

Facilitator instructions:

- Read through the facilitator notes and make note of discussion points for each scenario
- Locate and familiarize yourself with your local treatment guidelines for pneumonia, if available at your institution. If local guidelines are not available, locate the national guidelines (references below).
- Locate your local antibiogram

Objectives:

At the completion of this small group activity, the learner should be able to:

1. Describe the appropriate treatment of community-acquired pneumonia
2. Describe the appropriate treatment of hospital-acquired pneumonia
3. Locate pneumonia treatment guidelines and apply to a clinical case scenario
4. Describe the appropriate use of antibiotics in the treatment of COPD exacerbation
5. Distinguish respiratory colonization from infection

Case Scenario #1: Ms. Reynolds is a 22-year-old college student. She presents to the campus acute care clinic with a 5-day history of malaise, fever and productive cough. She is otherwise healthy, has no known allergies and is not on any medications. On physical examination, the patient has a temperature of 101.9°F, blood pressure of 96/64 mmHg, pulse of 105, respiratory rate of 22 and oxygen saturation of 95% on room air. She has râles, dullness to percussion and increased resonance over her right lung base. A chest x-ray reveals a right lower lobe consolidation. What clinical condition does this patient have? How would you manage this patient? Would you prescribe antibiotics, if so, which one(s) and for how long?

This patient has community-acquired pneumonia (CAP). Local guidelines can be a useful tool in antibiotic stewardship. Locate either your institutional guidelines for community acquired pneumonia or the Infectious Diseases Society of America guidelines and/or pocketcard (reference below).

*This patient can be treated as an outpatient. She should be prescribed antibiotics to target *S. pneumoniae*, *H. influenzae*, and atypicals such as *M. pneumoniae* and *C. pneumoniae*. A macrolide antibiotic or doxycycline would be appropriate in communities where <25% of CAP is due to macrolide-resistant *S. pneumoniae*. In communities with a higher level of drug-resistant *S. pneumoniae*, a respiratory fluoroquinolone (i.e. moxifloxacin or levofloxacin) or a β -lactam antibiotic such as high-dose amoxicillin or amoxicillin-clavulanate **PLUS** a macrolide would be appropriate. Current evidence suggests that CAP can be safely treated with only 5 days of antibiotic therapy.*

Case Scenario #2: Mr. Adams is a 21-year-old college student who presents to the campus acute care clinic with a 3-day history of malaise, sore throat, fever, nasal congestion, post-nasal drainage and productive cough. On physical examination, the patient has a temperature of 100.1°F, blood pressure of 98/72 mmHg, pulse of 100, respiratory rate of 16 and oxygen saturation of 97% on room air. His nasal turbinates are erythematous and swollen bilaterally, his oropharynx is erythematous without exudates, his lung exam is benign. He smokes 1 pack of cigarettes per day. Should antibiotics be prescribed for this patient? What clinical parameters would prompt you to consider antibiotics?

This patient has a cough illness or bronchitis that most likely represents “the common cold”. He should not be treated with an antibiotic. The common cold is caused by viral pathogens, such as rhinovirus, parainfluenza, adenovirus, RSV, and influenza. Although sore throat, nasal symptoms, and cough may be present, there is no prominent symptom or sign. Symptoms may last up to 14 days with an average of 7 to 11 days. Purulent nasal secretions do not predict bacterial sinusitis unless accompanied by other signs and symptoms of bacterial infection. Studies have found the common cold resolves without antibiotic treatment. Treatment with an antibiotic does not shorten the duration of illness or prevent bacterial rhinosinusitis. Patients with purulent green or yellow secretions do not necessarily benefit from antibiotic treatment. Over-the-counter cough suppressants have limited efficacy for relief of cough due to upper respiratory infection. Acute cough associated with the common cold may be relieved by first-generation antihistamines and decongestants.

Case Scenario #3: You are in the Emergency Department seeing Mr. Jeffries, an 83-year-old male who was discharged to a ventilator-weaning facility 2 days ago after a 3-week hospitalization for a cerebrovascular accident. The patient is not able to provide a history, but has a fever, cough, purulent respiratory secretions and increased ventilator requirements. His physical examination is remarkable for a temperature 101.1°F and scattered rhonchi throughout bilateral lung fields. His white blood cell count is 16,000 cells/mm³ and a chest x-ray reveals a left upper lobe consolidation. What clinical condition does this patient have? What antibiotic regimen would you start him on?

Locate either your local guidelines for the treatment of hospital-acquired pneumonia and ventilator-acquired pneumonia or use the Infectious Diseases Society of America guidelines (reference below) in addition to your local microbiologic data (antibiogram).

This patient has late onset ventilator-acquired pneumonia (VAP). He is at risk for multi-drug resistant pathogens such as MRSA, Pseudomonas, Klebsiella pneumoniae, Acinetobacter in addition to S. pneumoniae, methicillin-sensitive S. aureus, H. influenzae, and antibiotic-sensitive enteric gram-negative bacilli. Empiric therapy should include a combination of drugs that covers the above organisms. One example of combination therapy would be piperacillin-tazobactam PLUS an aminoglycoside PLUS vancomycin. What regimen would provide the best coverage of these organisms given your local microbiologic data?

This patient should also have blood cultures and respiratory cultures drawn in the Emergency Department. The patient's clinical condition and culture results should be evaluated at 72 hours. Antibiotic de-escalation or streamlining should occur at that time.

Case Scenario #4: Ms. Grey is a 72-year-old female with a history of Chronic Obstructive Pulmonary Disease (COPD) who presents to the Emergency Department with a 3-day history of cough, wheezing and shortness of breath. She denies fevers or chills. She has not noticed any change in her sputum production. The patient states that she ran out of her inhalers 1 week ago. Physical examination is remarkable for mild tachypnea, an increased anterior-posterior diameter of her chest, decreased breath sounds bilaterally with scattered wheezes. A chest x-ray reveals no acute cardiopulmonary disease. Your attending does not feel the patient needs to be admitted to the hospital. In addition to refilling her inhalers and giving her a short steroid taper, your attending asks you if you would like to give the patient a prescription for antibiotics. How do you reply? Would this change if the patient warranted inpatient hospitalization?

This patient is experiencing a COPD exacerbation. Current guidelines recommend antibiotics in COPD exacerbation for: Increased sputum purulence PLUS dyspnea or increased sputum volume or any patient requiring admission for COPD. The preferred agents are: trimethoprim-sulfamethoxazole, doxycycline, azithromycin, amoxicillin-clavulanate, cefuroxime, moxifloxacin or levofloxacin. The duration of antibiotic therapy should be limited to 5 days.

Case Scenario #5: You are in the Emergency Department seeing Mr. Best, a 53-year-old quadriplegic male who is ventilator-dependent after a c-spine injury. The patient had a fever to 102.3°F at his nursing facility. He is accompanied by medical records which show sputum culture results from one week ago. At that time, the patient grew out a pan-resistant strain of *Pseudomonas aeruginosa*. The patient has not been treated with antibiotics for this. He is normotensive. A chest x-ray is performed and is unremarkable. His white blood cell count is 8,300 cells/mm³. In addition to obtaining blood cultures and urine cultures, your attending asks if you would like to initiate antibiotic treatment to target the patient's sputum culture results. What is your reply?

*This patient's pan-resistant *Pseudomonas aeruginosa* isolate represents respiratory colonization. The Clinical Pulmonary Infection Score (CPIS) can be a useful tool in preventing unnecessary antibiotic administration due to treatment of respiratory colonization in ventilator-dependent patients. Have your group calculate the CPIS score for this patient (using the table below). Antibiotics are not indicated for patients with a CPIS score < 6 and antibiotics for the treatment of ventilator-associated pneumonia would not be indicated in this patient. The CPIS score can also be a useful tool in antibiotic de-escalation at 72 hours.*

Table. Clinical Pulmonary Infection Score used for the diagnosis of ventilator-associated pneumonia

Criterion	Range	Score
Temperature, °C	≥ 36.5 and ≤ 38.4	0
	38.5 and ≤ 38.9	1
	≥ 39 and ≤ 36	2
Blood leukocytes, mm ³	≥ 4,000 and ≤ 11,000	0
	<4,000 or >11,000	1
	+band forms ≥ 500	2
Oxygenation, PaO ₂ /FiO ₂	>240 or ARDS	0
mmHg	≤ 240 and no evidence of ARDS	2
Pulmonary radiography	No infiltrate	0
	Diffused (or patchy) infiltrate	1
	Localized infiltrate	2
Tracheal secretions	<14+ ^a of tracheal secretions	0
	≥ 14+ ^a of tracheal secretions	1
	+ purulent secretion	2
Culture of tracheal aspirate (semi-quantitative: 0–1-2 or 3+)	Pathogenic bacteria cultured ≤ 1+ or no growth	0
	Pathogenic bacteria cultured >1+	1
	+ same pathogenic bacteria seen on the Gram stain >1+	2

Resources:

- Mandell LA, Wunderink RG, Anzueto A, Bartlett JG, Campbell GD, Dean NC, Dowell SF, File TM, Musher DM, Niederman MS, Torres A, Whitney CG. Community-Acquired Pneumonia in Adults: Guidelines for Management. *Clinical Infectious Diseases* 2007;44:S27–S72. Also available at: www.idsociety.org
- Guidelines for the Management of Adults with Hospital-acquired, Ventilator-associated, and Healthcare-associated Pneumonia. *American Journal of Respiratory and Critical Care Medicine* 2005; 171:388–416. Also available at: www.idsociety.org
- Rothberg MB, Pekow PS, Lahti M, Brody O, Skiest DJ, Lindenauer PK. Antibiotic Therapy and Treatment Failure in Patients Hospitalized for Acute Exacerbations of Chronic Obstructive Pulmonary Disease. *JAMA* 2010;303(20):2035-2042.
- Gonzales R, Bartlett JG, Besser RE, Cooper RJ, Hickner JM, Hoffman JR, Sande MA. Principles of Appropriate Antibiotic Use for Treatment of Uncomplicated Acute Bronchitis: Background. *Annals of Internal Medicine*. 2001;134:521-529.
- Schurink CA, Van Nieuwenhoven CA, Jacobs JA, Rozenberg-Arska M, Joore HC, Buskens E, Hoepelman AI, Bonten MJ. Clinical pulmonary infection score for ventilator-associated pneumonia: accuracy and inter-observer variability. *Intensive Care Medicine* 2004;30(2):217-24.