Pneumonia 101
For Nurses

Nurses Take Antibiotic Stewardship Action Initiative

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The Department of Antimicrobial Stewardship, The Johns Hopkins Hospital:
• Valeria Fabre, MD
• Sara E. Cosgrove, MD, MS
• Elizabeth Zink, MS, RN, CCNS, CNRN

The Office of Antibiotic Stewardship, Centers for Disease Control and Prevention:
• Arjun Srinivasan, MD
• Lauri Hicks, DO
• Melinda Neuhausser, PharmD

Disclaimer: The conclusions in this presentation are those of the JHU authors and do not necessarily represent the views of the Centers for Disease Control and Prevention.
Pneumonia is diagnosed when the following are present:

- New lung infiltrate

- Clinical evidence that the infiltrate is of infectious origin (e.g., associated fever, leukocytosis, purulent secretions, pleuritic chest pain, cough)

- Decline in oxygenation
Definitions

• Community-acquired pneumonia (develops in the community)

• Hospital-acquired pneumonia (develops ≥ 48 hours after admission)

• Ventilator-associated pneumonia (develops > 48 hours after endotracheal intubation)

• Aspiration pneumonia: pneumonia following micro- or macro-aspiration of oral or gastrointestinal flora

Understanding what type of pneumonia the patient has helps with antibiotic choices
PNA Mimics

Infiltrates
- Atelectasis
- Pulmonary edema
- Pulmonary hemorrhage
- Fibrosis
- Tumor
- Sarcoidosis

Oxygen decline
- Pulmonary embolism
- Mucous plugging
- Atelectasis
- Pulmonary edema
- Pleural effusions
- Aspiration pneumonitis
The Color Of The Sputum Does Not Indicate Infection

- 241 patients presenting with acute cough
  - “Proof of infection”: bacterial growth along with moderate number of leukocytes/LPF
  - Lack of correlation between sputum color and infection in healthy individuals
  - There was good correlation for patients with underlying chronic lung disease

- 3,402 patients with acute or worsened cough
  - Sputum color was not associated with resolution of symptoms over time
  - Symptom resolution was not associated with antibiotics
"If There Are Bacteria, There Has To Be An Infection..."

• The presence of bacteria growing in cultures from a non-sterile site does not equal infection
  
  − Examples of non-sterile sites where bacteria may be found and the patient may not necessarily have an infection include the respiratory tract and wounds
  
  − Case:
    
    • 65 yo man with chronic tracheostomy admitted for pneumonia
    • Sputum culture grows MSSA treated with 7 days of oxacillin
    • Patient is markedly improved – off the ventilator, afebrile, respiratory secretions back to baseline
    • Before discharge another sputum sample is sent which shows few MSSA and light PMNs. The primary team is considering extending treatment. Is this appropriate?
Tracheobronchitis

- Defined as fever with no other recognizable cause and new or increased sputum production, positive endotracheal tube aspirate culture ($>10^6$ CFU/ml) and no radiographic evidence of pneumonia

- It is reasonable to NOT treat ventilator-associated tracheobronchitis with antibiotics

- Treatment of tracheobronchitis can be considered in patients with copious purulent respiratory secretions despite aggressive suctioning OR those patients with copious purulent secretions that are affecting the ability to extubate
  - Treatment is shorter than pneumonia (3-5 days)
  - Oral agents should be considered
Aiming For Safer Antibiotic Use

• Every time a patient takes an antibiotic, it is an opportunity for bacteria to become more resistant
  
  – This is a disadvantage to the patient as resistant infections are more difficult to treat

• 1 in 5 patients who receive an antibiotic will experience an adverse event

• 1 in 3 antibiotics used in the hospital are inappropriate in some way (not needed, given for too long, too broad-spectrum)

• The goal is for the patient to receive antibiotics only when needed
How Can Nurses Help Reduce Unnecessary Antibiotics Driven By Non-Infectious Respiratory Processes?

- Familiarize yourself with the definition of pneumonia
- When a patient reports or develops respiratory symptoms, consider other etiologies before obtaining a respiratory culture
- Do not send respiratory specimens for culture when there is no concern for infection
- Do not send a sputum culture for test-of-cure
Should I Collect a Respiratory Specimen for Bacterial Culture? Algorithm for Adult Intensive Care Unit Patients

Developed by The Johns Hopkins Hospital Department of Antimicrobial Stewardship

Does the patient have at least 2 of the 4 following signs and symptoms?
- New oxygen requirement despite suctioning
- Purulent respiratory secretions
- New infiltrate on chest X-ray (atelectasis and edema are not considered infiltrates)
- Fever/hypothermia (not induced) OR increased peripheral white count (leukocytosis)

Did the patient have a respiratory specimen collected for bacterial culture within the last 72 hours that was sent to work up respiratory symptoms?

- YES
  - Do not collect a respiratory specimen for bacterial culture, communicate with ordering provider
  - Collect respiratory specimen for bacterial culture

- NO
  - Do not collect a respiratory specimen for bacterial culture as pneumonia is unlikely, communicate with ordering provider
  - Consider other reasons for the patient’s signs and symptoms

Kalil et al., Management of Adults With Hospital-acquired and Ventilator-associated Pneumonia: 2016 Clinical Practice Guidelines by the Infectious Diseases Society of America and the American Thoracic Society
References

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Slide 8
• Tamma PD, et al. JAMA Internal Medicine. 2017; 177(9):1308-1315.