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Highlights of clinical practice guideline for the management of community-acquired pneumonia: 2019 update by the american thoracic society and infectious diseases society of America

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Highlights of Clinical Practice Guideline for the Management of Community-Acquired Pneumonia

2019 Update by the American Thoracic Society and Infectious Diseases Society of America

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Abstract: Pneumonia is the leading cause of morbidity and mortality in the United States. The American Thoracic Society and The Infectious Diseases Society of America recently published updated guidelines for the diagnosis and treatment of community-acquired pneumonia. Initial antibiotic therapy should cover for *Streptococcus pneumoniae*, *Haemophilus influenzae*, and other gram-negative bacilli. Patients who have risk factors for the development of antibiotic resistant pathogens, such as methicillin-resistant *Staphylococcus aureus* and *Pseudomonas aeruginosa* should have appropriate empiric coverage for these pathogens. The recommended duration of treatment of community-acquired pneumonia is a minimum of 5 days in conjunction with clinical improvement, which has remained consistent from previous guidelines.

Key Words: pneumonia, community-acquired pneumonia, guideline, diagnosis

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An update of the American Thoracic Society (ATS) and Infectious Diseases Society of America (IDSA) clinical guideline for management and prevention of community-acquired pneumonia (CAP) was published in print form (also available at http://www.idsociety.org). These guidelines are an update of the guidelines published by ATS/IDSA in 2019.[1]

The following are selected recommendations from this new guideline regarding diagnosis and treatment of CAP. Comments by the authors of this review are in italics.

DIAGNOSIS

- Obtaining a blood culture, sputum culture, or sputum Gram stain routinely in adults treated in outpatient settings is not recommended.
- Pretreatment blood culture, sputum culture and Gram stain of respiratory secretion are recommended in adults with the following:
  - –Classified as having severe CAP
  - –Receiving empiric therapy for methicillin-resistant *Staphylococcus aureus* (MRSA) or *Pseudomonas aeruginosa*
  - –Previous documented infection of MRSA or *P. aeruginosa*
  - –Hospitalized and received parenteral antibiotics in the last 90 days

Diagnosis is assessed based on patient's clinical presentation of signs and symptoms, as well as diagnostic imaging. Typical signs and symptoms of pneumonia include couth with or without sputum production, shortness of breath, chest pain, tachypnea, and increased work of breathing. Systemic signs can include fever, chills, malaise, fatigue, and elevated white blood cell counts. A diagnosis is confirmed when the chest x-ray shows infiltrates and clinical presentation matches.

The decision to obtain cultures should be determined on the basis of clinical presentation, local etiological considerations, and local antimicrobial stewardship processes. Historically, sputum cultures and Gram stains had poor positive predictive values. Routinely obtaining cultures have led to false-positive results from contaminants leading to inappropriate antibiotic use and increased hospital length of stay. In severe CAP, however, delay in covering multidrug resistant organisms may lead to worse patient outcomes. Therefore, the benefit of obtaining early cultures is crucial for deescalation in this patient population.

ADDITIONAL TESTS

- The routine uses of urinary antigens *Streptococcus pneumoniae* or *Legionella* are not recommended. Exceptions to this recommendation include adults with severe CAP, patients who may have been exposed to an area of recent outbreak, or CAP associated with recent travel.
- If a patient presents with flu-like symptoms or illness, clinical judgments should warrant testing for influenza.
- Procalcitonin should not be used alone as a clinical predictor of initiation antibiotics.
- The Pneumonia Severity Index (PSI) is not recommended over the tool based on confusion, urea level, respiratory rate, blood pressure, and age greater or equal to 65 to determine if patients warrant hospitalization.

The rationale behind the use of urinary antigens comes from randomized trials that have demonstrated poor negative predictive value of urinary antigen testing[2]; however, a handful of large observational studies have shown that urinary antigen testing has been associated with a reduction in mortality.[3] Overall, the basis behind the recommendation to avoid unnecessary testing is appropriate given the current landscape of available literature.

In the past, some investigators have previously suggested that certain levels of procalcitonin indicate presence of bacterial infections.[4] The guidelines now recommend that procalcitonin should not be used alone as a clinical predictor of initiation antibiotics based on recent literature that failed to identify a procalcitonin threshold to distinguish between bacterial and viral pathogens.[5]

The PSI and CURB-65 were developed as validated clinical prediction rules for prognosis of CAP in immunocompetent patients. The PSI is now recommended over the CURB-65 to determine if patients warrant hospitalization.[6] Consistent with previous guidelines, clinical prediction tools should be used in combination with clinical judgments.

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CLASSIFICATION

- The term health care–associated pneumonia (HCAP) should be eliminated.

The 2005 ATS/IDSA guidelines for the management of hospital-acquired and ventilator associated pneumonia defined a subset of pneumonia, which was termed HCAP.[7] It attempted to stratify patients with potential risk factors for multidrug-resistant infections. These previous risk factors included patients who reside in a nursing home or long-term care facility, hospitalization for at least 2 days in the last 90 days, receiving home infusion therapy, chronic dialysis, home wound care, or a caregiver who is known to have an antibiotic-resistant pathogen. Many studies have recently demonstrated that risk factors used to define HCAP do not correlate with higher rates of antimicrobial-resistant pathogens.[8] The two consistently proven and strongest risk factors associated with MRSA and *P. aeruginosa* infections are a previous hospitalization (within the last 90 days) in which the patient received treatment with parenteral antibiotics and previous confirmed infection with either MRSA or *P. aeruginosa*. Recent literature has outlined deficiencies in the positive predictive value of the current HCAP criteria.[9] Patients should be stratified based on their individual risk for MRSA or *P. aeruginosa* and treated accordingly.

TREATMENT

- Outpatient empiric treatment
  –Macrolide monotherapy should only be used in geographical areas with proven pneumococcal resistance of less than 25%.
  –Amoxicillin or doxycycline should be used in patients without comorbidities.
  –Macrolide in combination with Augmentin or a cephalosporin or respiratory fluoroquinolone monotherapy should be used in patients with comorbidities.

- Inpatient empiric treatment without MRSA and *P. aeruginosa* risk factors
  –Combination therapy with a β-lactam and a macrolide is recommended.
  –Monotherapy with a respiratory fluoroquinolone is recommended.
  –Patients who have a contraindication to both macrolides and fluoroquinolones should receive combination therapy with a β-lactam and doxycycline.

- Inpatient treatment with MRSA and *P. aeruginosa* risk factors
  –Empiric therapy for MRSA includes vancomycin or linezolid.
  –Empiric therapy for *P. aeruginosa* includes piperacillin-tazobactam, cefepime, ceftazidime, aztreonam, meropenem, and imipenem.

- Influenza
  –Oseltamivir is recommended for adults with CAP to test positive for influenza in both the inpatient and outpatient setting.
  –Treatment within 2 days of symptom onset or hospitalization may result in the best outcomes.[10]
  –In patients with a positive influenza test, no evidence of a bacterial pathogen (including a low procalcitonin level), and early clinical stability, early discontinuation of antibiotics should be considered.

In the 2007 guidelines, nonsevere CAP patients without comorbidities qualified for macrolide monotherapy as first line treatment.[11] Since then, the prevalence of resistant strains of *S. pneumoniae* has increased. It is currently estimated that macrolide resistance is greater than 25% in most areas of the United States.[12]

Treatment within 2 days of symptom onset or hospitalization may result in the best outcomes.[10] The use of anti-influenza agents in the outpatient setting reduces duration of symptoms and likelihood of complications in patients with influenza. Anti-influenza agents have shown to reduce mortality risk in the inpatient setting. Although it is most beneficial to start therapy within 2 days of symptom onset, studies also support starting at a later time to prevent the risk of viral shedding and potential transmission to other patients.[13]

In adults with CAP who test positive for influenza, standard antibacterial treatment should be initiated. Bacterial infections can occur concomitantly with an influenza infection. *Staphylococcus aureus* is the most common superimposed bacterial infection associated with influenza pneumonia. In patients with a positive influenza test, no evidence of a bacterial pathogen, and early clinical stability, early discontinuation of antibiotics should be considered.

DURATION OF THERAPY

- Duration of therapy should be based on clinical improvement with a minimum of at least 5 days treatment.
- Longer courses of antibiotic therapy are recommended for the following:
  –Pneumonia complicated by meningitis, endocarditis, and other deep-seated infection.
  –Infection with other, less-common pathogens (eg, *Burkholderia pseudomallei*, *Mycobacterium tuberculosis*, or endemic fungi)
  –MRSA or *P. aeruginosa* infections (total antibiotic duration of 7 days)

Validated measures such as heart rate, respiratory rate, blood pressure, oxygen saturation, temperature, appetite, and normal mentation should be used to determine clinical improvement. Antibiotic therapy should be continued until the patient achieves stability for at least 5 days. Most patients will achieve clinical stability within the first 2 to 3 days; therefore, a total duration of 5 days is appropriate. Procalcitonin levels are useful in settings where the hospital length of stay exceeds 5 to 7 days. Failure to achieve clinical stability within 5 days is associated with higher mortality and worse clinical outcomes.[14] This should prompt the assessment for a pathogen resistant to the current therapy, a complication of pneumonia, or another source of infection.

REFERENCES

1. Metlay JP, Waterer GW, Long AC, et al. Diagnosis and treatment of adults with community-acquired pneumonia. An official clinical practice guideline of the American Thoracic Society and Infectious Diseases Society of America. *Am J Respir Crit Care Med*. 2019;200(7): e45–e67.
2. Falguera M, Ruiz-Gonza´ lez A, Schoenenberger JA, et al. Prospective, randomized study to compare empirical treatment versus targeted treatment on the basis of the urine antigen results in hospitalised patients with community acquired pneumonia. *Thorax*. 2010;65:101–106.
3. Uematsu H, Hashimoto H, Iwamoto T, et al. Impact of guideline-concordant microbiological testing on outcomes of pneumonia. *International J Qual Health Care*. 2014;26:100–107.
4. Christ-Crain M, Stolz D, Bingisser R, et al. Procalcitonin guidance of antibiotic therapy in community acquired pneumonia: a randomized trial. *Am J Respir Crit Care Med*. 2006;174:84–93.
5. Self WH, Balk RA, Grijalva CG, et al. Procalcitonin as a marker of etiology in adults hospitalized with community-acquired pneumonia. *Clin Infect Dis*. 2017;65:183–190.

6. Aujesky D, Auble TE, Yealy DM, et al. Prospective comparison of three validated prediction rules for prognosis in community-acquired pneumonia. *Am J Med*. 2005;118:384–392.
7. American Thoracic Society; Infectious Diseases Society of America. Guidelines for the management of adults with hospital-acquired, ventilator-associated, and healthcare-associated pneumonia. *Am J Respir Crit Care Med*. 2005;171: 388–416.
8. Webb BJ, Dascomb K, Stenehjem E, et al. Predicting risk of drugresistant organisms in pneumonia: moving beyond the HCAP model. *Respir Med*. 2015;109:1–10.
9. Ewig S, Welte T. Adding fuel to the flames? It is time to leave HCAP. *Respir Med*. 2012;106:1309–1310.
10. Lee EH, Wu C, Lee EU, et al. Fatalities associated with the 2009 H1N1 influenza a virus in New York city. *Clin Infect Dis*. 2010;50:1498–1504.
11. Mandell LA, Wunderink RG, Anzueto A, et al, Infectious Diseases Society of America; American Thoracic Society. Infectious Diseases Society of America/American Thoracic Society consensus guidelines on the management of community-acquired pneumonia in adults. *Clin Infect Dis*. 2007;44:S27–S72.
12. Haran JP, Volturo GA. Macrolide resistance in cases of community-acquired bacterial pneumonia in the emergency department. *J Emerg Med*. 2018;55(3):347–353.
13. Louie JK, Yang S, Acosta M, et al. Treatment with neuraminidase inhibitors for critically ill patients with influenza A (H1N1) pdm09. *Clin Infect Dis*. 2012;55:1198–1204.
14. Mene´ ndez R, Torres A, Zalaca'ın R, et al, Neumofail Group. Risk factors of treatment failure in community acquired pneumonia: implications for disease outcome. *Thorax*. 2004;59:960–965.