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ONE MINUTE CONSULT
BRIEF ANSWERS TO SPECIFIC CLINICAL QUESTIONS

Q: Should urine antigen testing for *Legionella pneumophila* be ordered for all hospitalized patients with community-acquired pneumonia?

A: Urine antigen testing for *Legionella pneumophila* should not be ordered for all hospitalized patients admitted for community-acquired pneumonia (CAP), as a positive urine antigen test would not change guideline-recommended treatment of CAP. Empiric antibiotic treatment of CAP already ensures efficacy against *Legionella* infection.

There is no statistical difference in rates of death, clinical relapse, intensive care unit admission, length of hospital stay, or length of antibiotic therapy with pathogen-specific treatment vs empiric guideline-directed treatment of CAP.[1] Furthermore, there is a cost burden of urine antigen testing.

However, testing should be performed for severe cases of CAP, during legionnaires disease outbreaks, and in patients with a history of recent travel in an effort to optimize treatment or determine the source of an outbreak and have a positive environmental impact.

CLINICAL CHARACTERISTICS OF *LEGIONELLA* PNEUMONIA

CAP commonly presents with fever, cough (productive or nonproductive), and shortness of breath. Other common symptoms include but are not limited to fatigue, loss of appetite, pleuritic chest pain, and myalgias. CAP caused by *L pneumophila* can present with none, some, or all of these symptoms. *Legionella* pneumonia is commonly associated with altered level of mentation (11%–25% of cases), diarrhea (19%), and early-onset pleuritic chest pain (21%–24%).[2]

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These findings may help distinguish *Legionella* CAP from CAP from other etiologic agents. Hyponatremia, hypophosphatemia, elevated transaminase levels, and highly elevated C-reactive protein and ferritin levels are nonspecific laboratory abnormalities that increase the diagnostic specificity for *Legionella* pneumonia in the right clinical context.[3] Interestingly, combining clinical symptoms and laboratory abnormalities also increases the diagnostic specificity for *Legionella* pneumonia.[4]

SEVERE COMMUNITY-ACQUIRED PNEUMONIA

Severe CAP is defined as CAP with 1 major criterion (septic shock with need for vasopressor support, or respiratory failure requiring mechanical ventilation) or 3 or more minor criteria. Minor criteria include respiratory rate greater than 30 breaths per minute, hypoxemia (ratio of partial pressure of oxygen to fraction of inspired oxygen ≤ 250), multilobular infiltrates, confusion, uremia (blood urea nitrogen > 20 mg/dL), leukopenia, thrombocytopenia, hypothermia, and hypotension requiring aggressive fluid resuscitation.[5]

The mortality rate in patients with *Legionella* pneumonia who are admitted to an intensive care unit is between 9.1% and 41.7%.[6–8] Furthermore, there are certain patient populations (those with immunosuppression, chronic lung disease, history of smoking, or age over 50) that are more susceptible to severe CAP from *Legionella*.[4] For example, *Legionella* pneumonia patients with cancer can have a case-fatality rate as high as 31%.[9] Additionally, these patients at increased risk may experience relapse of *Legionella* pneumonia

TABLE 1
Advantages and disadvantages of tests for *Legionella pneumophila*

Test	Sensitivity	Specificity	Advantages	Disadvantages
Culture	10%–80%	100%	Detects all serogroups	Results take several days, difficult technique
Urine antigen	70%–80%	> 99%	Results in less than 1 hour	Detects only *Legionella pneumophila* serogroup 1
Polymerase chain reaction	95%–99%	> 99%	Results in hours, detects all serogroups	Availability may be limited in some areas
Direct fluorescent antibody stain	25%–75%	> 95%	Results in hours, detects all serogroups	Difficult technique
Serology	80%–90%	> 99%	Detects all serogroups	Must test acute-phase and convalescent-phase sera, results take several weeks

Adapted from reference 13.

if it is not appropriately treated.[10] Thus, all patients with severe CAP and all patients considered more susceptible should undergo urine antigen testing for *L pneumophila*.

TREATMENT CONSIDERATIONS

The recommended empiric treatment for hospital inpatients with nonsevere CAP is combination therapy with a beta-lactam plus a macrolide antibiotic or monotherapy with a respiratory fluoroquinolone, either of which treats *Legionella* infection. A prospective, randomized study comparing targeted therapy based on results of urine antigen testing for *L pneumophila* vs empiric guideline-based treatment showed no statistically significant differences in outcomes of death, clinical relapse, intensive care unit admission, hospital length of stay, or length of antibiotic treatment.[1]

EPIDEMIOLOGIC FACTORS

Legionnaires disease is a water-borne illness, and a majority of community outbreaks arise from water sources contaminated with *Legionella*. Travel within 2 weeks of the initial presentation and possible or confirmed *Legionella* pneumonia outbreaks should prompt urine antigen testing. It is difficult to assess the number of cases of travel-related *Legionella* pneumonia owing to the dispersal of cases away from the environmental source of infection. Thus, it is imperative to inquire about recent travel when evaluating a patient. If the history is positive for any type of travel within 2 weeks of initial presentation, urine antigen testing for *L pneumophila* should be ordered.[11]

There should be a strong clinical suspicion for a community or nosocomial outbreak of *Legionella* infection if there are 2 or more confirmed cases of *Legionella* pneumonia.[12] This may lead to increased urine antigen testing and to subsequent increased recognition and control of the source of the outbreak to prevent further cases.

GAPS IN URINE ANTIGEN TESTING

Methods to test for *Legionella* pneumonia include the urine antigen test, culture, and polymerase chain reaction (PCR) (**Table 1**).[13]

The benefits of urine antigen testing are its short time to results (less than 1 hour) and its high specificity (greater than 99%).[14] The test detects *L pneumophila* in the urine as early as 1 day after symptom onset but can remain positive for weeks.[14] However, the drawback of the urine antigen test is that it only tests for *L pneumophila* serogroup 1, the most common serotype in the United States, whereas culture and PCR detect all species and serogroups. The sensitivity of urine antigen testing is 70% to 80% and for culture it is 10% to 80%.[15] Culture carries a 100% specificity, while PCR carries a specificity greater than 99%.[15] The drawback of culture and PCR is the time to result, which is approximately 3 days for culture, and several hours for PCR. The sensitivity of PCR exceeds that of culture.[15] There are inherent limitations of each test. Thus, when testing for *Legionella* species, more than 1 method should be used.

TAKE-HOME MESSAGES

Urine antigen testing for *L pneumophila* should not be done for every patient hospitalized for CAP. If the

TABLE 2
Indications for *Legionella* testing

Atypical symptoms including but not limited to altered mentation, pleuritic chest pain, and diarrhea
Admission to intensive care unit
High-risk patient features including immunosuppression, chronic lung disease, history of smoking, and age older than 50
Hypoxemia and increasing oxygen requirements
Recent travel (ie, within 2 weeks of initial presentation)
Concern for community or nosocomial pneumonia outbreak

appropriate empiric antibiotics are started, a positive urine antigen test will not change treatment strategies for patients with nonsevere CAP.

Legionella pneumonia may present with atypical symptoms such as altered mentation, pleuritic chest pain, and diarrhea, all of which point to severe CAP. More than 1 test (ie, urine antigen test, PCR) should be used for severe CAP.

Physicians must practice good clinical judgment when deciding whom and how to test for *Legionella* pneumonia (**Table 2**). Urine antigen testing for *L pneumophila*—when appropriately indicated as discussed here—can result in prompt and timely diagnosis of *Legionella* pneumonia, targeted antimicrobial therapy, and a potentially shorter duration of therapy compared with empiric therapy without a positive test. When appropriately used, urine antigen testing can lead to early recognition of a community outbreak and thus help to prevent spread of the infection. ■

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DISCLOSURES

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