an individual patient's progress or deterioration, and which may lead to appropriate social-care service. Future studies aimed at designing an ADLs scale for patients with COPD should address all relevant psychometric properties and practicalities and should include long-term follow-up that explores the efficacy of interventions.

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Financial/nonfinancial disclosures: The authors have reported to *CHEST* that no potential conflicts of interest exist with any companies/organizations whose products or services may be discussed in this article.
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DOI: 10.1378/chest.13-1703

Acknowledgments

Other contributions: This work was performed at Manchester Metropolitan University, Elizabeth Gaskell Campus, Manchester, England.

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Legionnaires' Disease

Importance of High Index of Suspicion in Patients in the ICU With Community-Acquired Pneumonia

From a layperson's perception, Legionnaires' disease seems to be increasing, as judged by newspaper headlines and TV reports. Whether this is because of increasing recognition with greater use of the *Legionella* urinary antigen or because of an actual absolute increase is not readily answered. This increasing incidence is supported by epidemiologic statistics from the US Centers for Disease Control and Prevention and Eurosurveillance.[1,2] Speculation that proliferation of *Legionella* in natural aquatic bodies as a result of

climate change, global warming, and flooding has contributed to this increase.

In this issue of *CHEST* (see page 290), Arancibia et al[3] report a prospective multicenter observational study of 104 consecutive immunocompetent adult patients hospitalized in the ICU in four hospitals in Chile. Community-acquired pneumonia (CAP) in patients admitted to the ICU is oftentimes Legionnaires' disease and second only to pneumococcal pneumonia in frequency,[4,5] a finding that Arancibia et al[3] have confirmed. Legionnaires' disease (8.6%) was the second most common cause in this study, exceeded only by pneumococcal pneumonia (26%).

The clinical presentation of Legionnaires' disease is nonspecific, so the diagnosis can be easily overlooked because standard bacteriologic testing and cultures will be nonrevealing. Earlier studies of Legionnaires' disease listed a few clues that should raise the index of suspicion for this treatable pneumonia. High fever (> 39°C) and gastrointestinal symptoms (especially diarrhea) occur more commonly in Legionnaires' disease than in other causes of CAP.[6] The cough is often nonproductive, yet the Gram stain of sputum typically shows neutrophils; however, microorganisms are scanty or primarily nonspecific oral flora.

Detailed scoring systems based on clinical criteria have been proposed for distinguishing Legionnaires' disease from other causes of CAP, including the Winthrop-University Hospital score[7] and the Community-Based Pneumonia Incidence Study score.[8] An inherent deficiency for these scores is that they were derived from surveys of hospitalized patients in an era when only those patients with severe CAP were evaluated by confirmatory microbiologic testing. Given subsequent studies, notably the Community-Acquired Pneumonia Network (CAPNETZ) studies from Germany, it is now clear that the spectrum of Legionnaires' disease includes nonseverely ill patients who lack many of the classic diagnostic symptoms.[9] Nevertheless, the ICU may be the ideal site where such scores may be useful. Patients in the ICU are akin to the patients with Legionnaires' disease in the earlier era when the disease was unsuspected and appropriate therapy was not given early in the course. These scores tend to be moderately sensitive, but are not particularly specific (ie, a negative score does not predict absence of disease).[10] In a study of consecutive patients admitted to the hospital from the ED, high fever (> 39°C), hyponatremia, and other abnormal laboratory test results (lactic dehydrogenase, thrombocytopenia, C-reactive protein) were more frequent in Legionnaires' disease than in pneumonias of other causes.[11] In the CAPNETZ study of ambulatory patients with community-acquired Legionnaires' disease, the patients were younger, had fewer comorbidities, and experienced a milder clinical presentation, such that their scores would likely be lower.

Specific laboratory testing for *Legionella* is necessary for diagnosis. Underdiagnosis results from lack of application of these confirmatory tests. The *Legionella* urinary antigen has revolutionized the diagnosis of Legionnaires' disease because of the rapidity of the test (results available within 15 min of receipt of urine), simplicity in processing, and high specificity (> 90%); if the test is positive, the diagnosis is almost indisputable. It was the sole diagnostic test in the Arancibia et al[3] study. So, it should be noted that their incidence is an underestimate. Note that the *Legionella* urinary antigen can also be applied to pleural fluid, as can the pneumococcal urinary antigen for pneumococcal empyema. However, if it is used as the sole test, about 20% of patients with Legionnaires' disease will be missed. The urinary antigen test is unreliable in detecting the non-*pneumophila* species and non-serogroup 1 within the Legionellaceae family. As a result, we have recommended specialized *Legionella* culture for all cases of CAP admitted to the hospital and certainly those admitted to the ICU. *Legionella* culture of respiratory secretions using selective media with dyes and inhibitors is the gold standard.[12] The sputum may not fulfill the Murray-Washington criteria (ie, presence of neutrophils and absence of squamous epithelial cells), yet *Legionella* still may be isolated.

Polymerase chain reaction has been much ballyhooed,[13,14] but is not yet commercially available. Its disadvantage, unlike culture, is the inability to produce a microbe so epidemiologic links can be linked to a putative water source. The venerable Gram stain is surprisingly useful. In our hospital, physicians have found that Gram stain showing predominance of neutrophils but few, if any, microorganisms is a reliable clue for Legionnaires' disease. This finding is sensitive if sputum is available. Such Gram stains are not specific; *Mycoplasma*, *Chlamydia*, and viruses may produce a similar Gram stain appearance.

Hyponatremia has been consistently observed to be an indicator in numerous studies since our initial observation in 1982[15] and even appears to be present in less severely ill patients, although to a lesser degree.[9] In the Arancibia et al[3] study, 67% of patients with Legionnaires' disease experienced hyponatremia as compared with 15% of pneumonias of other cause. Hyponatremia was also an independent indicator for severity of Legionnaires' disease. In the CAPNETZ study of ambulatory pneumonia, 19% of patients with Legionnaires' disease experienced hyponatremia as compared with 9.5% of pneumonias of other cause; statistical significance was attained for both ICU and ambulatory patients. The mechanism is uncertain, but it is not due to inappropriate secretion of antidiuretic