Scenario 2: Community-Acquired Pneumonia Requiring Hospitalization but Not Requiring Admission to an Intensive Care Unit

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The patient is a 65-year-old woman with community-acquired pneumonia of sufficient severity to require hospitalization. Factors important for consideration in clinical trials are illustrated.

A 65-year-old female resident of Atlanta, Georgia, with known tobacco-induced chronic bronchitis and chronic obstructive pulmonary disease of mild severity presents to the emergency department (ED) in December, complaining of a marked increase in purulent sputum production, worsening exertional dyspnea, and fever of 1 day’s duration.

Medical history. The patient has a 35-pack-year smoking history and continues to smoke but has recently “cut down” her cigarette use. She uses bronchodilator inhalers only “as needed.” She received a course of antibiotics for an exacerbation of her chronic obstructive pulmonary disease ~2 months ago, but she does not remember the name of the antibiotic.

The patient has a history of essential hypertension and was admitted once previously for symptoms of dyspnea and was treated for congestive heart failure. She is overweight and takes an oral agent for glucose intolerance.

The patient and her husband received influenza immunizations in October. She does not recall receiving the pneumococcal vaccine.

Social history. The patient lives a sedentary lifestyle and works intermittently as a domestic house cleaner. She has 2 children and 4 grandchildren. She and her husband frequently babysit for their 3- and 5-year-old grandchildren when they are not in day care. The children have not been ill recently. The patient does not know whether the grandchildren have had all of their vaccinations, but she does know that their parents struggle financially.

There are no pets or pertinent hobbies. She and her husband have not traveled recently. They do enjoy their “well-maintained” hot tub.

Physical examination. The patient appears uncomfortable as a result of frequent productive coughing, dyspnea, and chills. The patient’s vital signs are as follows: blood pressure, 130/80 mm Hg; body temperature, 39.2°C (102.5°F); pulse, 100 beats/min and regular; respiratory rate, 24 breaths/min with an O₂ saturation of 89% while breathing room air; O₂ saturation on 2 L/min oxygen by nasal prongs, 92%. She is obese. In the examination of the patient’s lungs, definite “crackles” are heard over the left lower lobe, with tubular (bronchial) breathing and egophony. No pleural friction rub is heard. A few wheezes are heard only on forced expiration. There is no gallop rhythm or heart murmur. There is no pedal edema. The remainder of the examination is unremarkable.

Laboratory/diagnostic data. The patient’s laboratory test results are as follows: hemoglobin level, 14 g/dL; hematocrit, 42%; WBC count, 19,000 cells/μL with 85% neutrophils (note: bands are no longer reported at our institution) and 9% lymphocytes; and platelet level, 110,000 cells/μL (down from 180,000 cells/μL 1 year ago). Electrolyte levels are as follows: Na⁺, 150 mg/dL; K⁺, 5.2 mg/dL; chloride, 115 mg/dL; and CO₂, 22 mg/dL, with a calculated anion gap of 13. The patient’s
blood urea nitrogen (BUN) level is 35 mg/dL, and her creatinine level is 1.4 mg/dL, both of which have increased in comparison with 1 year ago. Liver function test results are normal. Arterial blood gas values on 2 L/min O2 are as follows: pH, 7.42; pO2, 65 mm Hg (estimated pO2/FiO2, 232); and pCO2, 35 mm Hg.

**Radiology.** The initial “wet” read by an ED radiology resident was “normal size heart and clear lungs.” This precipitated a “stat” chest CT scan with pulmonary embolism protocol. The CT scan demonstrated left lower lobe consolidation with air bronchograms and minimal pleural effusion, with no pulmonary emboli. (Note: the official reading of original chest radiograph the next morning was “Low hemi-diaphragms bilaterally. Left lower lobe consolidation.”)

**Management.** Once she returned from the CT scan, she was given intravenous fluids and empirical intravenous ceftriaxone and azithromycin through a peripheral vein. No blood cultures or sputum cultures were ordered. She was admitted to a general medicine floor under the care of a hospitalist. No other diagnostic tests were performed.

**SCORES**

**Pneumonia severity index (PSI).** The patient has a PSI score of 95, which puts her in risk class IV (predicted mortality, 9.5%), on the basis of BUN level (+10), hypoxemia (+20), a possible history of congestive heart failure (+10), and age (+65–10 for female sex).

**CURB-65** (confusion, urea level $>$ 7 mmol/L, respiratory rate $\geq$ 30 breaths/min, low systolic or diastolic blood pressure, and age $\geq$ 65 years) score. The patient has a CURB-65 score of 2, on the basis of age and BUN level (predicted mortality, 6.8%).

**Infectious Diseases Society of America/American Thoracic Society (IDSA/ATS) criteria for severe CAP.** The patient has an IDSA/ATS score of 2–3 (intensive care unit probably not indicated) on the basis of BUN level, estimated pO2/FiO2, and a possible decrease in platelet count from baseline.

**Centers for Medicare and Medicaid Services/Joint Commission on Accreditation of Healthcare Organizations (CMS/JCAHO).** The CMS/JCAHO score is 5/5, on the basis of the following:

- First antibiotic was given at 3 h and 33 min after presentation to ED (ED physician refused to allow the research coordinator to discuss the research trial with the patient because, if patient refused, she would be outside the 4-h window)
- Initial antibiotic treatment was consistent with guidelines
- Arterial oxygen saturation was checked
- Smoking status was assessed (the patient was given a brochure and contact numbers for a smoking-cessation nurse)
- Immunization status was assessed (a registered nurse-initiated order for polyvalent pneumococcal polysaccharide vaccine was placed in chart on the day of discharge)

**ISSUES FOR DISCUSSION**

Table 1 presents issues relevant to the design of treatment protocols illustrated by this patient. Table 2 lists questions related to the issue of which clinical trial design is most appropriate for the study of CAP requiring hospitalization.
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