Justifying the Use of Blood Cultures When Diagnosing Community-Acquired Pneumonia

Chalasani and colleagues (see page 932) have reported on their study of the use of blood cultures in community-acquired pneumonia (CAP). In their retrospective study, the authors find that relatively few patients with CAP have positive blood cultures, almost all positive isolates are Streptococcus pneumoniae and rarely do positive cultures lead to alterations in antibiotic therapy. The authors recommend prospective studies to see if blood cultures really are useful in an age when the cost of medical procedures must be justified. The authors have excluded from the study the subgroups of patients most likely to have bacteremic pneumonia—those with AIDS, myeloma, sickle cell anemia, and hematologic malignancy. They recognize that the use of blood cultures in these high-risk groups is without question.

The present study comes a year after the American Thoracic Society published their consensus statement on Guidelines for the Initial Management of Adults with Community-Acquired Pneumonia.1 In the statement, a panel rejects the use of sputum Gram’s stain or “use of clinical syndromes to predict microbial etiology.” Empirical antibiotic therapy is recommended in all patients with CAP.

It is beyond the scope of this editorial to review the complex and conflicting literature on the value of clinical and microbiologic data in the specific diagnosis of CAP. It is fair to say that most infectious disease physicians believe that their training and skills are useful in determining causes of infection. The use of history-taking, physical examination, and review of Gram’s stain, or other appropriate examinations of body fluids is an infectious disease tradition that grew out of Oslerian bedside teaching and was enhanced by clinical-microbiologic correlates exhaustively elucidated by Maxwell Finland and others. The major textbooks of medicine and infectious disease still recommend unequivocally the use of blood cultures, sputum Gram’s stain, and clinical evaluation in an attempt to determine the specific cause of CAP.2-4

Will prospective studies really show that such an approach is just one more example of cost ineffectiveness—academic teachings unsupported by outcome data? Certainly, depending on hospital setting, there will be patients with CAP who will have positive blood cultures for less common organisms. Chalasani found one patient with bacteremic Escherichia coli pneumonia. Other series have found Gram-negative rods to cause between 5.9%5 and 20%6 of CAP. Bacteremic Gram-negative pneumonia is well described both as a community-acquired and nosocomial infection.7 Bacteremic community-acquired E coli may occur in association with urinary tract infection.8 Bacteremic Klebsiella pneumoniae pneumonia has been described in the alcoholic. Acinetobacter pneumoniae have occurred as a bacteremic community-acquired infection.9 Chalasani et al found three patients with pneumonia caused by Haemophilus influenzae. This organism has also been implicated frequently in life-threatening community-acquired pneumonia and occurs most commonly in patients with COPD and those on steroids.10,11 About 20 to 50% of strains are β-lactamase producing and might require modification of an empirical antibiotic regimen. Chalasani et al found one patient with bacteremic β-hemolytic streptococcal pneumonia. β-Hemolytic streptococci (both Group A and B) do cause bacteremic pneumonia, which often requires specific, high-dose penicillin therapy.12 All infectious disease specialists will have their anecdotes of unusual pathogens causing bacteremic CAP, for example Bacillus, Pasteurella, and Francisella species. In many cases, a blood culture may have saved the day. Additionally, most admit, that a few patients who may have appeared to have CAP initially were diagnosed later by blood and other appropriate cultures as having endocarditis or urosepsis.

Whatever prospective studies may show about the use of blood cultures, sputum Gram’s stain, or clinical syndromes, we cannot afford to rely on empirical therapy for bacterial pneumonia. The cephalosporin–erythromycin approach is doomed to failure. Simple guidelines will not work for a disease that is now more complicated than ever—a disease in which more
agents are being described and more antibiotic resistance emerging. Even the pneumococcus no longer presents us with a predictable sensitivity pattern. The increasing pattern of antibiotic-resistant community-acquired pathogens largely reflects the irresponsible use of an empirical approach to bacterial infection in general. This is the very worst possible time for complacency in the diagnosis of CAP.

If blood cultures are not helpful in the diagnosis of CAP, then we will have to improve our techniques. Already, a role for polymerase chain reaction in pneumococcal disease is established.\(^3\) If carefully collected sputum, Gram’s stained and reviewed by well-trained individuals, is not adequate to predict the cause, then better collection methods, more specific stains, and newer immunologic techniques will need to be developed.

The current climate emphasizing cost and efficiency in clinical practice may suggest that we cannot afford blood cultures, sputum studies, or even physician time in pursuing specific diagnosis. However, we must be prepared to show that neither can we bear the cost and consequences of universally applied empirical therapy. If our approach to the diagnosis of CAP truly has failed, then we must use the technology at hand to do better.

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Predictors of Cardiopulmonary Resuscitation Outcome in a Community Hospital

In-hospital cardiopulmonary resuscitation (CPR) for cardiopulmonary arrest continues to have a disappointingly low survival rate despite significant advances in medical technology and therapeutics. Objective measures of severity of illness such as the Acute Physiology and Chronic Health Evaluation II (APACHE II) scoring system have found usefulness as a predictor of overall mortality in ICU patients. The article by Bialecki and Woodward in this issue of CHEST (see page 1009) attempts to take the next step by determining the usefulness of the APACHE II and predicted death rate (PDR) scoring systems to predict CPR outcomes in all hospitalized patients. The results reported by Bialecki et al serve to confirm previous observations and offer new insights in a community-based hospital population.

Several interesting observations were reported. Bialecki et al found that patients with high APACHE II scores (ie, low physiologic reserve) were less likely to survive to hospital discharge after CPR than patients with low APACHE II scores who also had CPR. The positive predictive accuracy was highest with APACHE II scores of greater than 20. Interestingly, the PDR calculation, which incorporates the APACHE II score as one of its major determinants, was not a strong predictor in multivariate analysis. This study reaffirms the observations that CPR outcome is more favorable when the arrest is a result of ventricular tachyarrhythmia than when the arrest is primarily related to noncardiac causes. The level of hospital care at the time of CPR (ie, ICU vs telemetry step-down vs nontelemetry bed) also influenced outcome. Interestingly, ICU patients had significantly higher APACHE II scores but improved survival after CPR than their medical floor counterparts, possibly related to a quicker response time in the ICU setting. Therefore, the use of the APACHE II score to predict CPR outcome depends, among other things, on the location of the patient at the time of CPR.

One of the strengths of this investigation is the large