

Lab Role in Diagnosis of Bacterial Infections of Lower Respiratory Tract

Lower respiratory tract infections include acute and chronic bronchitis, community acquired pneumonia, nosocomially acquired pneumonia and pneumonia in immunocompromised hosts (which will not be discussed here).

The diagnosis of acute and chronic bronchitis is primarily a clinical one. The microbiology laboratory can do little to help in these cases as the organisms recovered in culture are also the organisms which colonize the upper respiratory tract. Few comparative studies have been done to determine if differences exist between the types and quantities of organisms which grow in culture from normal healthy individuals and those individuals with bronchitis.

The diagnosis of pneumonia is made clinically; based on history, physical findings and radiological confirmation. The laboratory can assist in establishing the etiology of the pneumonia after the clinical diagnosis has been made. Appropriate tests include sputum for culture and Gram stain, blood and pleural fluid cultures and serology. Optimal results from the sputum examination start with supervised specimen collection. Briefly, the patient rinses his/her mouth with water or saline and then expectorates a specimen resulting from a deep cough, which is submitted promptly to the laboratory. A Gram stain is made and screened for the presence of squamous cells. A large number of squamous cells indicates that the specimen consists of saliva. It is of no clinical benefit to culture saliva as it is contaminated with a wide variety of oropharyngeal flora. These are often the same organisms which cause pneumonia. If possible, a new specimen should be collected. **Screening sputum gives more accurate results, improves the quality of collection, and is cost effective for the patient and hospital.** Sputum screening procedures are now required by our laboratory accreditation agency, The College of American Pathologists and will be instituted in our laboratory May 17, 1999. This protocol will be followed:

- Upon receiving a sputum specimen in the laboratory, a Gram stain will be done to assess specimen adequacy.
- If greater than 25 squamous cells/LPF are seen, respiratory therapy will be notified and another specimen obtained.
- If the second specimen is also inadequate, Respiratory Therapy will consult with the physician. If Respiratory Therapy did not assist with collection, the physician or referring facility will be notified. Sputum Gram stains which reveal a low number of squamous cells are assessed for the presence of a predominant organism, intracellular organisms, white and red blood cells, bronchial lining cells and macrophages; and if present, these are reported.

There is controversy over when laboratory testing should be performed in patients with pneumonia. This is due, in part, to the expense of testing and the variable sensitivity of the tests available. For example the sensitivity of sputum culture has been estimated to be anywhere from 25% to 50%. The sensitivity is dependent on collection factors and the specific screening protocol employed. Guidelines from the American Thoracic Society suggest a sputum culture not be performed for patients with mild disease. Patients with a more severe clinical presentation usually require hospitalization and sputum culture is considered appropriate. Blood cultures may be more helpful in identifying the specific etiological agent. A clinically significant pleural effusion should be aspirated and the fluid sent for culture. If *Legionella* is suspected, *Legionella* culture and urinary antigen testing should be requested.

In patients with nosocomial pneumonia, the performance of sputum cultures and Gram stains are

associated with the same problems as those from patients with community acquired pneumonia. These patients are usually sicker and cultures of sputum, blood and/or pleural fluid are routine. In addition, more invasive techniques may be employed to obtain less contaminated specimens directly from the lower respiratory tract such as bronchoalveolar lavage (BAL), bronchial brushings and lung biopsy.

Organisms such as *Mycobacterium tuberculosis*, *Legionella species* and *Pneumocystis carinii* are never considered normal colonizing flora and screening procedures are not considered as important. However, a better quality specimen, such as BAL or induced sputum will yield fewer false negative culture results. Various serological tests are available, but tend to be less useful as the diagnosis is made later in the course of the disease after most of the therapeutic decisions have been made.

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