bacterial infections in children with LIP most often are a result of the same bacterial pathogens that cause lower respiratory infection in children with HIV without LIP, manifesting as fever, increased sputum production, and respiratory difficulty superimposed on chronic pulmonary symptoms and radiologic abnormalities.[71]

In studies in Malawi and South Africa before the availability of ART, the clinical presentations of acute bacterial meningitis in children with and without HIV were similar.[72,73] However, in a study from Malawi, children with HIV were 6.4-fold more likely to have repeated episodes of meningitis than were children without HIV, although the study did not differentiate relapses from new infections.[72] In both studies, children with HIV were more likely to die from meningitis than were children without HIV.

## Diagnosis

When evaluating children with HIV with a suspicion of a bacterial infection, pediatric infectious diseases should be consulted. Non-bacterial pathogens must also be considered as possible diagnoses in immunocompromised children with HIV.

Attempted isolation of a pathogenic organism from normally sterile sites (e.g., blood, cerebrospinal fluid, pleural fluid) is strongly recommended, as identification and antimicrobial resistance testing will guide effective treatment. Depending on its availability and pretest probability, molecular diagnostic testing of nasopharyngeal swabs, stool samples, or cerebrospinal fluid can be considered to aid in the diagnosis of children presenting with concerns for infection.[74-76] These molecular diagnostic testing panels also aid in the detection of antibiotic resistance markers, which can facilitate treatment management.[77]

In children presenting with respiratory symptoms, the diagnosis of pneumonia is often based on clinical symptoms and can be supported by an abnormal chest radiograph. The use of molecular diagnostic testing can aid in differentiating viral from bacterial pneumonia and has the potential to decrease hospitalizations and empiric antibiotic use.[78] Even after diagnosis with a viral infection, the clinician must consider that a secondary bacterial pneumonia can occur following the initial phase of a viral respiratory infection or during the recovery phase.[79] Blood and fluid from pleural effusion (if present) should be cultured. The differential for children with HIV and pneumonia must include *Mycobacterium tuberculosis* (TB) even if they are receiving ART, and must include PCP if they are not receiving combination ART. Presence of wheezing makes acute bacterial pneumonia less likely than other causes, such as viral infections, asthma exacerbation, atypical bacterial infections, or aspiration.[80] Children with LIP often have recurrent episodes of bacterial respiratory infection superimposed on chronic respiratory symptoms of cough and mild tachypnea.[81]

In children with bacteremia, a source should be sought. In addition to routine chest radiographs, other diagnostic imaging may be necessary in children with HIV with compromised immune systems to identify less apparent foci of infection (e.g., bronchiectasis, internal organ abscesses).[82-84] In children with suspected bacteremia and central venous catheters, blood culture should be obtained through the catheter and (if possible) peripherally.[85]

## Prevention Recommendations

Children with HIV who are not receiving combination ART are at high risk for acquiring opportunistic infections. Regardless of their treatment status and CD4 count, children with well-