



Editorial
Physicians Academy
November 2017

Bacterial Infections in Patients with Leukemia

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Despite significant advances in supportive care, infectious complications continue to be a significant cause of morbidity and mortality in patients with leukemia. The implementation of empiric antibiotic therapy in patients with febrile neutropenia led to dramatic reduction in mortality and was hailed as a turning point in cancer treatment. Nonetheless, the development of more effective and dose intensive salvage chemotherapy regimens, incorporation of monoclonal antibodies, use of consolidation and maintenance strategies, and increased use of indwelling venous catheters have increased susceptibility to infections and changed the spectrum of infections in patients with leukemia. Specifically, multidrug resistant organisms, as well as those previously considered innocuous have emerged. Even under the optimal circumstances i.e. timely diagnosis and implementation of appropriate therapy, infections in leukemia remain a therapeutic challenge.

The most common bacterial pathogen in the 1960s in neutropenic patients was *Staphylococcus aureus*. However, presumably due to the widespread use of methicillin, fatal staphylococcal infection rates dropped from 23.5% in 1954 to 3.1% in 1963 according to a ten year review of National Cancer Institute data. This success was dampened in the late 1960s and early 1970s by the emergence of aerobic gram-negative bacilli such as *Klebsiella pneumoniae*, *Enterobacter*, *E. coli*, *Pseudomonas* and other enteric organisms such as *Enterococci* and the anaerobes. Cephalothin, a first-generation cephalosporin, led to improved outcomes with these infections. This period marked the emergence of *Pseudomonas aeruginosa* as a major pathogen associated with high mortality rates in this population.

Bloodstream infections (BSI) are commonly associated with mucositis, cellulitis, pneumonia, neutropenic enterocolitis, invasive fungal disease and central venous catheters. The clinical presentations of BSI may vary from bacteremia to fulminant shock. It should be emphasized that gram-negative organisms continue to dominate the scene as the most frequent pathogens causing infections in febrile neutropenic patients. Apart from BSI, other sites of infection include the respiratory tract, skin and soft tissue, gastrointestinal and genitourinary tract, in order of frequency.

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