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EDITORIAL

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Stahylococcal infections in children

Staphylococcus aureus is one of the commonest bacterial infections in infants and children. The commonest infections caused by the staphylococcus pertain to the skin, soft tissues, bones and joints. However, bacteremia, septicemia, pneumonia, meningitis, and endocarditis are known serious complications, along with the scalded skin syndrome and the toxic shock syndrome.[1]

Infections due to this organism may originate in the community or be acquired in the hospital. Community acquired infections are carried from person to person and thus spread easily. A more important source is the hospital where acquisition has become quite frequent and serious. Intravenous lines, catheters, indwelling foreign bodies or prostheses, are amongst the risk factors along with spread from the hospital personnel and lack of proper hygienic measures. They are also more common in underlying medical conditions and injection drug use. Age is another factor that determines the incidence of serious, life-threatening infections, being commoner in those under 1 year of age.[2]

Recognition and diagnosis is not very difficult in the superficial infections and a high index of suspicion in involvement of the bones and joints leads to proper diagnosis. Treatment of superficial infections was not a real problem initially with the organism being sensitive to the commonly used Penicillins, and Cephalosporins. However, the evolving resistance to Oxacillin has created a problem for treatment specially of the more invasive infections.

Methicillin resistance in *S. aureus* is defined as an oxacillin minimum inhibitory concentration (MIC) ≥4 mcg/mL Isolates resistant to oxacillin or methicillin also are resistant to all beta-lactam agents, including cephalosporins. Methicillin resistance is mediated by the *mecA* gene located on a mobile genetic element called staphylococcal cassette chromosome (SCC*mec*). MRSA has traditionally been classified into health care-associated (HA-MRSA) and community-associated (CA-MRSA). Arbitrarily, those with isolates >10% resistance to Methicillin are considered high prevalence areas. It is important therefore for each hospital to have their own data as it is for the country or region.[3]

The CDC defines invasive hospital-onset (nosocomial) HA-MRSA as cases with positive culture result from normally sterile site obtained >48 hours after hospital admission. HA-MRSA strains tend to have multidrug resistance and carry SCC*mec* type II or SCC*mec* type III. CA-MRSA usually is defined as an MRSA infection with onset in the community in a patient who is without risk factors for HA-MRSA.[3]

Two case reports in this issue highlight the variable presentation of this organism and the presence of Methicillin resistant organisms both in our community and the hospital settings.

The first describes the case of a 2 month old and that of a 10 year old, cases of Empyema Necessitans, a rare staphylococcal disease in infants and children. This turned out to be MRSA staph and required treatment with Tazobactam/Piperacillin and Linezolid, in the infant and Cefaperazone/Salbactam and Linezolid in the 10 year old. Both resolved well, after prolonged therapy. The second case report by Saman et al highlight deep vein thrombosis (DVT), septic pulmonary emboli due to staphylococcus, also Methicillin resistant. This was successfully treated by Vancomycin.

Major sources of MRSA besides patients are health care workers, and surfaces in the hospital. Patients, however, remain the greatest source of transmission in the health care setting. Term and late-preterm infants may acquire infection from

their mothers, some other source in the community, or possibly the nursery.[4] Adults and children colonized with MRSA are also sources of transmission. MRSA can colonize the skin and nares of hospitalized patients, health care workers, and healthy individuals.[5]

Risk factors for HA-MRSA infection include a history of MRSA infection or colonization, history of hospitalization, surgery, dialysis, prolonged hospitalization, burns, parenteral nutrition, indwelling catheters or devices as well as endotracheal intubation or tracheostomy.[6]

Being the leading cause of both community- and hospital-associated bacteremia, *S. aureus* bacteremia (SAB) is associated with increased morbidity and mortality, even with appropriate therapy. The choice of antibiotic therapy for suspected SAB in children depends on the source and severity of the infection, whether the infection is community or health care associated, and, if community associated, what the prevalence of methicillin-resistant *S. aureus* (MRSA) is in the community. For children with life-threatening infection with suspected SAB, empiric therapy consists of vancomycin plus either nafcillin or oxacillin. For suspected MRSA pneumonia, addition of a second anti-MRSA agent (e.g., clindamycin, ceftaroline, linezolid) within the first 24 hours of admission may be associated with decreased mortality. Gentamicin or rifampin may be added for synergy in selected circumstances (e.g., severe infections associated with prosthetic devices) [7]

Supportive measures are just as important and should include treatment of fever, respiratory support for patients with pneumonia or respiratory distress, adequate hydration and fluid management, and volume resuscitation and/or vasopressor support for severely ill patients with signs of poor perfusion or septic shock.

The mortality of SAB in the pre-antibiotic period was as high as 80 percent. With the current modalities of treatment and support, mortality has been successfully reduced to as low as 2 to 3 percent.[8]

Mortality is highest among infants <1 year of age, particularly premature neonates. Other risk factors for mortality include comorbid conditions, hospital-acquired infection, and associated pulmonary infection or endocarditis.[9]

Staphylococcal infections are still common and need to be considered in sick infants and children. A high index of suspicion, early diagnosis and testing for resistant strains assures proper management and good outcome.

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