Changing trends and etiology of bacteremia in a referral hospital in Saudi Arabia.

Sir,

Bloodstream infections continue to be a major cause of morbidity and mortality despite advances in antimicrobial therapy and supportive care. It has been estimated that between 200,000 to 400,000 episodes of bloodstream infections occur annually in the United States of America (USA).[1] The crude mortality rate among patients with nosocomial bloodstream infections is approximately 35%, and most deaths are due directly to the infections, not the underlying disease. Data from the Surveillance and Control of Pathogens of Epidemiological Importance (SCOPE) show that 70% of all nosocomial bloodstream infections occurred in patients with central vascular catheters. While many studies are available from Western countries, there has been little published work from developing countries, particularly, Saudi Arabia. Hence, changing trends and spectrum of bacterial etiologies causing bacteremia in 1999 were compared to those in 1985 at King Faisal Specialist Hospital and Research Center (KFSH & RC), a referral tertiary care hospital in Riyadh, Saudi Arabia. Patient blood was collected directly into a vacutainer blood culture tube containing 45 ml of supplemented Peptone Broth II with sodium polyanethol sulfonate (SPS) and penicillinase (Becton-Dickinson, Rutherford, New Jersey). The media were incubated promptly at 35ºC. The bottles were examined at least once a day for signs of microbial growth such as turbidity, hemolysis, or gas formation. Cultures showing evidence of growth were selected for Gram staining and inoculation on sheep blood agar, MacConkey agar or chocolate agar. The microorganisms were identified according to the procedures described in the Manual of Clinical Microbiology. Blind subcultures were also performed and all blood culture bottles were kept at 35ºC for at least 7 days. Whenever brucellosis, leptospirosis or fungemia were suspected, and the bottles were held at 35ºC for a total of 28 days. A comparison of bacteria isolated from blood cultures at KFSH between 1985 and 1999 showed that a higher number of culture-positive patients were detected in 1999 (55%) as compared to 1985 (42%). *Staphylococcus epidermidis* was the most predominant organism in 1999 (37%) and also in 1985 (21%). Bacteremia caused by *Staphylococcus aureus* decreased from 10% in 1985 to 1% in 1999. The predominant gram-negative organism in 1999 was *Klebsiella pneumoniae* (12%), *P.aeruginosa* (10%) was the 2nd most prevalent organism, followed by *E.coli* (9%) and *Streptococcus pneumonia* (6%). In 1985, *E.coli* was predominant (14%), followed by *P.aeruginosa* (13%), *Staphylococcus aureus* (10%) and *K.pneumonia* (6.5%). Bacteremia caused by anaerobic bacteria; *Bacteroides fragilis, Clostridium perfringens, Propionibacteria,* remained at low numbers in this period. *Salmonella sp*. although endemic in Saudi Arabia were only responsible for 6% of bacteremia, although, this was an increase from 4% in 1985. Improved diagnosis and prompt treatment resulted in some infections such as brucella to decrease from 3% in 1985 to 1% in 1999. *E.coli* bacteremia also decreased from 14% in 1985 to 9% in 1999. The number of admissions to KFSH during 1999 (22,500) was twice than the number of admissions in 1985 (11,595). The frequency of bacteremia with positive blood culture averaged 7% of total admissions in 1999. This is significantly higher than those reported in 1985 which was estimated to be 3%.[2] A 5 year study carried at Qatif Central Hospital,[3] Saudi Arabia in 84,400 patients showed an overall rate of bacteremia of 15.7 per 1000 admissions. *S.aureus* was the most frequently isolated organism (13%) followed by coagulase negative *staphylococci* (16%), *S.pneumoniae* 11.5%, *enterococci* (9%) and beta-hemolytic *streptococci* (9%). Of the gram-negative bacteria, the most frequently isolated were *Salmonella sp*. (20%), *E.coli* (11%), *Klebsiella sp*. (11%), *Pseudomonas sp*. (8%) and *Enterobacter sp*. (4.5%). However, this difference is due to the fact that 57% of these blood stream infections were acquired in the community, compared to 43% acquired in the hospital. At KFSH, the patients being treated are tertiary care patients with a high risk of contracting nosocomial blood stream infections due to their weakened immune status and debilitating diseases. However, good infection control practices have helped to decrease *S.aureus* infections from 10% in 1985 to 1% in 1999. The increased frequency and changing etiology of bacteremia may be a result of varying patient population, and selective pressure due to extensive use of antibiotics in hospital patients for therapy as well as prophylaxis. Gram-negative bacteria are known to be responsible for the majority of cases of bacteremia. During 1997, a total of 4,267 nosocomial and community-acquired bloodstream infections due to gram-negative organisms were reported from SENTRY hospitals in Canada (8 sites), the United States (30 sites), and Latin America (10 sites).[4] *Escherichia coli* was the most common isolate (41% of all gram-negative isolates), followed by *Klebsiella species* (18%), *Pseudomonas aeruginosa* (11%), and *Enterobacter species* (9%). At KFSH, *Klebsiella sp*.

was the most common followed by *P.aeruginosa* and *E.coli*, this is due to the fact that most of this patient population is tertiary care. *Staphylococcus epidermidis*, alphahemolytic *streptococci* of viridans group, and *Propionibacteria* were isolated with higher frequency during 1999 compared to 1985. In the 1985 study, the majority of these microorganisms were found to be common contaminants. This conclusion was based on chart review of many patients and consultation with attending physicians. However, the situation is rapidly changing as *Staphylococci* have significantly increased potential as pathogens especially in the compromised patient. Increased surgical interventions have led to a greater risk of nosocomial bloodstream infections. A nosocomial bloodstream infection prolongs hospital stay by one week or more, adding between $14,000 and $30,000 to costs of hospitalization. Various interventions, including skin preparation with chlorhexidine, use of vascular catheters with anti-infective coatings, and use of maximum barrier precautions during catheter insertion, have been shown to reduce risk for catheter-related infections. Antiseptic-impregnated and antibiotic-coated catheters, have been found to be 5 times less likely to produce bacteremia and half as likely to to be colonized at time of removal.[5] Such measures may help to reduce risk of infection, but it is important to carry out surveillance studies at large medical centres in Saudi Arabia, for identifying areas where infection prevention strategies can be implemented.

References

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