

Variations in the Organisms Causing Deep Surgical Site Infections in Fracture Patients at a Level I Trauma Center (2006-2015)

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Purpose: The purpose of this study was to quantify the current bacteriology of deep surgical site infections (SSIs) following fracture surgery at one institution and compare those data with historic controls at the same institution to determine if there is variation in the species present in infections identified over the past decade.

Methods: A retrospective review was conducted at a Level I trauma center to identify all deep SSIs (n = 243) occurring within 1 year of an index fracture fixation between January 2011 and December 2015. Bacteria were categorized as *Staphylococcus aureus* (*S. aureus*), coagulase-negative *Staphylococcus* (CoNS), *Streptococcus*, *Enterococcus*, gram-negative rods (GNR), gram-positive rods (GPR), anaerobes, or negative cultures. The proportion of each bacterial types was determined and compared to previously published data from the same trauma center (n = 211, December 2006 to December 2010) to assess variation in the proportions.

Results: The most common type of bacteria in the cohort was GNR (n = 109, 44.9%), followed by *S. aureus* (n = 95, 39.1%), and CoNS (n = 62, 25.5%). The proportion of CoNS species in infected patients was significantly higher (P <0.05) in each study year (2011-2015) when compared to the historical controls. Similarly, the proportion of GNR species in infected patients was higher in each study year compared to the previously reported data. The difference was statistically significant (P <0.05) in 2012 and 2014 and close to significant (P <0.08) in the remaining years. The proportion of *S. aureus* species among infected patients was significantly less than the historic controls in 2011, 2013, and 2014 (P <0.05). This reduction is specifically driven by a decrease in the proportion of methicillin-resistant *S. aureus* (MRSA) in the overall sample, with a significant reduction in 2013-2015 compared to historic controls (P <0.05).

Conclusion: The bacteriology of deep SSIs of fractures has changed substantially over the past decade at our center, specifically the proportions of GNR and CoNS have increased and the rate of MRSA has decreased (all P <0.05). The etiology of this change is unknown. It is possible that the use of certain perioperative antibacterial measures, such as the increase in the use of topical vancomycin powder in wounds or the switch to chlorhexidine-based skin preparation solutions, may be selecting for different bacteria. Or perhaps the decrease in MRSA rates may be reflective of the overall national decline in the rates of invasive health-care-related MRSA infections. Regardless of the etiology, clinicians should be aware that the bacteriology of SSIs at their institution may be changing relatively rapidly over time.