

The Efficacy of Antibiotic Strategies Employed at the Time of Definitive Wound Closure/Coverage for Severe Lower-Extremity Injuries

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Purpose: There are currently no guidelines to assist with the selection and duration of antibiotics used at the time of definitive wound closure/coverage in severe injuries to the lower extremity. Wound bioburden surveillance and targeted antibiotic therapy is not current practice. This study was designed to evaluate the clinical efficacy of the antibiotic therapy employed at the time of definitive wound closure/coverage in patients with severe lower-extremity injuries.

Methods: 655 patients were prospectively enrolled from 39 centers into a study of the wound bioburden in severe lower-extremity injuries that required either delayed wound closure or flap coverage. At the time of definitive coverage/closure, wound tissue samples were collected and processed at a central microbiology laboratory. We captured the antibiotic types and the dose and duration strategy in the wound coverage/closure perioperative period. An expert infectious disease panel evaluated each patient with a positive wound culture. Based on the bacteria recovered and the antibiotics provided, each patient's therapy was rated as: inefficient, possible effective, or effective for the treatment of the wound bioburden.

Results: Tissue cultures from 195/655 patients (29.8%) were positive at the time of definitive coverage/closure. Recovered organisms included staphylococcus (30.8% overall; CONS [coagulase-negative staphylococci], 27.2%; MSSA [methicillin-sensitive *Staphylococcus aureus*], 3.1%; MRSA [methicillin-resistant *S. aureus*], 1.5%), enterobacter (18.5%), and enterococcus (11.8%). The most common antibiotic strategy for this cohort was either Ancef alone (43.1%) or Ancef in combination with gentamycin, tobramycin, or vancomycin (14.4% combined). The expert infectious disease panel rated 111 of 195 cases (56.9%) as having an ineffective antibiotic exposure, 64/195 (32.8%) as having possibly effective exposure, and 20/195 (10.3%) as effective exposures. Of the 20 effective exposures, 3 (15.0%) developed a subsequent deep infection. Of the 64 possibly effective exposures and the 111 ineffective exposures, 14 (21.9%) and 28 (25.2%) developed a subsequent deep infection, respectively.

Conclusion: 57% of the antibiotic therapies administered in this study at the time of wound coverage/closure were likely ineffective against the recovered wound bioburden. The data show a trend toward increasing deep infection rates with less effective antibiotic exposure. Future therapies likely need to target the wound bioburden.