

### **Next-Generation Sequencing Results Suggest that a Change in Antibiotic Prophylaxis in Severe Open Tibia Fractures is Warranted**

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**Purpose:** Infection following open tibial fractures has remained relatively unchanged for decades. Antibiotic prophylaxis for open fractures and subsequent surgical procedures is standard of care. However, a 2019 OTA meeting abstract suggests that antibiotics administered at the time of wound closure/coverage in open tibial fractures are ineffective against the bioburden found in most cases based on culture data. Recent non-orthopaedic research suggests that choosing antibiotics based on next-generation sequencing (NGS) data can improve outcomes compared to choices made empirically or based on cultures. We hypothesized that infectious disease (ID) physicians would consider a change in prophylactic antibiotics at time of wound closure/coverage when considering both NGS and culture data compared to culture data alone.

**Methods:** This is a secondary analysis of the METRC Bioburden study. Of the 646 patients with high-energy tibia fractures that required second debridement surgery and delayed definitive wound closure/coverage, 60 cases had both NGS samples and cultures obtained from the wound at the time of definitive closure/coverage. A panel of 3 ID experts reviewed the 60 cases to answer the question “would you consider a change in the antibiotic(s) given based on the additional NGS information over culture information alone?”. They were provided clinical vignettes, NGS and culture data, and the antibiotics given from 24 h prior to surgery up to 72 h after surgery. The primary outcome was number of cases considered for a change in antibiotics by 2/3 majority or consensus.

**Results:** The ID physicians determined that in 37% of cases NGS information would have changed prophylactic antibiotic selection at the time of definitive wound closure/coverage. Per physician, the change in antibiotic recommendations was 20, 40, and 73% of cases.

**Conclusion:** The data suggest that in  $\geq 20\%$  of cases the antibiotic prophylaxis given at the time of definitive wound closure/coverage is thought to be inadequate per ID attendings. This information highlights the potential to improve antibiotic prophylaxis protocols in the hopes of decreasing infection rates. Choosing antibiotics is a clinical decision based on a multitude of factors, including ID physician training and preferences, and guided by the patient’s clinical scenario. These data indicate obvious variability in ID attending preferences based on bioburden.