

Impact of Antibiotics on Post-operative Infection in Facial Trauma

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INTRODUCTION

3 million individuals are admitted due to facial trauma annually in the United States.¹ The routine use of antibiotics is commonly practiced but evidence surrounding their efficacy is mixed. The use of pre- and perioperative antibiotics has been shown to reduce infection, but specific antibiotic choice remains variable.^{2,3} Additionally, many studies have deduced that postoperative antibiotics do not reduce infection rates in maxillofacial fractures.⁴⁻⁶

Studies have also shown many comorbidities to be associated with increased susceptibility for infection. For instance, HIV, diabetes, periodontal disease, drug abuse, and low socioeconomic status are factors displayed to be associated with infection.⁷ Specifically, immunosuppression has classically been linked to increased risk. Multiple studies conclude HIV-positive patients experience a higher overall rate of postoperative infection.⁸⁻¹⁰

AIM

- Determine which pre- and peri-operative antibiotics are associated with the highest incidence of surgical site infection in patients with acute facial fractures
- Determine the efficacy of postoperative antibiotics in the prevention of surgical site infection in facial trauma patients while controlling for patient comorbidities, fracture characteristics, treatment-related factors and patient adherence to prescribed treatment

METHODS

In this study, adult patients with CPT or ICD codes consistent with facial trauma management at Temple University Hospital between 2005 and 2019 were included for retrospective chart analysis. Patients with substantial bone loss (i.e. ballistic injury) requiring complex reconstruction were excluded. Additionally, patients without follow up with a TUH physician were excluded. Demographic data, radiographic diagnoses, fracture pattern, antibiotic regimens, comorbidities, fracture characteristics, and time from injury to surgical management were collected.

RESULTS

A total of 304 patients and 911 fractures are included in our initial retrospective cohort analysis. The mean age was 40.37 with 73.02% male subjects and 9.21% open fractures. The overall infection rate was 5.92%. The most common fracture site was mandible (31.37%) followed by nasal (24.36%) and orbit (20.69%).

HIV was the only comorbidity significantly associated with infection ($X^2=8.26$, $p=0.004$). Diabetes, periodontal disease, chronic sinusitis, alcohol use, substance use, and history of chemotherapy or radiation were not significantly associated with increased infection rate. There was no link between open fractures ($X^2=0.0826$, $p=0.744$) as well as time to surgical management with infection rate ($t=1.022$, $p=0.3077$).

The use of preoperative antibiotics was significantly associated with increased infection rates ($X^2=6.157$, $p=0.013$). Peri- and post-operative antibiotic usage was not significantly associated with infection ($X^2=1.655$, $p=0.198$ and $X^2=0.0091$, $p=0.924$, respectively). Furthermore, the choice of pre-operative antibiotic was not associated with infection rates ($X^2=11.12$, $p=0.348$).

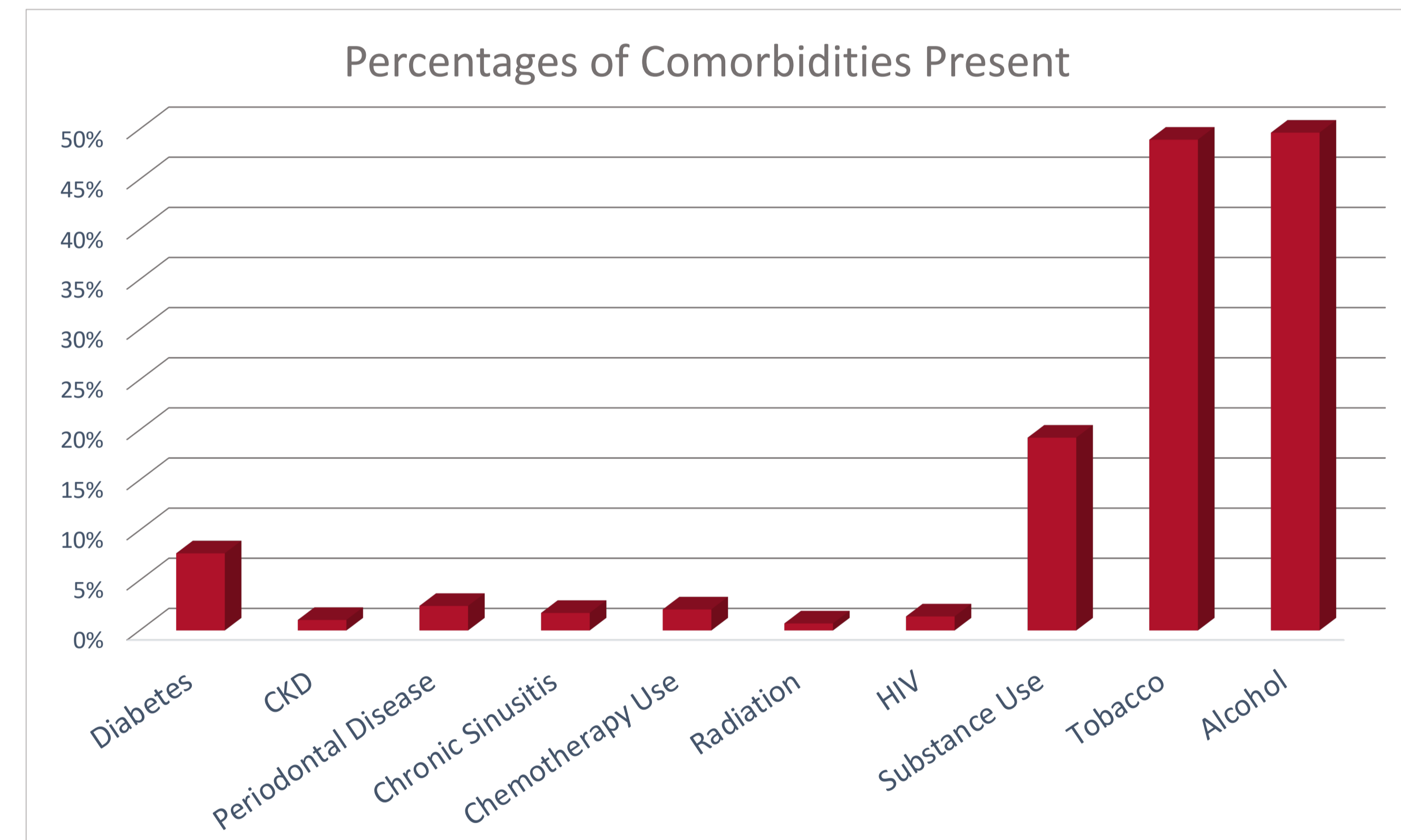


Figure 1: Percentages of Comorbidities Present. Percent breakdown of various comorbidities adult patients with maxillofacial fractures presented with at Temple Hospital from 2005 to 2019.

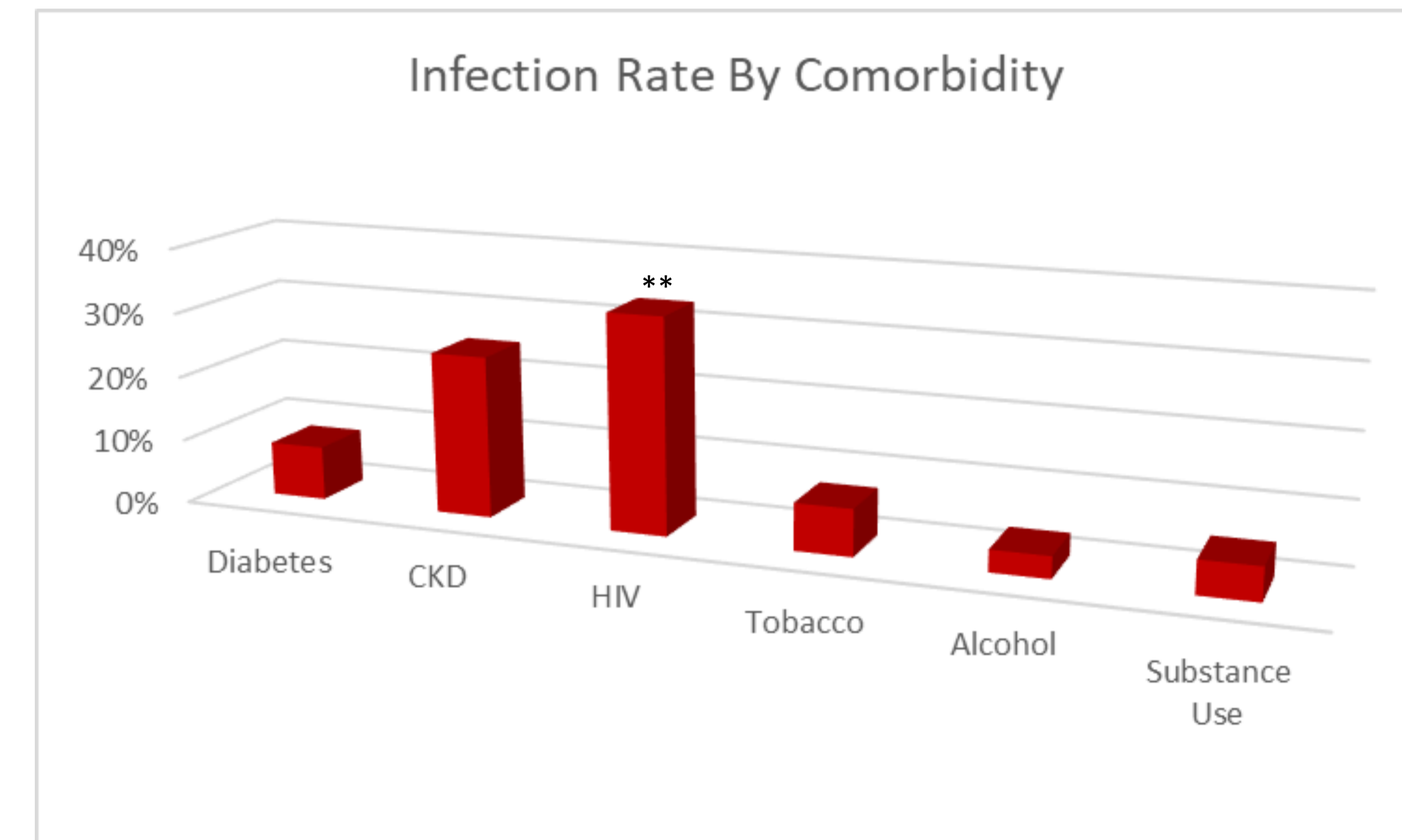


Figure 2: Infection Rate by Comorbidity. Infection rate per comorbidity following maxillofacial fracture treatment. HIV is associated with increased infection rate of 30% ($\chi^2=8.26$, $p=0.004$). The other comorbidities did not show statistical significance.

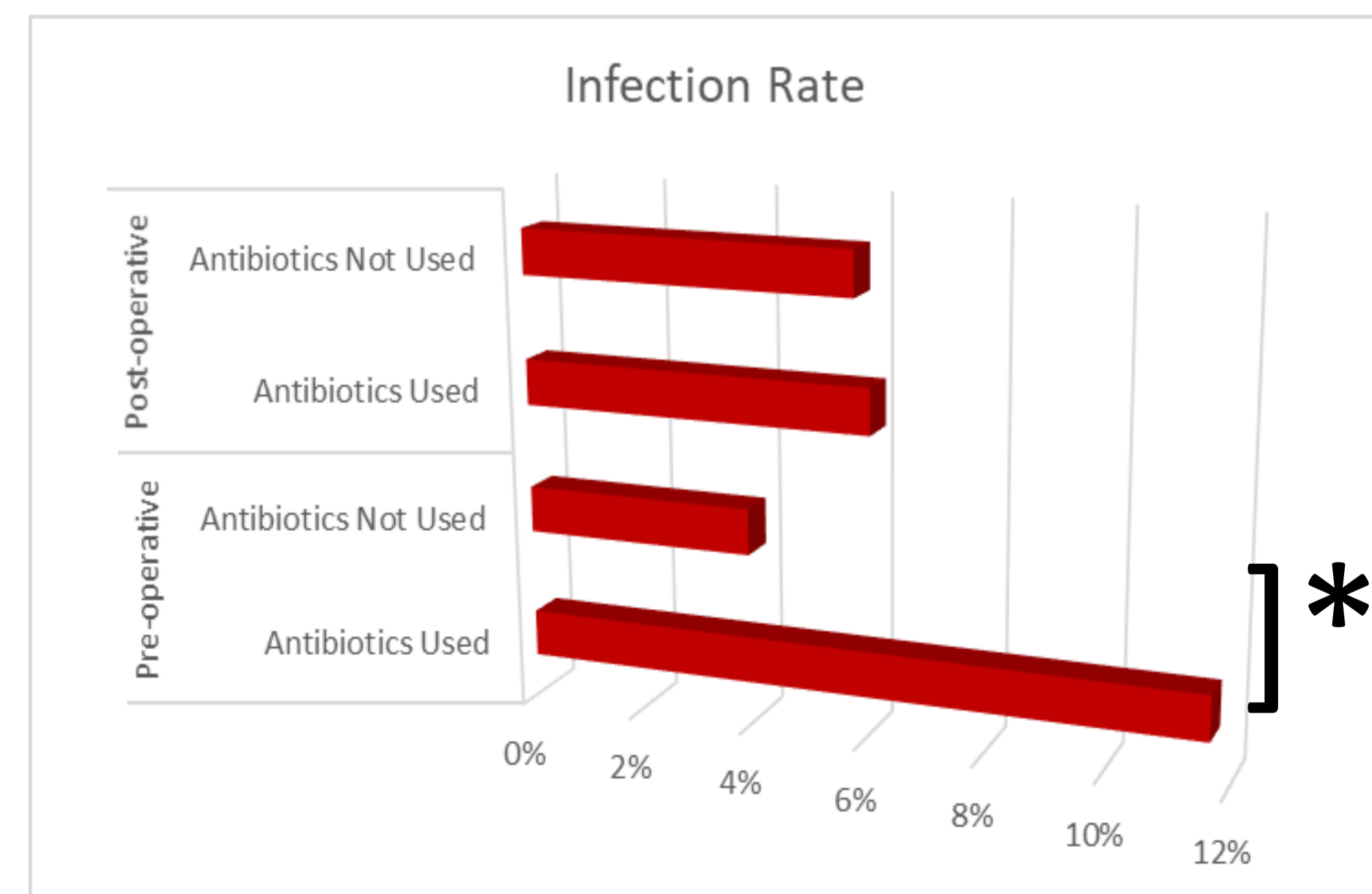


Figure 3: Pre-operative and Post-operative Infection Rates versus Antibiotic Usage. Effects of antibiotic usage on infection rate in pre-operative and post-operative periods. Increased infection rate (~12%) associated with pre-operative antibiotic use ($X^2=6.157$, $p=0.013$).

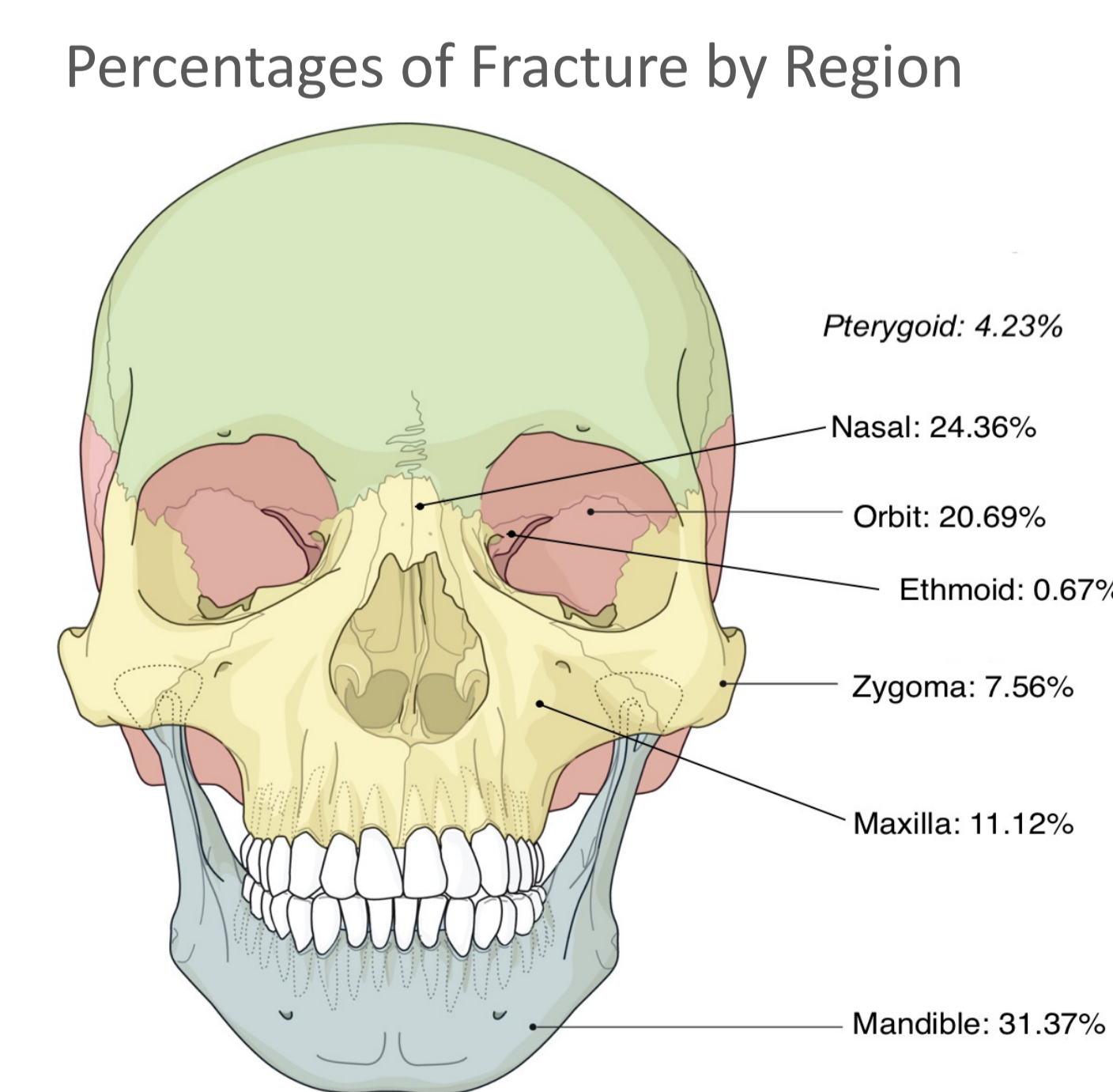


Figure 4: Percentages of Fracture by Region. Percent of fractures in each region is visually displayed on the diagram above.¹¹ Pterygoid region is not displayed.

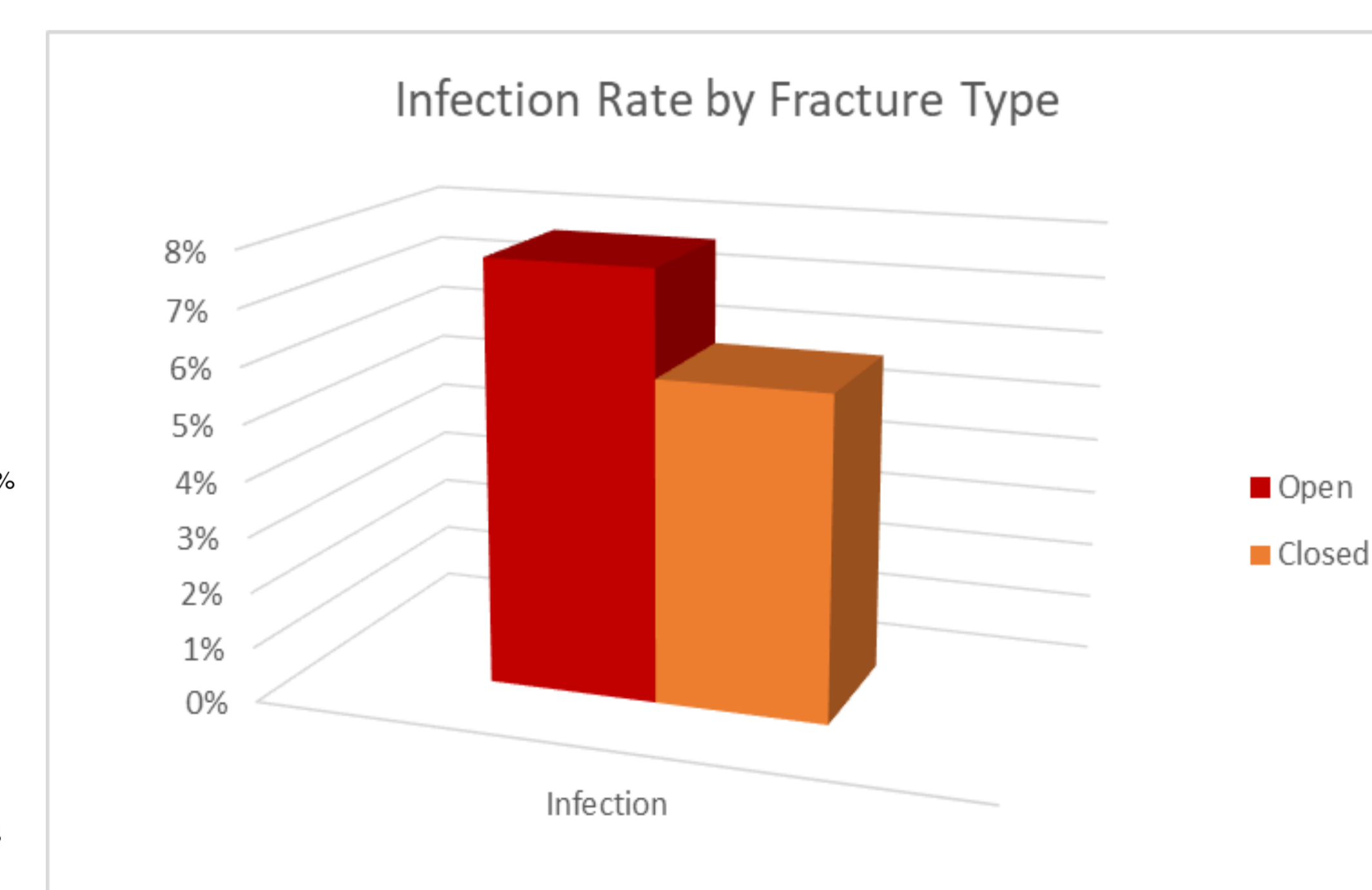


Figure 5: Infection Rate by Fracture Type. Open vs. closed fracture percentages shown above. 9.21% of total fractures are open.

CONCLUSION

As the results demonstrate, use of antibiotics does not lessen the rate of postoperative infection. Moreover, HIV was the only comorbidity associated with increased infection rate. In comparison to previous literature, the large sample size our study analyzed allows for the detection of statistically significant results. Furthermore, analysis of multiple factors such as fracture type, management (open/closed), type of antibiotic used, time period of antibiotic usage, complications, and associated comorbidities related to infection provides for more comprehensive results. Our analysis identifies HIV as a strong risk factor associated with infection rate and thus supports the standard use of antibiotics in HIV patients undergoing maxillofacial surgery.

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