

Widespread Adoption of Vancomycin Powder for Fracture Surgery Would Result in Hundreds of Millions in Annual Savings

Joseph Levy, PhD; Robert V. O'Toole, MD; Michael J. Bosse, MD; Joshua L. Gary, MD; Todd O. McKinley, MD; William T. Obremskey, MD, MPH, FIOTA; J Spence Reid, MD; Renan C. Castillo, MD; Nathan N. O'Hara, PhD; METRC

Purpose: A recent large trial showed that the use of sterile vancomycin powder placed directly over implants in surgical wounds during definitive fixation surgery of pilon and plateau surgeries reduced the risk of gram-positive deep surgical site infection by 3.7% (95% confidence interval [CI]: 0.8-6.7%) (relative risk 0.49 (95% CI: 0.27-0.88)). We sought to evaluate health-care costs implications if the benefit of vancomycin were to be extrapolated to all operatively treated fracture patients in the US, accounting for the cost of the intervention and cost offsets driven by fewer gram-positive deep surgical site infections.

Methods: We constructed a cost-of-illness model that compares 2 scenarios: (1) standard of care, which is currently to not utilize an intrawound antibiotic; and (2) using 1000 mg of vancomycin powder in operatively treated fracture wounds. National estimates of operative fracture incidence and cost of hospitalized infections were derived from the 2019 National Inpatient Sample, utilizing ICD-10 diagnosis and DRG (Diagnosis Related Group) codes for fracture, surgery, and infection. Rates of gram-positive infection by treatment were derived from the trial; cost of vancomycin powder was derived from Medicare reimbursement rates. We calculated scenario-specific per-person and annual total spending in the US.

Results: The average health-care per fracture spending in the standard-of-care simulation was \$45,356 per fracture and in the vancomycin simulation was \$44,969 per fracture ($P = 0.0108$). The low cost of the intervention, \$13.16 per fracture, is offset by an average \$400.20 in lower costs from decreased probability of gram-positive deep surgical site infection. These cost savings, when applied to the whole US operative fractures population result in nearly 400 million (95% CI: \$84M-\$566M) less spending driven by nearly 5000 fewer deep infections.

Conclusion: Given the substantial population burden, high costs associated with gram-positive deep surgical site infection, and low cost of vancomycin powder, our findings suggest marked cost savings and decreased population burden from the widespread use of intrawound vancomycin. Clinical guidelines should consider these economic findings. Future work will disaggregate costs and treatment effects by clinical characteristics of fractures, examine a longer time horizon, and incorporate societal cost burdens.