

# Perioperative Antibiotics for Clean Hand Surgery: A National Study

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**Purpose** Given that surgical site infections remain a common performance metric in assessing the quality of health care, we hypothesized that prophylactic antibiotics are overutilized in soft tissue hand surgery when antimicrobials are not indicated.

**Methods** We studied insurance claims from the Truven MarketScan Databases to identify patients who underwent 1 of 5 outpatient hand surgery procedures: open or endoscopic carpal tunnel release, trigger finger release, de Quervain release, and wrist ganglion excision between 2009 and 2015 (n = 305,946). Hospital payment claims for preoperative intravenous antibiotics and prescriptions filled for postoperative oral antibiotics were analyzed. We examined the rate and temporal trend of prophylactic antibiotics use and identified risk factors using multivariable logistic regression. We also calculated health care expenditures related to prophylaxis.

**Results** Prior to surgery, 13.6% (2009–2015) of patients received prophylactic intravenous antibiotics and trend analysis showed a statistically significant increase from 2009 (10.6%) to 2015 (18.3%), an increase of 72.5%. Preoperative prophylaxis was used most often prior to trigger finger release (17.5%) and least often prior to endoscopic carpal tunnel release (11.2%). Younger age, male sex, lower income, and obese patients had higher odds of receiving antibiotics. The total charge of prophylactic antibiotics medication used in this study equaled \$1.6 million.

**Conclusions** In 2015, prophylactic intravenous antibiotics were administered to nearly 1 in 5 patients prior to clean soft tissue hand surgery. Although consensus guidelines indicate prophylaxis is not indicated, their use has increased steadily in the United States from 2009 to 2015. (*J Hand Surg Am.* 2017; ■(■): ■–■. Copyright © 2017 by the American Society for Surgery of the Hand. All rights reserved.)

**Type of study/level of evidence** Therapeutic II.

**Key words** Antibiotics, hand surgery, prophylaxis, surgical site infection.



**S**URGICAL ANTIBIOTIC PROPHYLAXIS refers to the administration of antimicrobials prior to incision to prevent surgical site infections (SSIs).<sup>1–4</sup> Infectious complications are a major source of patient morbidity and, in hand surgery, can

result in delayed wound healing, stiffness, and loss of function.<sup>5–7</sup> Although the benefits of prophylactic antibiotics have been demonstrated in other surgical specialties, rates of infection following elective soft tissue hand procedures are exceedingly low, and

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antibiotics have not been shown to reduce the risk or incidence of SSIs in soft tissue hand procedures.<sup>6–11</sup> Current recommendations from an evidence-based consensus statement by the American Association of Plastic Surgeons and guidelines from the American Academy of Orthopaedic Surgeons indicate that antibiotic prophylaxis is not recommended for patients undergoing clean hand surgery, such as carpal tunnel release (CTR).<sup>2,12</sup> Regardless, their perceived benefit is pervasive among surgeons and prophylactic antibiotics are often used without evidence of efficacy.<sup>2,13–15</sup>

Surgical site infections account for 20% of all hospital-acquired infections and, in 2007, were responsible for an estimated \$3.5 to \$10 billion dollars in excess annual expenditures in the United States.<sup>1,16–19</sup> The impact of SSIs on the health care system is profound, and therefore, reducing the incidence through preventive measures has attracted considerable attention.<sup>20,21</sup> In 2006, the Centers for Medicare and Medicaid Service (CMS) implemented the Surgical Care Improvement Project (SCIP), a national effort committed to improving the quality and safety of surgical care.<sup>22–25</sup> Surgical site infection was designated as a core quality performance indicator, and since its implementation, compliance with perioperative guidelines has been a focus of administration policies and insurance reimbursement.<sup>26–30</sup> As a result, physicians are incentivized to adhere to generalized protocols, typically not specific to hand surgery, that intend to decrease the risk of SSIs.

Surgical prophylaxis accounted for approximately 15% of all antimicrobial agents prescribed in hospitals in 2006, and its misplaced use has been a major contributor to the emergence of multidrug-resistant bacteria.<sup>31–33</sup> Therefore, we sought to describe the prevalence of prophylactic antibiotics use during elective soft tissue hand surgery when antimicrobials are not indicated. In this national study of patients undergoing common hand surgery procedures, we examined practice patterns for perioperative antibiotic use and hypothesized that prophylactic antibiotics are overutilized in hand surgery.

## MATERIALS AND METHODS

### Data source

This study was performed using the Thomson Reuters MarketScan Commercial Claims Research Database, which includes information on more than 50 million active employees (and their dependents) with employer-based insurance plans including

preferred provider organization, comprehensive, health maintenance organization, and point of service.<sup>34</sup> Patients older than 65 years are included if they have Medicare Advantage or supplemental insurance, but primary Medicare patients are not included. The database was selected because it includes a large volume of information on health care utilization obtained from inpatient, outpatient, and pharmacy services, allowing assessment of perioperative antibiotic use. All data are deidentified, and this study was deemed exempt from review by the institutional review board at our institution.

### Study cohort

We identified patient ages 18 or older with a single Current Procedural Terminology (CPT) code for an elective hand surgery associated with an appropriate corresponding International Classification of Diseases—Ninth Revision (ICD-9) diagnosis code. Patients who underwent open CTR, endoscopic carpal tunnel release (eCTR), trigger finger release (TFR), de Quervain release (DQR), or wrist ganglion excision between January 1, 2009, and September 31, 2015, were included. The cohort consisted of patients with isolated conditions undergoing outpatient surgeries with no other conditions (ICD-9) or procedures (CPT) documented at the same encounter. We excluded patients without continuous enrollment during the 60-day study period (from 30 days prior to 30 days after surgery). [Appendix A](#) (available on the *Journal's* Web site at [www.jhandsurg.org](http://www.jhandsurg.org)) includes ICD-9 and CPT codes that were used to identify claims of interest.

### Patient factors

Demographic and patient characteristics available included age, sex, regional median income, region of country, insurance plan, and comorbid conditions.<sup>35</sup> We reported a single numeric comorbidity score using van Walraven et al's scoring system,<sup>36</sup> which is validated for use in large administrative databases, to summarize overall disease burden and correlate with mortality and health service measures (eg, length of hospitalization).

### Outcomes

**Antibiotics:** Prophylactic antibiotics use data were collected in the perioperative period. The administration of preoperative intravenous antibiotics was identified if a Healthcare Common Procedure Coding System (HCPCS) code was charged on the day of the operation.<sup>37</sup> The HCPCS is a standardized coding system developed by the CMS for hospital billing.

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