

# Does Prophylactic Antibiotic Choice for Total Shoulder Arthroplasty Matter? A Matched Cohort Analysis

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**INTRODUCTION:** Periprosthetic joint infection (PJI) of the shoulder is a devastating complication following total shoulder arthroplasty (TSA). The purpose of this study was to delineate the relationship between various perioperative antibiotics, including local, topical vancomycin, and their potential protective effect on PJI following shoulder arthroplasty. We hypothesized that patients who received topical vancomycin in conjunction with intravenous cefazolin would experience a reduced rate of postoperative PJI.

## METHODS:

A retrospective cohort study was conducted using the TriNetX database to identify patients who underwent TSA. These patients were then further stratified based upon the prophylactic antibiotics given within 1 day of the index arthroplasty procedure. The cohorts were then divided into those who received only cefazolin, those who received non-cefazolin prophylaxis, those who received vancomycin only, those who received cefazolin with any form of vancomycin, those who received cefazolin with topical vancomycin, those who received only clindamycin, and those who received cefazolin with clindamycin. All groups were analyzed against patients who received only cefazolin. The covariates that were included in the propensity matching included demographics (age at index procedure, sex, race, ethnicity), medical comorbidities (chronic ischemic heart disease, chronic kidney disease (CKD), diabetes mellitus (DM), nicotine dependence, and overweight and obesity), and prior arthroscopic shoulder surgery history. The 30-day, 90-day, 1-year, 2-year, and any-time risk of PJI and revision was analyzed, in addition to other infectious endpoints (any infection, superficial skin infection, deep skin infection, methicillin resistance Staphylococcus Aureus (MRSA) infection, and need for irrigation and debridement), surgical site complications (wound complications and hematoma/seroma), and hospital readmissions and emergency department (ED) visits. The incidence of the outcomes as well as survival analysis, was performed utilizing measures of association risk analysis with chi-squared testing and Kaplan-Meier survival analysis with log-rank tests. The significance threshold was set at  $p < 0.05$ .

## RESULTS:

28,098 patients were identified who underwent TSA and received only cefazolin for antibiotic prophylaxis. After the propensity score matching the cefazolin only cohort to the additional cohorts, 7,273 patients remained for the any non-cefazolin for prophylaxis analysis, 3,784 for the only vancomycin analysis, 1,017 for the cefazolin with local vancomycin analysis, 15,180 for the cefazolin and any vancomycin analysis, 2,174 for the only clindamycin analysis, and 3,113 for the cefazolin with clindamycin analysis. At 90 days and 2 years, cefazolin monotherapy was associated with a significantly lower incidence of PJI and overall infection than non-cefazolin regimens. No differences were found when cefazolin was compared with vancomycin alone. Notably, adding local vancomycin to cefazolin was associated with fewer infections at 2 years. Clindamycin alone was associated with higher infection risk at 2 years. Additional antibiotic prophylaxis with cefazolin was not associated with a decreased risk of infection at any time point. Full comparisons and survival analyses between cohorts are shown in Tables 1-6.

**DISCUSSION AND CONCLUSION:** Overall, non-cefazolin prophylaxis may not provide the same protection against PJI, revision, and overall infection as cefazolin prophylaxis does. As such, we recommend the standard utilization of cefazolin for

## all

**Table 1 Survival analysis relative to overall risk of infection**

	Cefazolin	Other	HR (95% CI)	P Value
Any Infection	15,180	15,180	1.00	
Superficial Skin Infection	1,234	1,234	1.00	
Deep Skin Infection	1,234	1,234	1.00	
MRSA Infection	1,234	1,234	1.00	
Need for Irrigation and Debridement	1,234	1,234	1.00	
Wound Complications	1,234	1,234	1.00	
Hematoma/Seroma	1,234	1,234	1.00	
Hospital Readmissions	1,234	1,234	1.00	
ED Visits	1,234	1,234	1.00	

**Table 2 Survival analysis relative to overall risk of infection**

	Cefazolin	Other	HR (95% CI)	P Value
Any Infection	15,180	15,180	1.00	
Superficial Skin Infection	1,234	1,234	1.00	
Deep Skin Infection	1,234	1,234	1.00	
MRSA Infection	1,234	1,234	1.00	
Need for Irrigation and Debridement	1,234	1,234	1.00	
Wound Complications	1,234	1,234	1.00	
Hematoma/Seroma	1,234	1,234	1.00	
Hospital Readmissions	1,234	1,234	1.00	
ED Visits	1,234	1,234	1.00	

**Table 3 Survival analysis relative to overall risk of infection**

	Cefazolin	Other	HR (95% CI)	P Value
Any Infection	15,180	15,180	1.00	
Superficial Skin Infection	1,234	1,234	1.00	
Deep Skin Infection	1,234	1,234	1.00	
MRSA Infection	1,234	1,234	1.00	
Need for Irrigation and Debridement	1,234	1,234	1.00	
Wound Complications	1,234	1,234	1.00	
Hematoma/Seroma	1,234	1,234	1.00	
Hospital Readmissions	1,234	1,234	1.00	
ED Visits	1,234	1,234	1.00	

**Table 4 Survival analysis relative to overall risk of infection**

	Cefazolin	Other	HR (95% CI)	P Value
Any Infection	15,180	15,180	1.00	
Superficial Skin Infection	1,234	1,234	1.00	
Deep Skin Infection	1,234	1,234	1.00	
MRSA Infection	1,234	1,234	1.00	
Need for Irrigation and Debridement	1,234	1,234	1.00	
Wound Complications	1,234	1,234	1.00	
Hematoma/Seroma	1,234	1,234	1.00	
Hospital Readmissions	1,234	1,234	1.00	
ED Visits	1,234	1,234	1.00	

**Table 5 Survival analysis relative to overall risk of infection**

	Cefazolin	Other	HR (95% CI)	P Value
Any Infection	15,180	15,180	1.00	
Superficial Skin Infection	1,234	1,234	1.00	
Deep Skin Infection	1,234	1,234	1.00	
MRSA Infection	1,234	1,234	1.00	
Need for Irrigation and Debridement	1,234	1,234	1.00	
Wound Complications	1,234	1,234	1.00	
Hematoma/Seroma	1,234	1,234	1.00	
Hospital Readmissions	1,234	1,234	1.00	
ED Visits	1,234	1,234	1.00	

**Table 6 Survival analysis relative to overall risk of infection**

	Cefazolin	Other	HR (95% CI)	P Value
Any Infection	15,180	15,180	1.00	
Superficial Skin Infection	1,234	1,234	1.00	
Deep Skin Infection	1,234	1,234	1.00	
MRSA Infection	1,234	1,234	1.00	
Need for Irrigation and Debridement	1,234	1,234	1.00	
Wound Complications	1,234	1,234	1.00	
Hematoma/Seroma	1,234	1,234	1.00	
Hospital Readmissions	1,234	1,234	1.00	
ED Visits	1,234	1,234	1.00	

HR, hazard ratio; CI, confidence interval; ED, emergency department; PJI, prosthetic joint infection; MRSA, methicillin-resistant Staphylococcus aureus; ICD, International Classification of Diseases.