Non-Cefazolin Antibiotic Prophylaxis is Associated with Higher Rates of Elbow Periprosthetic Joint Infection

Micah Jon Nieboer[1], Zachary Vincent Braig, Christian Scott Rosenow, Erick Marigi[1], Jonathan D Barlow[1], Joaquin Sanchez-Sotelo[1], Mark E Morrey[1]
[1]Mayo Clinic

INTRODUCTION:
Periprosthetic joint infection (PJI) is a common source of failure following elbow arthroplasty. Perioperative prophylactic antibiotics are considered standard of care. However, there are no data regarding the comparative efficacy of various antibiotics in the prevention of PJI for elbow arthroplasty. Previous studies in shoulder, hip, and knee arthroplasty have demonstrated higher rates of PJI with administration antibiotics other than cefazolin. Nevertheless, the elbow has a distinctive bacterial biome, and a higher rate of PJI than other joints. Therefore, this study evaluated whether perioperative antibiotic choice affects rates of PJI in elbow arthroplasty.
METHODS: A single institution prospectively collected Total Joint Registry database was queried to identify all patients who underwent primary elbow arthroplasty between 2003 and 2021. Elbows with known infection prior to arthroplasty (25) and procedures with incomplete perioperative antibiotic data (7) were excluded, for a final sample size of 603 total elbow arthroplasties and 19 distal humerus hemiarthroplasties. Cefazolin was administered in 561 elbows (90%) and non-cefazolin antibiotics including vancomycin (32 elbows, 5%), clindamycin (27 elbows, 4%), and piperacillin/tazobactam (2 elbows, 0.3%) were administered in the remaining 61 elbows (10%). Demographics between groups were similar with the exception of a higher mean number of prior surgeries in the cefazolin cohort and a higher American Society of Anesthesiology score in the non-cefazolin cohort (Table 1). Univariate and multivariate analyses were conducted to determine the association between the antibiotic administered and the development of PJI. Infection-free survivorship was estimated using the Kaplan-Meier (KM) method.
RESULTS: Deep infection occurred in 47 elbows (7.5%) and an additional 16 elbows (2.5%) were diagnosed with superficial infections. Univariate analysis demonstrated that patients receiving non-cefazolin alternatives were at significantly higher risk for any infection (Hazard Ratio (HR) 2.6, 95% confidence interval [CI] 1.4-5.0]; $p < 0.01$) and deep infection (HR 2.7 [95% CI 1.3 – 5.5]; $p < 0.01$) compared with cefazolin administration. Multivariable analysis, controlling for several independent predictors of PJI (tobacco use, male sex, surgical indication other than osteoarthritis, and American Society of Anesthesiology score), showed that non-cefazolin administration had a higher risk for any infection (HR 2.8 [CI 1.4 – 5.3]; $p < 0.01$) and deep infection (HR 2.9 [95% CI 1.3 – 6.3]; $p < 0.01$). Survivorship free of infection was significantly higher at all timepoints for the cefazolin cohort (Figure 1).
DISCUSSION AND CONCLUSION: In primary elbow arthroplasty, cefazolin administration was associated with significantly lower rates of PJI compared to non-cefazolin antibiotics, even in patients with a greater number of prior surgeries which is known to increase the risk of PJI. For patients with penicillin or cephalosporin allergies, preoperative allergy testing or a cefazolin test dose should be considered prior to administering non-cefazolin alternatives.

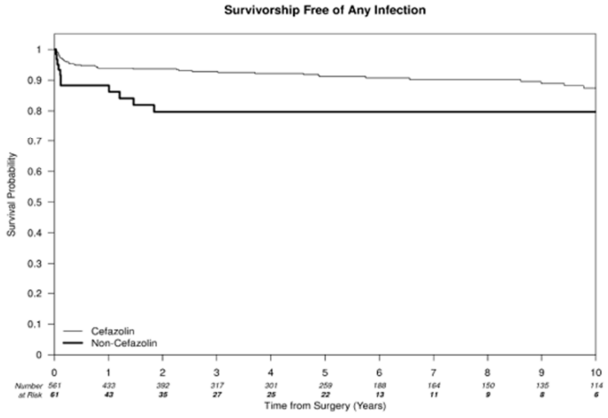

Table I: Demographics	Cefazolin (N = 567)	Non-Cefazolin (N=61)	P-value
Sex			0.20[1]
Male	173 (31%)	14 (23%)	
Female	388 (69%)	47 (77%)	
Age	62	64	0.20[2]
BMI	29	27	0.17[2]
Tobacco Use	47 (8%)	4 (7%)	0.62[1]
Diabetes	71 (13%)	8 (13%)	0.92[1]
Arthroplasty type			0.14[1]
Total	542 (97%)	61 (100%)	
Hemi	19 (3%)	-	
Surgical Indication			0.22[1]
Osteoarthritis	71 (13%)	9 (15%)	
Inflammatory	179 (32%)	20 (33%)	
Post-Traumatic	242 (43%)	19 (31%)	
Acute Traumatic	61 (11%)	12 (20%)	
Pathologic	8 (1.4%)	1 (2%)	
Perioperative Antibiotic			**<0.01**[1]
Cefazolin	561 (100%)	-	
Clindamycin	-	27 (44%)	
Vancomycin	-	32 (53%)	
Zosyn	-	2 (3%)	
Number of Prior Elbow Surgeries	1.3 (0-10)	0.7 (0-5)	**<0.01**[2]
Operative Time (minutes)	155 (45-770)	156 (77-640)	0.32[2]
American Society of Anesthesiology score			**0.01**[2]
1	37 (7%)	1 (2%)	
2	306 (55%)	24 (40%)	
3	208 (38%)	35 (58%)	
4	3 (<1%)	0	