# Continuous vs Intermittent Intraoperative Infusion of Cefazolin on Surgical Site Infections and Acute Kidney Injury in Patients Undergoing Cardiac Procedures

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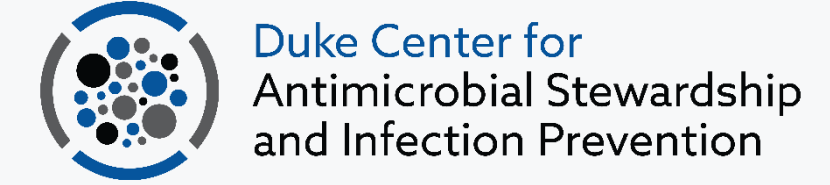
Abstract

Background: Continuous infusion cefazolin (CI) has been investigated as a means to optimize antibiotic exposure for prophylaxis against surgical site infections (SSIs), notably in patients undergoing cardiac procedures involving cardiac bypass (CPB). However, data are limited on its impact on late SSIs and adverse events. In 6/16, the Duke University Hospital (DUH) Antimicrobial Stewardship Team implemented a program to promote CI. We compared the incidence of culture-confirmed SSIs through postoperative day 90 (POD90) between patients receiving either intermittent infusion cefazolin (INT) or CI intraoperatively. We also compared the rate of acute kidney injury (AKI) between groups.

Methods: This retrospective quasi-experimental design included adult and pediatric patients undergoing cardiac surgery at DUH between 3/14-8/18 and receiving intraoperative cefazolin (alone or in combination with other antibiotics). Patients were categorized as CI (having received at least 1 intraoperative CI infusion) or INT. Culture-confirmed SSIs utilizing NHSN definitions were recorded. AKI was defined as a ≥ 0.3 mg/dL rise in serum creatinine within 2 days postoperatively.

Results: A total of 2,172 unique surgical procedures (from 2,143 patients) were included. Comparisons of groups are summarized in Table 1. Rates of SSIs were 1.1% and 1.6% in the CI and INT groups, respectively (RR [95% confidence interval] for CI 0.73, [0.35, 1.52]). AKI was reported in 12.9% and 17.4% of patients, respectively.

Conclusions: We were unable to detect a difference in late SSIs between intraoperative CI and INT cefazolin. Differences observed between AKI between groups requires further investigation, but likely impacted by confounders, including pre-existing renal dysfunction.

Background

- Cefazolin exhibits time-dependent killing, and prolonged infusion rates attain T>MIC more effectively than intermittent infusions.
- Continuous infusion cefazolin has been studied for the prevention of SSIs for patients undergoing cardiac procedures involving CPB. However, data are limited on late SSIs and adverse events

Methods

- Primary objective: compare rates of culture-confirmed SSI thru POD90 between CI and INT groups
- Secondary objective: compare rates of AKI
- single-center, retrospective, quality improvement study
- Study population: adult and pediatric patients undergoing cardiac procedures at DUH from 8/14-8/18 undergoing CBP and receiving intraoperative cefazolin
- CI group received at least one weight-based loading dose, followed by a 0.5-1 g/hr continuous infusion (based on renal function) until incision closure.
- Comparisons expressed as relative risk (RR) (95% confidence interval)

Results

Table 1. Patient demographics

	Continuous Infusion (n = 1,333)	Intermittent Infusion (n= 839)
Male, n (%)	888 (66.6)	541 (64.5)
Age, median (IQ$_{25}$, IQ$_{75}$)	65.4 (56, 72.1)	64.3 (53.9, 71.4)
Charleson Score, median (IQ$_{25}$, IQ$_{75}$)	5 (3, 9)	7 (4, 12)
Diabetes, n (%)	136 (10.2)	95 (11.3)
Wound Class D, n (%)	3 (0.2)	3 (0.4)
Baseline Scr ≥1.5 mg/dL, n (%)	139 (10.5)	146 (17.6)
Intraop vancomycin, n (%)	956 (71.2)	488 (58.2)

Results

- There were 15 (1.13%) and 1.55% SSIs in the CI and INT groups, respectively (RR [95% confidence interval] for CI 0.73, [0.35, 1.52]).). Methicillin susceptible *S,aureus* was the most common SSI (n=5 in both groups).

Figure 1. Infection-free days by cefazolin group*

*note y-axis range 0.98-1.00
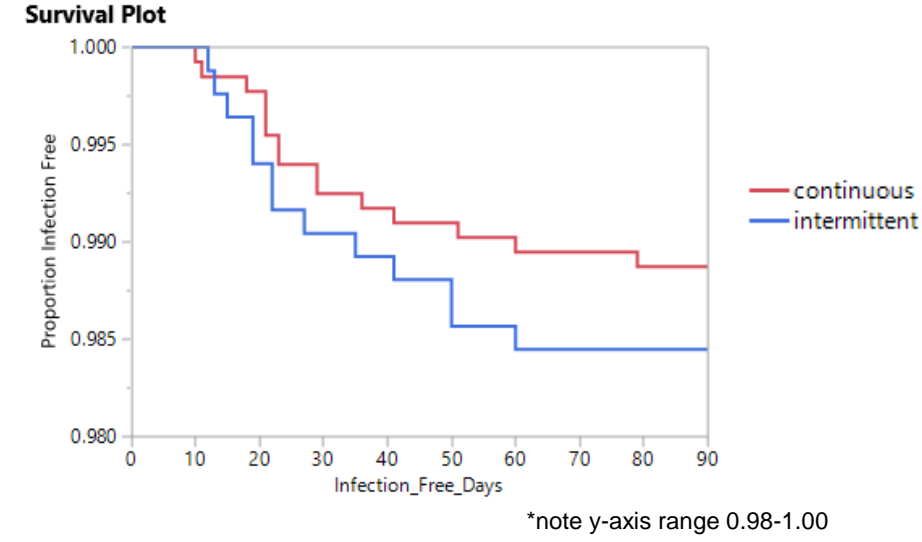
- Rates of AKI were 12.9% and 17.4% in the CI and INT groups, respectively

Table 2. Risk factors for AKI

	With AKI n, (%)	Without AKI n, (%)
Male	208 (65.8)	1215 (65.9)
Diabetes	52 (16.5)	179 (9.7)
Baseline Scr ≥1.5 mg/dL	104 (32.9)	181 (9.8)
Intraop vancomycin	235 (74.4)	1203 (65.2)
CI cefazolin	171 (54.1)	1157 (62.7)

Discussion

- We were unable to observe an impact of intraoperative CI cefazolin on SSIs in patients undergoing cardiac procedures requiring cardiac bypass.
- Similar to other studies, clinal outcomes and adverse effects were comparable between groups.

Limitations

- Single-center, retrospective (observational) study
- Confounding variables (which were not controlled for) may impact endpoints
- Sample size limited adequate power in primary endpoint.

Conclusions

- Use of CI cefazolin did not lead to a decrease in SSIs. Differences observed between AKI is likely impacted by confounders including pre-existing renal dysfunction.

References

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