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BACKGROUND

- *Staphylococcus aureus* is the most common etiology of acute osteoarticular infections in children
- Nafcillin or oxacillin are considered the drugs of choice for methicillin-susceptible *S.aureus* (MSSA) bacteremia but have a higher incidence of adverse events compared to cephalosporins
- Previous studies have shown that cephalosporins or clindamycin effectively treat MSSA osteoarticular infections
- Cefazolin and clindamycin have lower costs than nafcillin
- In recognition of these differences our antimicrobial stewardship program has recommended cefazolin for MSSA osteoarticular infections since 2012

OBJECTIVES

- Compare overall patient outcomes and in-patient costs between nafcillin and non-nafcillin regimens for MSSA osteoarticular infections with bacteremia

METHODS

- We retrospectively identified acute osteoarticular infections by ICD-9 codes in the electronic medical record and validated all cases through chart review
 - Inclusion criteria:
 - Admission to Primary Children's Hospital (PCH) from 2008 through 2012
 - Acute MSSA osteoarticular infection
 - Culture-proven MSSA bacteremia
 - Exclusion criteria:
 - Polymicrobial infection
 - Chronic or recurrent infection
- Care process measures:
 - Use of echocardiogram
 - Antibiotic regimens of nafcillin vs. non-nafcillin
 - In-patient antibiotic costs and hospital costs per PCH pharmacy database
- Outcome measures:
 - Length of stay (LOS)
 - Readmissions (treatment failure and all causes)
 - Duration of bacteremia (hours)
 - Number of surgical drainage procedures
 - Diagnosis of endocarditis
 - PICC complications (clot, infection, phlebitis) from therapy initiation to completion of treatment
 - Drug-related complications (rash, nephritis, fever, neutropenia) from therapy initiation to completion of treatment
- Results analyzed in Stata by Mann-Whitney test

RESULTS

- 76/86 (88%) of patients were treated with an antibiotic regimen which included nafcillin (Table 1)
- No differences in length of stay, duration of bacteremia, number of surgical drainage procedures, readmissions, use of echocardiogram, diagnosis of endocarditis, or total hospital costs between the two antibiotic groups (Table 2)
- Non-nafcillin regimens did not have increased complications relative to nafcillin regimens (20% vs. 42%, $p = 0.3$, Figure 1)
- Patients receiving nafcillin regimens had higher median in-patient antibiotic costs compared to patients receiving non-nafcillin regimens (\$240 vs \$77, $p < 0.002$, Table 2)

Table 1. Demographic data

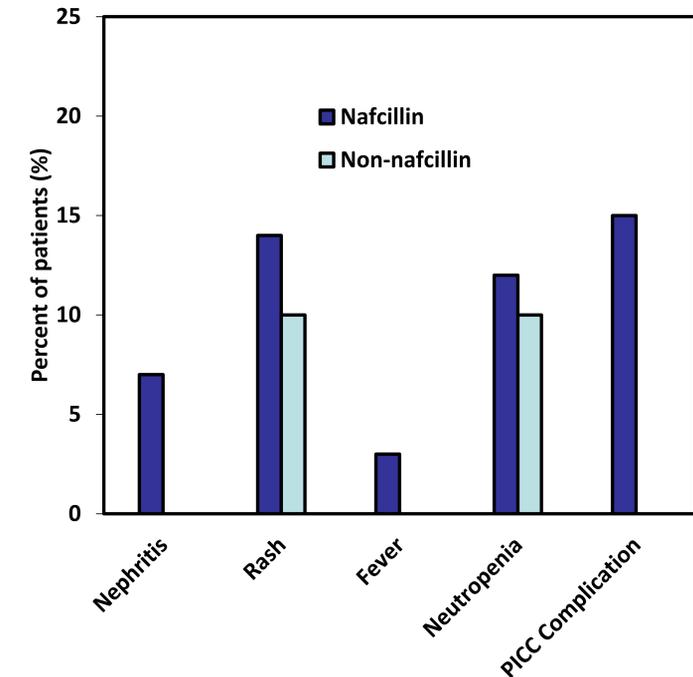
	Nafcillin (n=76)	Non-nafcillin (n=10) [†]	p-value
Median age, years	9.5	6.5	0.53
Male gender, n (%)	46 (61)	5 (50)	0.53
ABO cases, n (%)	42 (55)	5 (50)	0.75
ABA cases, n (%)	17 (22)	2 (20)	0.87
ABO+ABA cases, n (%)	17 (23)	3 (30)	0.61

ABO = acute bacterial osteomyelitis. ABA = acute bacterial arthritis
[†]2 patients treated with cefazolin only. 1 patient treated with clindamycin only. 7 patients treated with cefazolin + clindamycin.

Table 2. Care process and clinical outcome data

	Regimen with nafcillin (n = 76)	Regimen without nafcillin (n=10)	p-value
Median duration of bacteremia, hours (IQR)	39 (26-67)	36 (26-52)	0.78
Median LOS, weeks (IQR)	0.86 (0.71-1.29)	0.79 (0.71-1.14)	0.54
Readmissions	6	0	0.36
Readmissions for therapeutic failure	1	0	0.72
Readmissions for PICC complication	5	0	0.41
Median surgical drainage procedures (IQR)	1 (0-2)	0.5 (0-1)	0.26
Echocardiogram, n (%)	37 (49)	4 (40)	0.61
Confirmed endocarditis, n (%)	1 (1.3)	0 (0)	0.72
Median in-patient antibiotic cost, dollars (IQR)	240 (92-444)	77 (27-112)	< 0.002
Median hospital cost excluding antibiotics, dollars (IQR)	14,459 (10,390-20,297)	11,496 (10,383-21,975)	0.69

Figure 1. Comparison of antibiotic-related and PICC-related complications in nafcillin vs. non-nafcillin regimens



LIMITATIONS

- We had a small sample size of non-nafcillin regimens and continue to collect data on safety and efficacy
- We did not include the costs of drug-related and PICC-related complications
- We do not have data on total costs for treatment of MSSA osteoarticular infections

CONCLUSIONS

- Non-nafcillin regimens had similar efficacy as nafcillin regimens without increased complications
- Non-nafcillin regimens had lower in-patient costs
- Concomitant endocarditis with MSSA osteoarticular infection is rare
- Greater use of cefazolin or clindamycin and more judicious use of echocardiograms in MSSA osteoarticular infections with bacteremia could substantially reduce costs