Reduced Vancomycin Susceptibility among Pediatric *Staphylococcus aureus* Bloodstream Infections

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Introduction

- Reduced vancomycin susceptibility (RVS) is considered to be present when the minimum inhibitory concentration (MIC) is equal to 2 µg/mL.[1]
- RVS *Staphylococcus aureus* (SA) bloodstream infections (BSI) have been associated with worse outcomes than non-RVS BSI in adults but this has not been well studied in children.[1,2]

Objectives

1. To compare patient and clinical factors of children with RVS vs. non-RVS SA BSI.
2. To compare the odds of treatment failure for children with RVS and non-RVS SA BSI.

Methods

Inclusion criteria: Infants and children <18 years old discharged from Penn State Children's Hospital from 2005-2015 with ≥1 blood culture positive for *S. aureus.*
Exclusion criteria: no vancomycin MIC available.

Definitions:

- RVS: vancomycin MIC = 2.
- Treatment failure: death within 30 days of positive culture, recurrence of SA BSI within 30 days, bacteremia > 3 days duration.

Statistical Analysis:

- Compared patient and clinical factors for guideline adherent and non-adherent cases using Chi square test or Mann-Whitney test.
- Compared odds of treatment failure overall using multivariable logistic regression adjusted for year and presence of complicated infection.
- Compared odds of treatment failure overall using multivariable logistic regression adjusted for year, presence of complicated infection, and line retention.

Results

- We identified 216 pediatric SA BSI; 139 (64%) had RVS.
- The median age was similar between RVS and non-RVS infections, 2.9 years vs 3.6 years, respectively (Table 1).
- RVS was present in 63% of MSSA BSI and 65% of MRSA BSI, P=0.835.
- The odds of treatment failure were similar for RVS and non-RVS BSI overall but were increased for children with a central line if the central line was not removed as a part of therapy (Table 3).

Table 1. Characteristics of RVS and non-RVS Infections.

	Non-RVS n=77 (%)	RVS n=139 (%)
Age		
<2 years	33 (43)	66 (49)
2-5 years	10 (13)	16 (12)
6-10 years	9 (12)	11 (8)
11-18 years	24 (32)	42 (31)
Male sex	51 (66)	84 (60)
Any comorbidity	60 (78)	112 (81)
Surgery in 30 days before culture	18 (23)	32 (23)
Hospitalization in year before culture	54 (70)	105 (76)
Central line present at time of culture	40 (53)	75 (54)

Table 2. Outcomes for RVS and non-RVS bloodstream infections.

	Non-RVS n=77 (%)	RVS n=139 (%)	P
Admitted to ICU	24 (31)	52 (38)	0.32
Required surgery	12 (16)	34 (24)	0.13
Died	13 (17)	23 (17)	0.95
Hospital length of stay, days	9 (6, 26)	13 (7, 36)	0.28
Duration of bacteremia, days	1 (1, 3)	2 (1, 3)	0.06

Figure. Annual proportion of *S. aureus* bloodstream infections with a vancomycin MIC=2 µg/mL has been >40% since 2006.

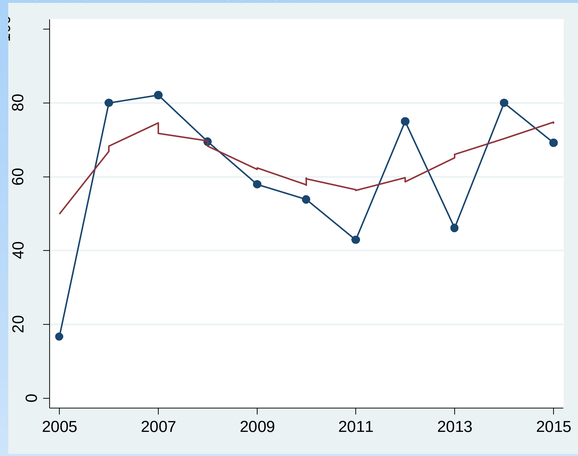

Table 3. Treatment failure following *S. aureus* bloodstream infections.

	Non-RVS	RVS	Odds Ratio (95% confidence interval)
Overall	20/77 (26)	42/139 (30)	1.30 (0.68, 2.47)*
Central line present at time of culture	7/40 (18)	30/75 (40)	3.14 (1.16, 8.54)†
MRSA	7/17 (41)	12/29 (41)	0.98 (0.28, 3.47)

*Adjusted for year and complicated infection; †Adjusted for year, complicated infection and line retention

Conclusions

- RVS was more common at our hospital among pediatric SA BSI than described elsewhere.[3,4]
- RVS may be an emerging problem among pediatric SA infections.
- For central line associated SA BSI, RVS was associated with increased odds of treatment failure compared to non-RVS infections if the line was retained.

References

[1]van Hal SJ. Clin Infect Dis. 2012 Mar;54(6);755-71. [2]Cervera C. Clin Infect Dis. 2014 Jun;58(12):1668-75.
[3]McNeil JC. Pediatr Infect Dis J. 201 Mar; 35(3):263-8. [4]Goldman JL. Pediatr Infect Dis J. 2014 Feb; 33(2);216-8.

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