Optimization of Vancomycin Use in Neonatal Intensive Care Unit

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Background

- Vancomycin is frequently used empirically in suspected neonatal sepsis.
- Inappropriate or unnecessary use of vancomycin can lead to additional morbidities and emergence of drug resistant pathogens.
- Standardization of vancomycin use is imperative for safer and more efficient patient care.[1]

Methods

- **Quality improvement initiative:** Optimize vancomycin use by implementing standardized late onset sepsis (LOS) guideline with defined indications and criteria for empiric antibiotics. Antibiotic utilization rate (AUR) is defined as days of therapy/1000 patient days.
- Guideline implementation started in 09/19 after completion of providers' education.
- Pre-guideline (12/18-03/19) and post-guideline (12/19-03/20) periods were retrospectively compared.

Results

- 63 LOS antibiotic courses were given to 40 patients pre-guideline, and 121 courses in 63 patients in post-guideline period.
- There was a significant decrease in vancomycin AUR in the post-guideline period (76.56 in the pre-guideline vs. 61.42, post-guideline; p=0.036).
- Clinical outcomes and mortality within 30 days of antibiotic usage were not significantly different between two periods (Table 2).
- Adherence to the LOS antibiotics guideline was 66.31%.

Table 1. Demographic characteristics of infants

Demographics Mean (Min, Max)	Pre-guideline N=63	Post-guideline N=121	p-value
Birth weight (g)⁺	2120 (600, 3770)	1750 (510, 5240)	0.06
GA at birth (weeks)	33.03 (22.86, 40.86)	31.79 (22.71, 41)	0.34
Late onset sepsis weight (g)⁺	3280 (700, 8280)	3490 (610, 7960)	0.55
Late onset sepsis GA (weeks)⁺	41.38 (25.43, 68.29)	43.15 (24.29, 72.29)	0.29
Late onset sepsis age (days)⁺	59.90 (5, 215)	80.52 (4, 290)	0.04
Length of stay (days)⁺	92.16 (1, 370)	125.38 (4, 282)	0.004
Demographics n (%)			
Male	41 (65.08)	76 (62.81)	0.77
Hispanic	16 (50)	26 (56.52)	0.24
History of MRSA	0 (0)	2 (1.61)	0.55
Presence of central line	41 (65.08)	90 (74.38)	0.19

⁺Variable with different denominator

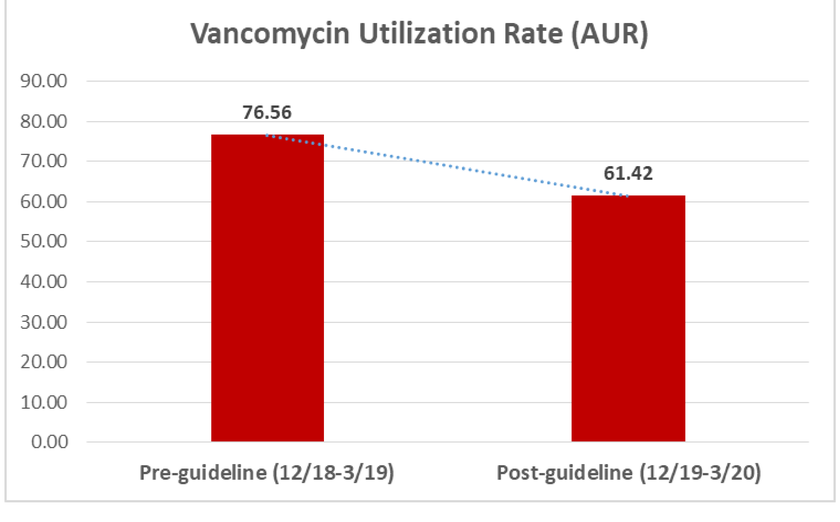

Table 2. Therapy indication, medication exposure and clinical outcomes 30 days after LOS treatment

	Pre-guideline	Post-guideline	p-value
Therapy indication n (%)			
Sepsis rule out	31 (49.21)	62 (47.33)	0.806
Blood stream infection	9 (14.29)	15 (11.45)	0.574
Respiratory tract infection	12 (19.05)	27 (20.61)	0.799
Urinary tract infection	5 (7.94)	12 (9.16)	0.778
Meningitis	2 (3.17)	7 (5.34)	0.501
Necrotizing enterocolitis	0 (0)	4 (3.05)	0.161
Other	4 (6.35)	4 (3.05)	0.280
Medication exposure n (%)			
Aminoglycosides	3 (4.76)	7 (5.79)	1.000
Diuretics	24 (38.62)	67 (55.37)	0.026
IV contrast	2 (3.17)	1 (0.83)	0.233
Clinical Outcomes n (%)			
Acute kidney injury	1 (1.59)	4 (3.31)	0.496
Blood stream infection	5 (7.94)	11 (9.09)	0.792
Respiratory tract infection	6 (9.52)	21 (17.36)	0.154
Urinary tract infection	2 (3.17)	8 (6.61)	0.329
Meningitis	1 (1.59)	2 (1.65)	0.973
Necrotizing enterocolitis	1 (1.59)	5 (4.17)	0.352
Soft tissue infection	5 (7.94)	4 (3.31)	0.167
Mortality	15 (23.81)	17 (14.05)	0.097

Conclusions

Development of a standardized guideline for LOS evaluation and empiric antibiotic utilization resulted in reducing vancomycin AUR, while not negatively affecting clinical outcomes or morbidities.

Reference

[1]*Schulman J, Dimand RJ, Lee HC, Duenas GV, Bennett MV, Gould JB. Neonatal intensive care unit antibiotic use. Pediatrics. 2015;135(5):826-833.*