



You need to just stop.

Missed stewardship opportunities to discontinue unnecessary vancomycin during pharmacist therapeutic drug monitoring

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Introduction

- Intravenous (IV) vancomycin has been a highly efficacious antimicrobial agent against increasing strains of methicillin-resistant *Staphylococcus aureus* (MRSA).
- Extensive use of vancomycin has created public health concerns as it can increase the risk of bacterial resistance patterns.
- The Centers for Disease Control (CDC) and Prevention reports a significant increase in vancomycin-resistant bacterial strains such as vancomycin-resistant *Staphylococcus aureus* (VISA) and vancomycin-resistant *Enterococcus faecium* (VRE) within the last decade.
- Unnecessary IV vancomycin exposure can also lead to increased adverse drug events.
- Nephrotoxicity is a notable adverse drug event which results in prolonged hospital length of stay.

Methods

Objectives

To determine the frequency and clinical components of inappropriate vancomycin continuation at the time of therapeutic dose monitoring (TDM).

Study Design

This medication use evaluation was a retrospective, observational cohort study at Henry Ford Hospital, a large, urban academic medical center in Detroit, Michigan and Henry Ford Wyandotte, a community hospital in southeast, Michigan from June 19, 2019 - June 30, 2019.

Inclusion Criteria

- Greater than or equal to 18 years old
- Administration of IV vancomycin for at least 3 days during hospitalization
- Re-dosed by a pharmacist

Exclusion Criteria

- Prophylactic vancomycin indication
- Vancomycin through a route other than intravenous

Data Collection and Endpoints

Data was collected from electronic medical records using a standardized case report form. Data collected included patient demographics, length of stay, vancomycin indication, duration of therapy, microbiology collection and results.

Analysis

Descriptive measures (incidence, proportions, measures of central tendency and dispersion) were used to evaluate the incidence of inappropriate vancomycin use at TDM.

Key Definitions:

Acute Kidney Injury (AKI): At time of re-dosing, AKI defined as an increase in SCr by ≥ 0.5 mg/dl within 48 hours; or increase in SCr to ≥ 1.5 x baseline, which is known or presumed to have occurred within the prior 7 days; or urine volume < 0.5 ml/kg/h for 6 hours.

Inappropriate Continuation of Vancomycin

- Documented VRE, MSSA
- De-escalation opportunities based on documented susceptibilities
- Microbiological cultures containing only Gram-negative bacteria and/or anaerobes
- Cultures with no growth
- Negative MRSA nares in community-acquired pneumonia (CAP) and hospital-acquired pneumonia (HAP) diagnosis

Appropriate Continuation of Vancomycin

- Documented MRSA
- Purulent skin and soft tissue infection without documented culture
- Patient on vasopressors (epinephrine, norepinephrine, phenylephrine, vasopressin) during vancomycin re-dosing without reason for de-escalation

Results

Baseline Patient Characteristics

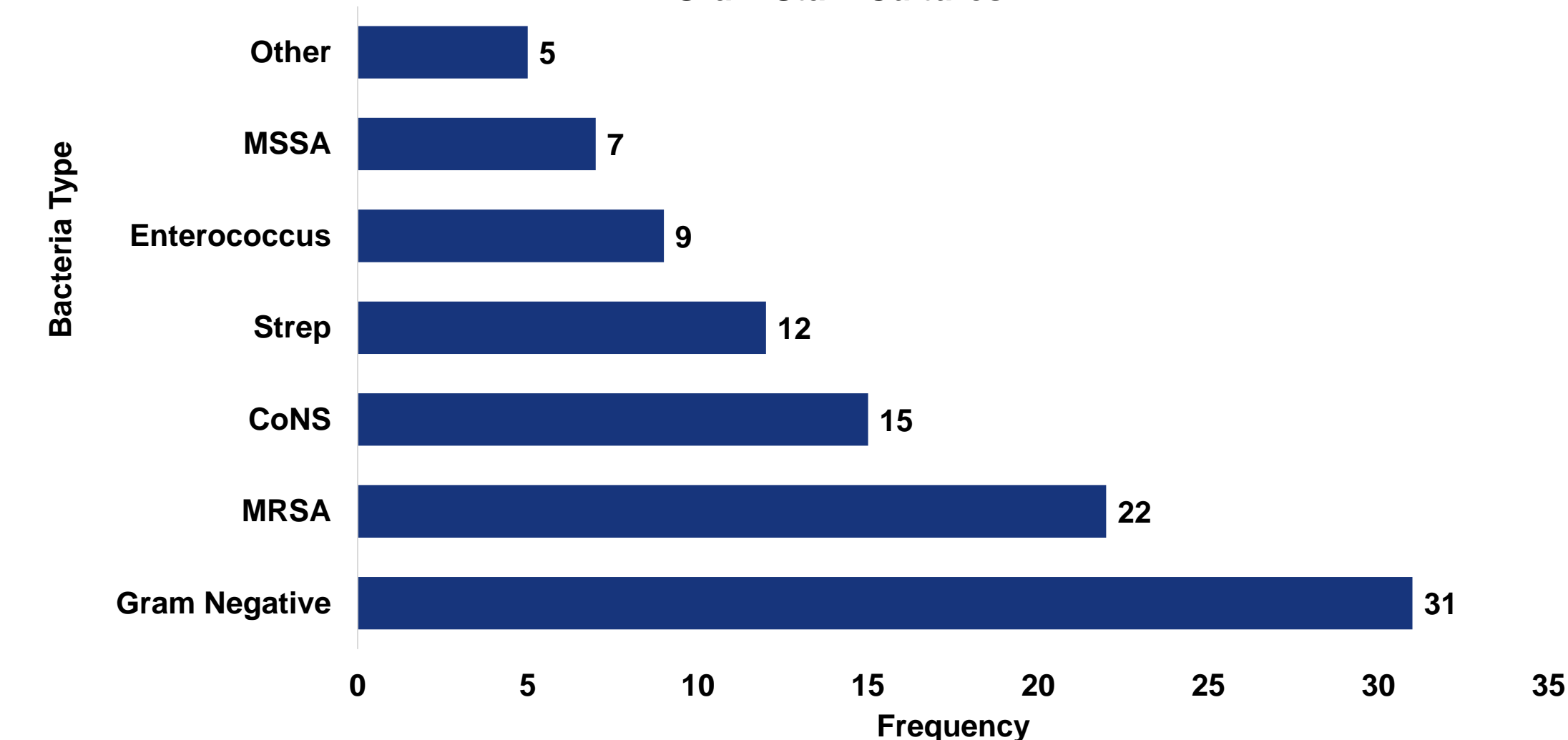
- The Last Great American Dynasty -

Demographics	n = 167
Median Age (years), (IQR)	60 (45-70)
Male, n (%)	103 (61.7%)
Immunocompromised, n (%)	35 (21%)
TDM in ICU, n (%)	64 (38.3%)
TDM in GPU, n (%)	103 (61.7%)

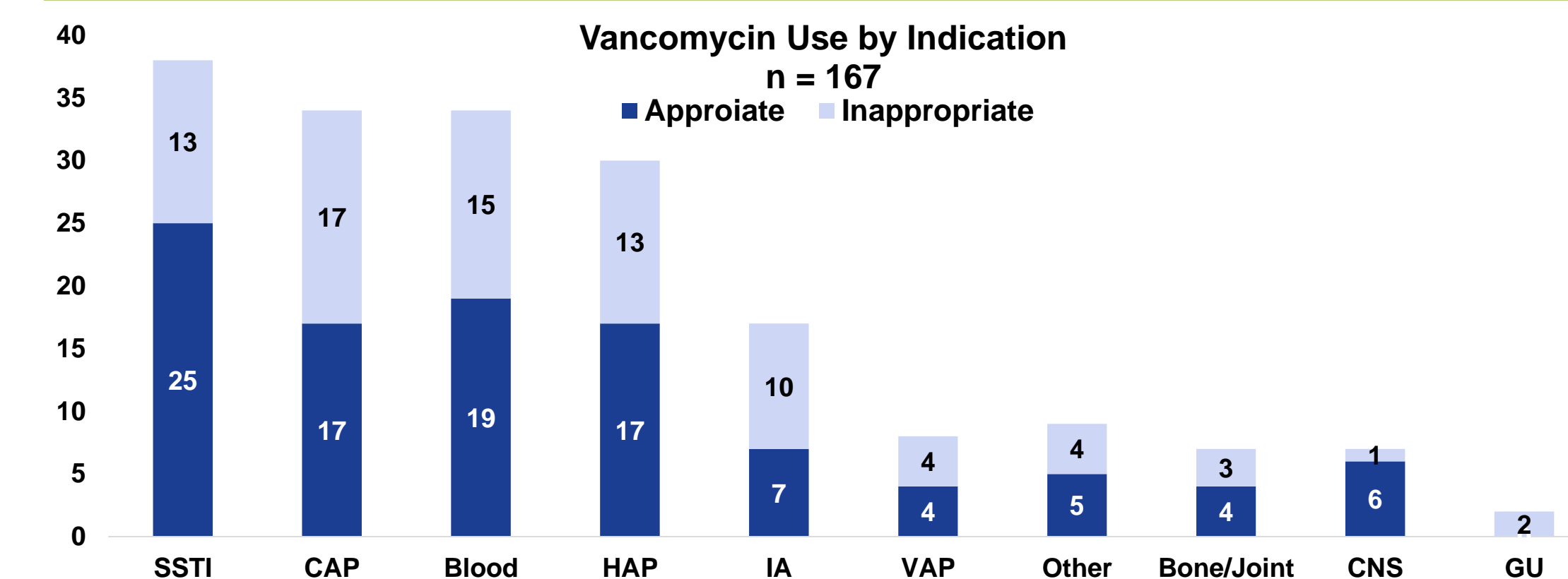
Culture Data

Culture Type	Frequency n = 167 (%)	- I Forgot That You Existed -			
		MRSA Nares	HAP	CAP	Total
No Growth	114 (68.3%)				
Gram Positive Growth	45 (26.9%)				
Gram Negative Growth	26 (15.6%)				
Combination Growth	10 (6%)				
		Indicated	19	25	44
		Completed (%)	2 (11%)	16 (64%)	18 (41%)
		Positive MRSA	1 (50%)	0	1 (12.5%)

- I Knew You Were Trouble - Gram Stain Cultures



- Illicit Affairs - Vancomycin Therapy



- Look What You Just Made Me Do - Vancomycin Use Assessment

Vancomycin Use	Appropriate n=93 (55.7%)	Inappropriate n=74 (44.3%)	P - Value (95% CI)
Total Days Assessed n (%)	679 (75%)	226 (25%)	-
Median Duration (Days), (IQR)	4 (3-5)	5 (4-8)	0.017 (0.201 - 1.982)
Median Excess Duration (Days), (IQR)	N/A	2 (1-4)	-
Development of AKI, n (%)	14 (15.1%)	13 (17.6%)	0.389
Most Frequent Diagnosis, n (%)	SSTI 25 (26.9%)	CAP 17 (23%)	0.44

Vancomycin Use	Academic Medical Center	Community Hospital	P - Value (95% CI)
Appropriate Therapy	64 (54.7%)	29 (58%)	0.694

- Should've Said No -

Vancomycin was continued inappropriately in 44.3% of patients assessed

Conclusion

- There are opportunities for pharmacy and antibiotic stewardship involvement at the time of vancomycin TDM to decrease inappropriate vancomycin use.
- The findings serve as a reminder that AKI is a common adverse effect due to vancomycin.
- Pneumonias were the most common indication for vancomycin, and it was also the indication with the most inappropriate use in this patient population.
- MRSA nares is underused but could escalate discontinuation of inappropriate vancomycin.

Resources

Liu C. Clinical practice guidelines by the infectious diseases society of america for the treatment of methicillin-resistant staphylococcus aureus infections in adults and children: Executive summary. *Clinical infectious diseases*. 02/2011;52(3):285-292. doi:10.1093/cid/cir034. Accessed at: <https://academic.oup.com/cid/article/52/3/e18/306145>.
Pew Research Center. Trends in U.S. Antibiotic Use. Center for Disease Control and Prevention. 03/2017. Updated 08/2018. Accessed at: <https://www.pewtrusts.org/en/research-and-analysis/issue-briefs/2017/03/trends-in-us-antibiotic-use>.