Examining Vancomycin Prescription Patterns at ARMC

Elena Stains, Jennah Syed, Mitchell Warman, David Zhang,
Joseph Reilly, Pharm D., BCGP, Vikram Lal, DO

AtlantiCare Regional Medical Center, Pomona, N.J., U.S.A.

Introduction

- Infections from Methicillin-Resistant Staphylococcus aureus (MRSA) cause approximately 11,000 deaths annually in the United States (1).
- Overuse of antibiotics in the healthcare setting contributes to multidrug resistant bacteria and has potential side effects for patients.
- Vancomycin is an antibiotic frequently prescribed for bacterial infections when the suspected pathogen is Methicillin-Resistant Staphylococcus aureus (MRSA) or Enterococcus (2). Concern for vancomycin-resistant infections is growing as resistant enterococci become more common (3).
- Our primary objective is to evaluate both the empiric prescribing and continued administration of intravenous vancomycin at ARMC based on published guidelines in order to determine appropriateness of prescribing in our patient population

AIM Statement

Reduce unnecessary vancomycin prescription among inpatient units at ARMC by 30% by 2025.

Methods

Patients admitted to ARMC and started on the pharmacy-managed vancomycin protocol during an 8-week period were included in our analysis. Provider initiated protocol orders for IV vancomycin were identified from a daily report generated from Cerner Discern Analytics. Investigators analyzed patient demographics, laboratory values, cultures and sensitivities, provider decision-making, and other contributing variables in real-time to determine two outcome measures:

(1) Whether empiric vancomycin was appropriate for each patient based on published guidelines from Infectious Diseases Society of America (IDSA) and / or ARMC hospital policy or guidelines regarding the necessity of MRSA coverage for each indication.

(2) Whether the continued use of vancomycin exceeding 3 days was appropriate in each case as determined by study investigators

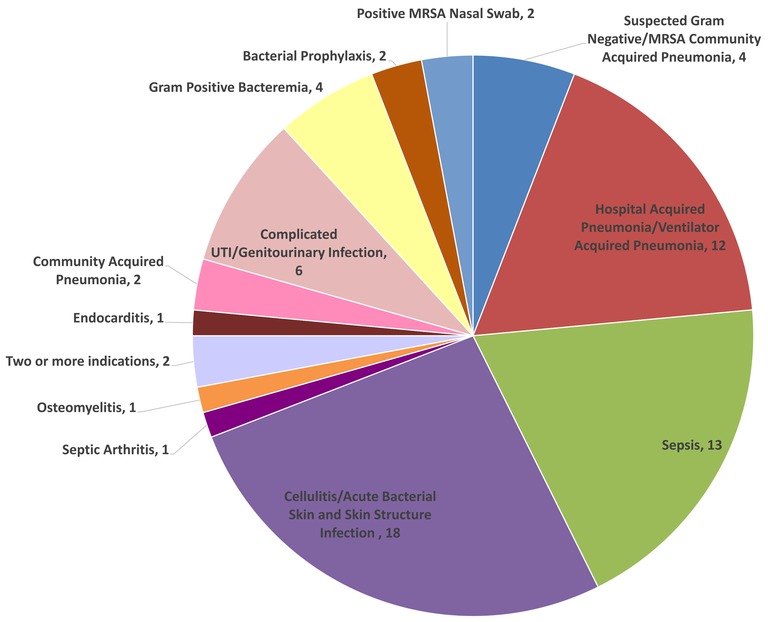
Patients prescribed empiric vancomycin were put into categories of either indicated (appropriate), not indicated, or undefined as determined by investigators. Furthermore, included patients who continue vancomycin for 4 days or more were also categorized in the same fashion.

The prescribing of vancomycin was deemed inappropriate (not indicated) when: empiric vancomycin use for community acquired infections in patients without risk factors for MRSA or enterococcus when beta lactam therapy would have been a viable option; continued vancomycin treatment when patient characteristics, cultures, or MRSA nasal swabs suggest it is not warranted; blood culture with *S. epidermidis* suggesting contamination instead of bacteremia; investigator determined based on overall clinical assessment.

Results

Table 1. Patient Characteristics & Findings (n=69)	
Average age in years – no. ± SD	67.3 ± 16.9
Male – no. (%)	42 (60.9%)
Penicillin Allergy – no. (%)	11 (15.9%)
Vancomycin administration >48 hrs – no. (%)	13 (18.8%)
Average duration of vancomycin treatment – no. (days)	4.95 ± 2.12

Figure 1. Number of Patients Started on Vancomycin By Indication



Results

Figure 2a. Appropriateness of Starting Vancomycin (Percentage of Patients)

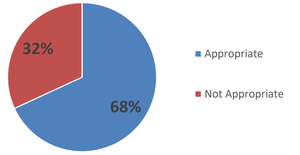


Figure 2b. Appropriateness of Continuing Vancomycin after Appropriately Starting (Percentage of Patients)

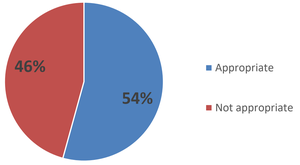
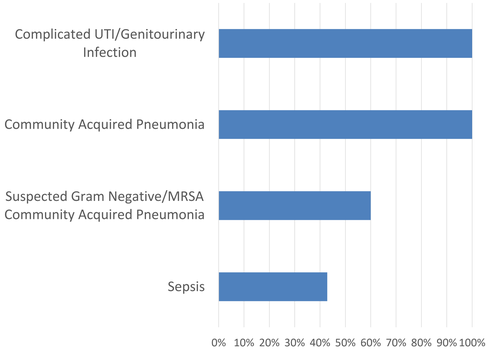


Figure 3. Top 4 Inappropriate Indications--Percentage of Cases Deemed Inappropriate for Vancomycin



Conclusion

- The most common reason for empiric IV vancomycin in ARMC was cellulitis or acute bacterial skin infections with the next most common being sepsis and hospital or ventilator acquired pneumonia.
- Overall, vancomycin was deemed appropriate in 68% of the patients included in the study and it was found that continuing vancomycin after three days was appropriate in 54% of the cases.
- The most common cause for inappropriate empiric vancomycin was complicated UTI/genitourinary infection. UTIs are rarely due to a MRSA, so other empiric agents should be given for UTIs if MRSA is not suspected.
- CAP cases were also found to be a common cause of inappropriate empiric vancomycin. MRSA is a rare source of CAP and if the patient has not had any recent hospitalizations or history of MRSA infection, vancomycin is not the empiric choice to treat CAP.
- Because of the risk of resistance to vancomycin within our hospital system, it is important to critically analyze the appropriateness of beginning vancomycin when the literature does not suggest benefit in doing so. In the future, this data can be used to educate providers and encourage consideration to the appropriate antibiotic for specific sources of infection. From there, further studies can be done to determine if the rate of unnecessary vancomycin use within ARMC has decreased.

References

1. "MRSA Blood Infections Are Less Fatal in Kids, vs. Adults, but Cause Significant Complications." *Children's National Hospital*, childrensnational.org/news-and-events/childrens-newsroom/2017/mrsa-blood-infections-are-less-fatal-in-kids-vs-adults-but-cause-significant-complications. Accessed 9 Aug. 2023.
2. Gruenberg K. Specialized Medications Used Against Bacteria: Bacitracin, Mupirocin, Clindamycin, Metronidazole & Tinidazole, Vancomycin, Bezlotoxumab. In: Papadakis MA, McPhee SJ, Rabow MW, McQuaid KR, Gandhi M. eds. *Current Medical Diagnosis & Treatment 2024*. McGraw Hill; 2024. Accessed August 13, 2023. https://accessmedicine-mhmedical-com.gcsom.idm.oclc.org/content.aspx?bookid=3343&sectionid=279857013

3. Miller WR, Murray BE, Rice LB, Arias CA. Resistance in Vancomycin-Resistant Enterococci. *Infect Dis Clin North Am*. 2020;34(4):751-771. doi:10.1016/j.idc.2020.08.004