Evaluation of Empiric Vancomycin Utilization at 72 Hours Post Admission: is De-escalation of Vancomycin Appropriate?

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BACKGROUND

- One-third of antibiotic prescriptions in hospitals involve potential prescribing problems such as giving an antibiotic without proper testing or evaluation, prescribing an antibiotic unnecessarily, or giving an antibiotic for too long.[1]
- The Centers for Disease Control and Prevention (CDC) established guidelines for appropriate use of vancomycin, which includes serious infections caused by beta-lactam resistant gram-positive bacteria or patients with serious allergies to beta-lactam antimicrobials.[2]
- A 2016 CDC study found that rates of vancomycin use increased by 32% within United States hospitals from 2006-2012.[3]
- Studies have shown vancomycin is commonly prescribed inappropriately, and often is continued without proper clinical indications. [4,5]

STUDY PURPOSES

- Evaluate the indication/clinical appropriateness of the continuation of empiric vancomycin therapy.
- Confirm the final microbiology results requiring vancomycin therapy.
- Examine a 72-hour time-out as an effective de-escalation intervention.

METHODS

- Retrospective cohort study from January 2018- October 2018.
- Data collected from the electronic medical record from two community hospitals, Chandler Regional Medical Center and Mercy Gilbert Medical Center.
- Institutional Review Board approved.

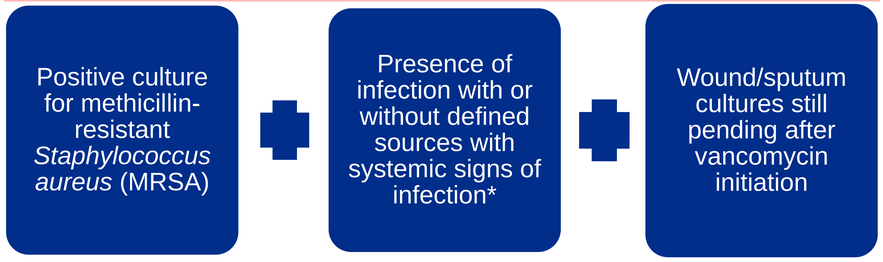
Inclusion Criteria

- Adult patients >18 years old
- Received at least 3 days of empiric vancomycin therapy during hospital admission

Exclusion Criteria

- Immunocompromised
- Pregnant
- End-Stage Renal Disease on hemodialysis
- Received vancomycin for surgical prophylaxis
- Expired within 72 hours of vancomycin initiation

Figure 1. Criteria for Appropriate Vancomycin Continuation at 3 days Post-Admission



*White Blood Cells <4,000 or >12,000 and/or Temperature ≥ 37.5°C

RESULTS

Figure 2. Vancomycin Indications at Day 3 Post-Admission

Vancomycin Indication	Day 3 Post-Admission		
	Number Patients (N= 160) (%)	Appropriate per criteria (%)	Wound/tissue/ sputum cultures pending (%)
Positive blood culture	20 (13%)	17 (85%)	N/A
Skin and Soft Tissue Infection (SSTI)	82 (51%)	54 (65%)	23 (28%)
Pneumonia (PNA)	37 (23%)	30 (81%)	11 (29%)
Osteomyelitis	5 (3%)	5 (100%)	2 (40%)
Joint Infection	6 (4%)	4 (66%)	2 (66%)
Urinary Tract Infection (UTI)	3 (2%)	2 (66%)	N/A
Intra-abdominal Infection	4 (2%)	3 (75%)	2 (50%)
Other	3 (2%)	3 (100%)	1 (33%)

Figure 3. Final Microbiology Results

Pathogen	Number of Patients (%)	Pathogen	Number of Patients (%)
MRSA/MRSE*	36 (23%)	**Gram-negative organisms**	7 (4%)
Other *Staphylococcus* spp.§	28 (18%)	**Other (i.e. *Micrococcus* spp.)**	3 (2%)
***Streptococcus* spp.**	6 (3%)	**No pathogen isolated**	80 (50%)

*methicillin-resistant *Staphylococcus epidermidis* (MRSE), §methicillin-sensitive *Staphylococcus* spp.

Figure 4. Multivariate Logistic Regression Model Predicting Inappropriate use of Vancomycin at Day 3 Post-Admission

	Estimate	Odds Ratio (95% Confidence Interval)	P-value
American Indian/Alaskan Native	1.102	3.01 (1.21, 7.53)	0.0174
SSTI Diagnosis	1.056	2.87 (1.24, 6.80)	0.0147

RESULTS (continued)

- 118 of 160 patients (74%) met appropriate criteria for vancomycin continuation at 3 days post-admission. Of these 118 patients:
  - 91 (77%) had an infectious diseases consult by day 3 of hospital admission (p= 0.82).
  - 72 patients (61%) had MRSA risk factors (p= 0.99).
  - 21 patients (13%) had a culture that was obtained after 72 hours of empiric vancomycin therapy.
- 44 of 160 patients (28%) had pending cultures at 72 hours, and 23 patients (14%) had a known non-MRSA pathogen at time of assessment.
- Baseline patient characteristics were well-matched between appropriate versus inappropriate per criteria except for Alaskan Native/Native American race (16 patients [14%; p= 0.02]).

CONCLUSIONS

- Approximately 25% of patients receiving empiric vancomycin therapy did not meet clinical criteria for continuation beyond 72 hours.
- Skin and soft tissue infections (SSTI) were the indication most associated with continued vancomycin utilization beyond 72 hours.
- Although patients were identified as meeting criteria for appropriate continuation of vancomycin at 72 hours post admission, there still may have been an opportunity to discontinue vancomycin.
- Timely culture obtainment and antibiotic de-escalation intervention once another pathogen is identified are possible strategies to ensure effective vancomycin de-escalation at a 72-hour antibiotic time-out.
- Our results identified indications in which empiric vancomycin prescribing can be optimized, and a 72-hour antibiotic time-out may be warranted as a stewardship intervention.

REFERENCES

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