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Evaluation of a pharmacy managed vancomycin dosing protocol for critically ill adult patients requiring continuous renal replacement therapy (CRRT) at a community hospital

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OBJECTIVE

The purpose of this medication use evaluation (MUE) was to evaluate a pharmacy managed vancomycin dosing protocol for patients on CRRT patients in a community hospital.

BACKGROUND

- Vancomycin is a key antimicrobial agent for the treatment of Gram-positive bacterial infections.[2]
- Medication dosing in patients requiring continuous renal replacement therapy (CRRT) for acute or acute on chronic renal failure has been a focus in literature in the last decade.
- It is known that the type of CRRT technique, rate of volume removed, and interruptions of therapy can make dosing in this patient population challenging.
- In 2020, Infectious Diseases Society of America published clinical practice guidelines for the monitoring of vancomycin, outlining vancomycin dosing in CRRT.[1]
- Current institution protocols dose vancomycin in CRRT/CVVH by giving a loading dose of 20 mg/kg (max: 2,500 mg) and give subsequent doses based on random vancomycin levels at the pharmacist's discretion.

METHODS

- **Study Design:** Retrospective chart review was used to identify critically ill adult patients admitted who received two or more doses of intravenous vancomycin therapy while on CRRT between January 7, 2018 and May 24, 2020.
- **Institutional Review Board (IRB) Approval:** Parkview Health IRB approved this quality improvement project.
- **Inclusion criteria:** Patients who received two or more doses of intravenous vancomycin whilst on CRRT.
- **Exclusion criteria:** Patients were excluded if they were receiving hemodialysis prior to or during admission, had multiple instances of CRRT during the admission, or had greater than 8 vancomycin levels drawn.
- **Primary outcome:** The primary outcome was percent of patients with a therapeutic vancomycin level at any point of their admission based on indication for use

RESULTS

Table 1: Baseline Demographics

Characteristics	Sepsis n= 42	Pneumonia n= 13	Other Indications n= 7
Age, Years, Average (SD)	64.6 (11.89)	67.2 (11.36)	63.3 (16.88)
Male, n, (%)	24 (57)	5 (38)	4 (57)
Hospital LOS, Days, Average (SD)	11.6 (7.99)	11.1 (9.78)	23.4 (16.50)
ICU LOS, Days, Average (SD)	8.83 (6.08)	9.11 (9.31)	15.7 (10.22)
Vancomycin Orders per patient, Average (SD)	3.36 (2.00)	3.85 (2.41)	8.29 (10.70)
SCr prior to CRRT, mg/dL, Average (SD)	5.38 (3.33)	3.6 (1.45)	4.22 (2.07)
Albumin prior to CRRT, g/dL, Average (SD)	2.8 (0.62)	2.76 (0.82)	2.47 (0.49)

Figure 1: Vancomycin Treatment Indication

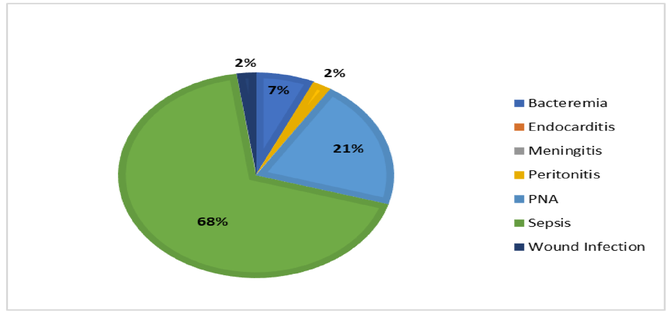


Figure 2: Percent of Patients Reaching Therapeutic Goals by Number of Levels Drawn

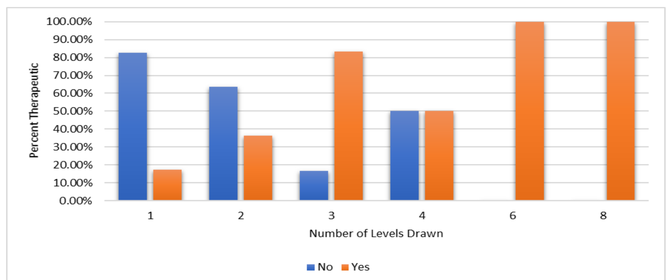
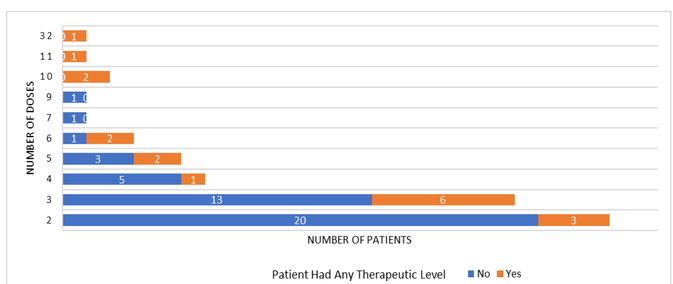


Figure 3: Number of Patients With Therapeutic Levels by Number of Doses Given



OUTCOMES

- The indication for vancomycin was sepsis in 68% of cases. CRRT was initiated in 71% of patients after a vancomycin administration. Patients received an average of 4 vancomycin doses during admission.
- 29% of total patients achieved a therapeutic vancomycin level during admission. Of those with a therapeutic level, 67% were being treated for sepsis with a goal of 15 to 20 mcg/mL
- 71% of total patients failed to achieve a therapeutic vancomycin level during admission.
  - Of patients without a therapeutic level, 45% received 2 doses and 30% received 3 doses.
  - On average, patients without a therapeutic level only had 1 level drawn and 34% of patients had no levels drawn during therapy.

DISCUSSION & CONCLUSIONS

- The evaluation of a pharmacy managed vancomycin dosing protocol on CRRT patients was inconclusive due to the duration of vancomycin therapy.
- Patient culture data was collected and assessed to determine if vancomycin therapy was indicated. The cultures included within our research were *Staphylococcus aureus* (MRSA) or *Staphylococcus* with a positive mecA (methicillin resistance) gene and *Enterococcus faecalis*.
- Based on culture results, it can be presumed that vancomycin was initiated for empiric therapy and then de-escalated in most cases.
- In patients that did not obtain a therapeutic level, the number of vancomycin doses received was less than required to reach steady state.
- A future direction to assess the vancomycin dosing protocol would be to evaluate patients with a confirmed indication for prolonged vancomycin therapy.

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Disclosure
The authors of this presentation have the following to disclose concerning possible financial or personal relationships with commercial entities that may have a direct or indirect interest in the subject matter of this presentation:
Fulton: Nothing to disclose | Mills: Nothing to disclose | Ferrell: Nothing to disclose | Todt: Nothing to disclose | Gaul: Nothing to disclose