

Assessing Dosing Practices of Vancomycin in the Emergency Department (ADVICE)



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Background

- Vancomycin has a narrow therapeutic index, and may result in adverse effects with errors in dosing and administration.
- A Vancouver Coastal Health/Providence Health Care vancomycin empiric dosing guidelines exists to aid clinicians.
- Judicious use of vancomycin and standardized dosing through appropriate use of institutional protocols may result in improved patient care and reduced antimicrobial resistance.

Objectives

- Primary Objective:** Characterize the nature of vancomycin dosing practices
- Secondary Objective:** Identify areas for optimization of vancomycin dosing practices

Methods

- Design:** Single centre, retrospective chart review
- Inclusion Criteria:** Age 19-89, admitted from St. Paul's Hospital Emergency (June 1, 2016 to July 18, 2017)
- Exclusion Criteria:** Discontinuation of vancomycin pre-1st maintenance dose, left against medical advice, patient who received PO vancomycin, no weight available during hospitalization, clinical pharmacy intervened for either load or 1st maintenance
- Primary Outcomes:**
 - Proportion of initial dosing accuracy of vancomycin
 - Proportion of correct dosing interval
- Secondary Outcomes:**
 - Proportion of patients with >60 mins delay from when initial loading dose ordered to when administered
 - Proportion of patients with dosing administration errors as defined by either >60 mins deviation from prescribed time from load to maintenance, or unintentional omission of 1st maintenance
 - Student's t-test for association of patient specific factors (weight, age) with deviation from dosing protocol

Parameter	Mean (standard deviation)	Median (IQR)
Age	51 (16)	
Weight (kg)	71.5 (18.8)	
Male sex (%)	66 (NA)	
Serum creatinine (mcmol/L)		79 (43)
Creatinine clearance (mL/min)		74 (52)

Table 1: Baseline Characteristics (n = 197)

Results

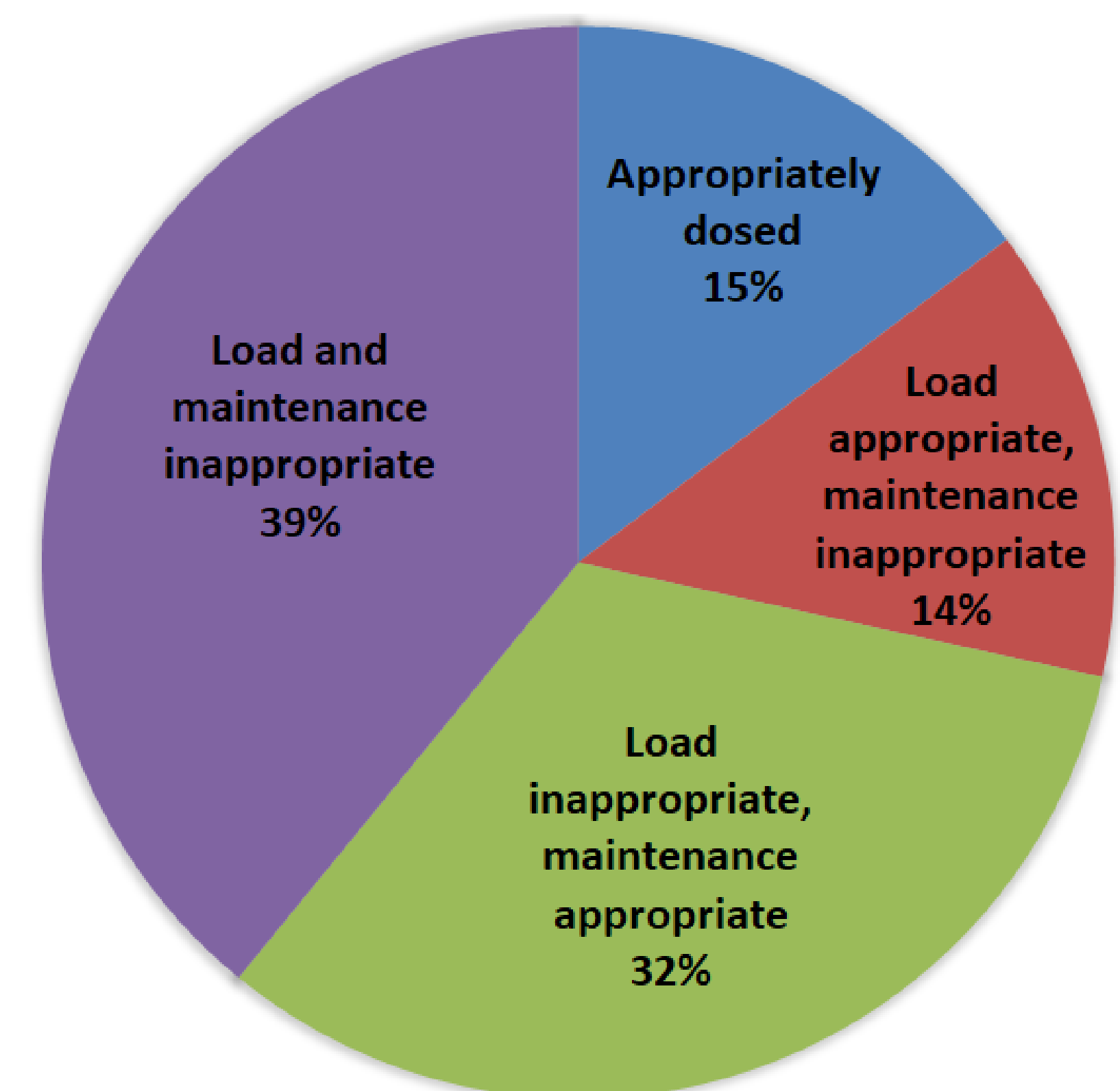


Figure 1: Vancomycin Initial Dosing Accuracy Trends

Dosing condition	Percentage of patients (%)
Underloaded	36
Overloaded	23
Undermaintained	21
Overmaintained	15

Table 1: Proportions of Patients According to Dosing Conditions

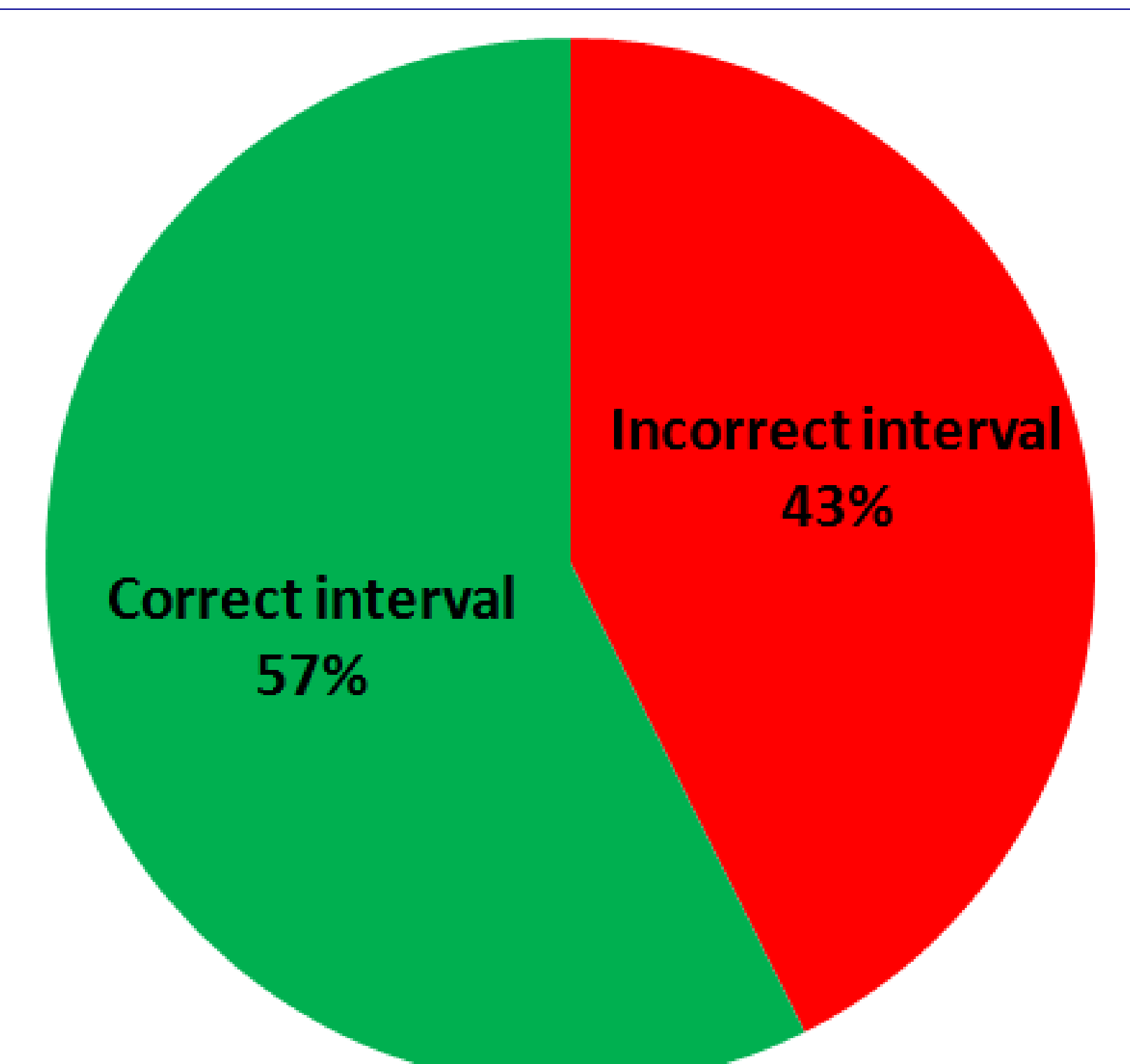


Figure 2: Proportions of Prescribed Vancomycin Dosing Interval According to Patient's Serum Creatinine

Parameter	No. patients (%)
Time (mins) from load to maintenance less than 60 mins deviation from prescribed frequency	67 (34.0)
Time (mins) from load to maintenance more than 60 mins deviation from prescribed frequency	73 (37.1)
Maintenance dose was not administered	57 (28.9)

Table 2: Vancomycin Administration Practices

Parameter	Median (IQR)
Time from STAT order to administration of loading dose	69 (83)
Time deviation from load to 1 st maintenance dose	90 (210)

Table 3: Time Deviation from STAT Order For Vancomycin (<60 mins order to administration), and Prescribed Vancomycin Frequency

Dosing condition	Mean weight in kg (standard error)	p-value	Mean age (standard error)	p-value
Underloaded	79.1 (2.3)	0.0015	55 (2.0)	0.29
Overloaded	63.4 (1.9)	0.34	51 (2.4)	0.85
Undermaintained	85.2 (3.0)	0.000034	49 (1.8)	0.62
Overmaintained	63.5 (2.7)	0.42	46 (2.5)	0.32
Appropriately dosed	66.8 (2.9)	NA	51 (3.2)	NA

Dosing condition	Median SCr in mcmol/L (IQR)	Mean age (standard error)
Correct ordered interval	113 (78)	51 (14)
Incorrect ordered interval	90 (210)	52 (19)

Table 4: Association of Patient Factors With Deviations from Dosing Protocol

Limitations

- Retrospective chart review design
- Clinical endpoints not evaluated due to insufficient sample size
- Maintenance dosing interval chosen may have taken into account changing renal function

Conclusions

- Initial vancomycin dosing for St. Paul's Hospital Emergency Department patients is suboptimal
 - Results mirror previous ED vancomycin studies
- More than half of patients had correct initial dosing frequency of vancomycin
- Embedded interventions in computerized provider order entry and education could improve adherence to protocol