

Correlations of Vancomycin Clearance During Intermittent Infusion with Measured and Estimated Creatinine Clearance in Critically Ill Patients: 6-Hour Urine Collection May Be Beneficial

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BACKGROUND

Although vancomycin dosing recommendations are based on creatinine clearance estimated using the Cockcroft–Gault formula, it may not be optimal for critically ill patients due to their physiologic changes. A direct measure of creatinine clearance can provide more accurate information on renal function and dose adjustment of vancomycin.

OBJECTIVES

The objective of the this study is to determine vancomycin clearance during intermittent infusion and to explore its correlations with measured and estimated creatinine clearance in critically ill patients with normal renal function.

METHODS

Twenty critically ill patients with normal renal function who received treatment with vancomycin intermittent infusion were enrolled.

Vancomycin clearance (CL_{van}) was determined 1 to 2 times for each patient during the study (N=32).

Vancomycin clearance correlation with measured creatinine clearance in a 6-hour urine (CL_{6-h}) and estimated creatinine clearance from the Cockcroft–Gault formula (CL_{CG}) was investigated.

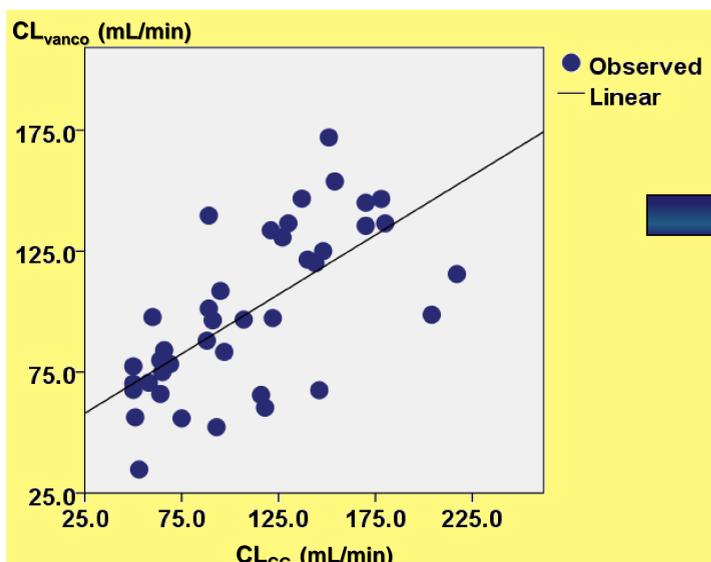
RESULTS

Data analysis revealed that CL_{6-h} is a stronger predictor of CL_{van} rather than CL_{CG} (Pearson coefficient correlation = 0.83 versus 0.67; $P < 0.001$). The relationship between CL_{van} and CL_{6-h} was utilized to develop the following equation to estimate clearance of vancomycin in the critically ill patients without renal impairment: CL_{van} (mL/min) = 26.55 + 0.73 CL_{6-h} (mL/min).

Characteristics of patients	Range
Male (number)	16
Female (number)	4
Age (years)	46.8 ± 19.8
BMI (kg/m ²)	24.0 ± 2.8
eGFR (mL/min)	108.0 ± 44.3
APACHE II score	12.7 ± 5.0

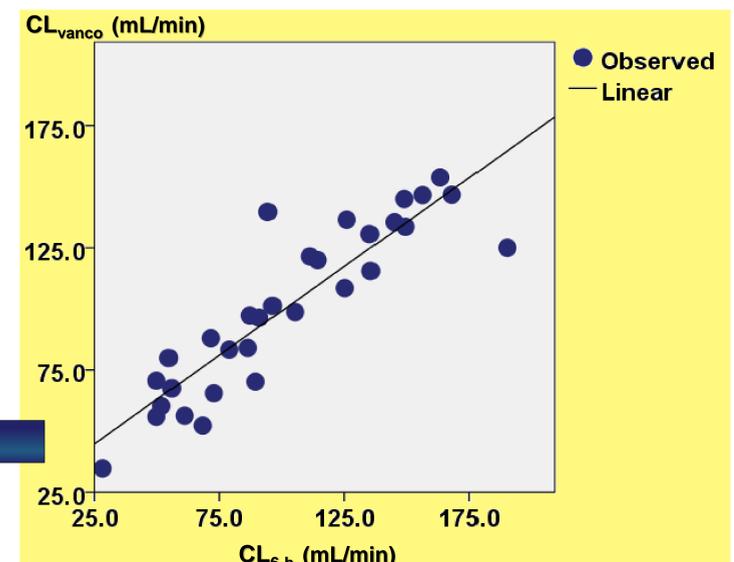
eGFR: estimated glomerular filtration rate
APACHE: acute physiology and chronic health evaluation

Clearance (mL/min)	Mean (statistic)	Std. Deviation (statistic)	Variance (statistic)
CL_{CG}	108.0	44.3	1966.0
CL_{6-h}	106.1	44.4	1978.2
CL_{van}	102.2	31.0	965.7



$$Y = 26.55 + 0.73 X$$

$P < 0.001$



CONCLUSIONS

Measured creatinine clearance estimated from a 6-hour urine collection is a simple test that provide more reliable and practical information compared to the Cockcroft–Gault formula for vancomycin dose adjustment in critically ill patients with normal renal function.