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#### Background and importance:

This retrospective study aimed to assess the utility of renal glomerular filtration rate (GFR) estimation formulas, including Cockcroft-Gault (CG), Modification of Diet in Renal Disease (MDRD-4), and Chronic Kidney Disease Epidemiology (CKD-EPI), in the pharmacokinetic monitoring of vancomycin.

#### Aim and objectives

The study aimed to evaluate the correlation between estimated GFR using different formulas and the actual clearance of vancomycin in patients, providing valuable insights for pharmacokinetic monitoring and dosing adjustments.

#### Material and methods

- ❖ Retrospective study (October 2022 - March 2023) on patients monitored by the Clinical Pharmacokinetics Unit during vancomycin treatment.
- ❖ Inclusion criteria: age  $\geq 18$ ,  $\geq$  two vancomycin trough plasma concentrations ( $C_{min}$ ), and stable serum creatinine ( $\pm 0.5$  mg/dL) during monitoring.
- ❖ Recorded variables: gender, age, weight(kg), height(cm), serum creatinine mg/dL, estimated glomerular filtration rate (eGFR) (mL/min) using various formulas, observed vancomycin  $C_{min}$ (mcg/mL), and predicted  $C_{min}$ (mcg/mL) based on Bayesian adjustment (software: Mw-Pharm++®).
- ❖ Linear regression analyzed the relationship between initial estimated vancomycin plasma clearance ( $Cl_p$ ) using eGFR data and patient's actual  $Cl_p$  obtained through Bayesian estimation (considering monitored vancomycin concentrations).

#### Results:

- A total of 34 patients were recruited (65.70% males, mean age  $\pm$  standard deviation:  $68.06 \pm 16.89$  years).
- The mean estimated glomerular filtration rate(GFR) values were:  $84.44 \pm 49.87$  mL/min,  $116.23 \pm 52.95$  mL/min,  $91.53 \pm 28.22$  mL/min for the CG, MDRD-4, and CKD-EPI formulas, respectively.
- The mean observed vancomycin  $C_{min}$  in the second analytical determination was  $16.13 \pm 6.56$  mcg/mL.
- The mean predicted  $C_{min}$  values were  $17.15 \pm 8.08$  mcg/mL,  $14.03 \pm 8.26$  mcg/mL, and  $14.57 \pm 7.56$  mcg/mL for the CG, MDRD-4, and CKD-EPI formulas, respectively.
- Based on the coefficients of determination calculated from the regression lines, 83%, 76%, and 86% of the variations found in the actual vancomycin clearance can be explained by variations in the estimated clearance using GFR data obtained with the CG, MDRD-4, and CKD-EPI formulas, respectively.

#### Conclusion and relevance:

- In this study, the Cockcroft-Gault and CKD-EPI formulas exhibited better correlation with actual vancomycin clearance compared to MDRD-4.
- The findings suggest a potential risk of overdosing when using MDRD-4.
- Although initial vancomycin dosing based on estimated GFR formulas provides a reasonable approach, pharmacokinetic monitoring of plasma concentrations remains a safer approach for antibiotic dosing.



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SYSTEMIC USE