

Assessing nephrotoxicity associated with different vancomycin dosing modalities in obese patients at a community hospital

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OBJECTIVE

To evaluate the association of nephrotoxicity in obese patients receiving vancomycin with AUC-based dosing compared to trough-based dosing

BACKGROUND

Vancomycin requires therapeutic drug monitoring (TDM) based on its pharmacokinetic properties.¹ Guidelines have shifted to analyzing area under the curve over 24 hours rather than trough concentrations due to nephrotoxicity concerns and correlation to efficacy.¹⁻³

Sinha and colleagues demonstrated an independent association of vancomycin and acute kidney injury (AKI) in a meta-analysis (RR 2.45, 1.69-3.55) with typical AKI development within 4-17 days after vancomycin initiation.⁴

Obesity is one of the various risk factors that have been established for vancomycin-associated nephrotoxicity. Other risk factors include concurrent nephrotoxic medications, pre-existing renal dysfunction and critical illness.⁵

Vancomycin-associated nephrotoxicity in obese patients has been attributed to increased drug exposure as dosing calculations are based on actual body weight and as volume of distribution does not increase with weight in a proportional manner.⁶

DEFINITIONS

Nephrotoxicity	Target TDM Attained
Primary Outcome (KDIGO): <ul style="list-style-type: none"> ↑ SCr ≥ 0.3 mg/dL within 48 hours Secondary Outcome (RIFLE): <ul style="list-style-type: none"> ↑ SCr ≥ 2 times baseline within 1-7 days persisting for ≥ 24 hours 	AUC-based dosing: <ul style="list-style-type: none"> 400-600 mg*h/L Trough-based dosing: <ul style="list-style-type: none"> 10-20 mg/L 15-20 mg/L for severe infections
Total Daily Dose (TDD) of Vancomycin	Obesity Class
Total milligrams of vancomycin received within a 24-hour period	Class I (BMI 30.0-34.9 kg/m ²) Class II (BMI 35.0-39.9 kg/m ²) Class III (BMI ≥ 40.0 kg/m ²)

METHODS

Retrospective, observational, single-centered study divided into two cohorts; one including patients evaluated for therapeutic targets based on trough dosing (February 2017-February 2019) and one including patients evaluated for therapeutic targets based on AUC dosing (March 2019-August 2020).

Inclusion Criteria	Exclusion Criteria
<ul style="list-style-type: none"> Age ≥ 18 years old Vancomycin continued for ≥ 48 hours BMI ≥ 30 kg/m² 	<ul style="list-style-type: none"> Documented patient allergies to glycopeptides Pregnant or breastfeeding patients Baseline hemodialysis patients Patient received prior vancomycin doses at outside facility

OUTCOMES

Primary Outcome	Secondary Outcomes
<ul style="list-style-type: none"> Nephrotoxicity (KDIGO definition) occurring after vancomycin initiation 	<ul style="list-style-type: none"> Nephrotoxicity (RIFLE definition) occurring after vancomycin initiation Total daily dose of vancomycin Target therapeutic drug monitoring attained

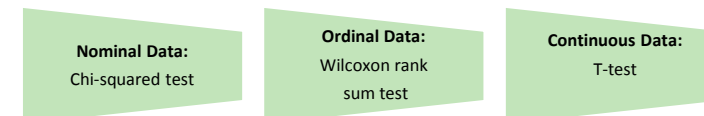
DATA COLLECTION

Demographics	Nephrotoxicity	Dosing & Monitoring
<ul style="list-style-type: none"> Age Gender Height Actual body weight Ideal body weight Adjusted body weight BMI ICU v. ward 	<ul style="list-style-type: none"> SCr on admission SCr after 48h of vancomycin Concurrent nephrotoxic medications 	<ul style="list-style-type: none"> Loading Dose TDD of vancomycin

DATA COLLECTION

Data will be collected utilizing a chart review process of the electronic medical record of obese patients receiving vancomycin for at least 48 hours

STATISTICAL ANALYSIS



The criterion for significance is set at an *a priori* value of $p \leq 0.05$

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DISCLOSURES

The authors of this presentation have the following to disclose concerning possible financial or personal relationships with commercial entities:

No authors have any disclosures.