

Characterization of Vancomycin Dosing and Pharmacokinetic Outcomes in Obese Patients Treated in a Community Hospital

Susan Vaughan, PharmD candidate; Michael Oszko, PharmD, BCPS; Stephanie Porto, PharmD, BCPS
Lawrence Memorial Hospital, Lawrence, Kansas



Purpose

Vancomycin dosing in obese and morbidly obese patients has not been well studied. Kinetic results are erratic. The purpose of this study is to characterize the pharmacokinetics in obese and morbidly obese patients receiving Vancomycin.

Methods

- Retrospective, observational study design
- Attained hospital's IRB approval
- Data extracted from hospital's eMAR for patients with Vancomycin trough in previous 3 years
- Collected patient data: gender, age, SCr, height, weight, BMI (calculated) from patient charts
- Collected pharmacokinetic data: trough level, maintenance dose and frequency, time lab drawn and time lab scheduled
- Inclusion criteria: Vancomycin trough level drawn by lab, BMI > 30, dosed per hospital protocol
- Exclusion criteria: Unstable SCr (>0.5mcg/mL change in 2 days), SCr > 3, patients on Vancomycin prior to hospital admission, labs drawn at inappropriate time
- Calculated CrCl using Salazar-Corcoran equation
- Dose and frequency patient received were compared to current hospital dosing guidelines (15-20mg/kg actual body weight, frequency per CrCl as determined by Salazar-Corcoran equation using actual body weight)
- Troughs stratified as low (<10mcg/ml), in range (10-20), or high (>20)

Subjects

- 265 patients identified with Vancomycin trough level
- 116 obese patients (BMI>30) with Vancomycin trough level
- 38 met inclusion criteria

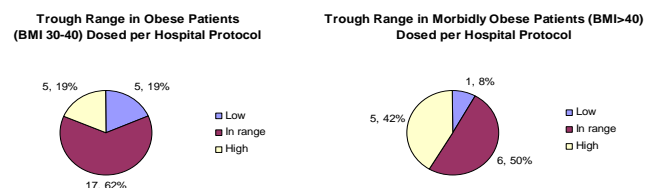
Average ± SD (Range)	Total (n=38)	Males (n=17)	Females (n=21)
Age	49.8 years (18-85)	47.7 years (18-85)	51.5 years (22-85)
BMI	39.2 ± 9.5 (30.4-68.3)	37.3 ± 6.8 (31.0-56.4)	40.8 ± 11.1 (30.4-68.3)
SCr	0.9 ± 0.37 (0.4-2.6)	1.0 ± 0.45 (0.6-2.6)	0.8 ± 0.26 (0.4-1.6)
Vancomycin trough	18.1 ± 9.2 (7.5-48.5)	17.0 ± 8.7 (9.4-43.3)	18.9 ± 9.5 (30.4-68.3)

Data analysis

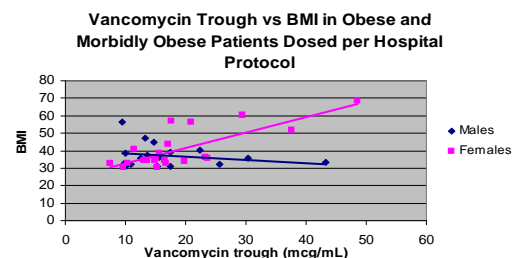
- The following relationships were explored:
 - Trough vs BMI
 - Trough vs Age
 - Trough variation between sexes

Results

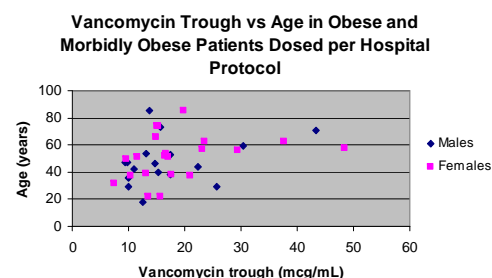
- Morbidly obese patients (BMI>40) were more likely to be out of target Vancomycin trough range than obese patients (BMI>30)



- Greater trough variability was observed in obese females than obese males



- Age did not affect Vancomycin trough levels for males or females.



Study limitations

- Retrospective design
- Small sample size
- Limited to obesity as morbidity (did not evaluate comorbidities)
- Protocol dictated maximum 2g per dose
- Multiple individuals participated in dosing

Discussion

We hope this data will lead to further research enabling development of acceptable Vancomycin dosing protocol for obese and morbidly obese patients.

From this preliminary work, we have identified the following as potential areas of further research:

- Pharmacokinetic variation between sexes
- Impact of comorbidities on Vancomycin pharmacokinetics because of the wide variation with BMI and age. Comorbidities to consider include diabetes, renal disease, hypertension, edema, hydration status, and sepsis.
- Evaluation of pharmacokinetics in obese and morbidly obese patients compared to patients with healthy BMI

Conclusion

- Age and BMI do not correlate to trough levels in obese patients treated with Vancomycin when dosed per hospital protocol.
- Greater trough variability was observed in obese females than obese males
- Factors other than BMI are likely to correlate to Vancomycin trough.

Conflict of interest statement

Susan Vaughan, PharmD candidate does not have any conflicts of interest.
Mike Oszko, PharmD, BCPS does not have any conflicts of interest.
Stephanie Porto, PharmD, BCPS does not have any conflicts of interest.