

## DEVELOPMENT OF A VANCOMYCIN DOSING NOMOGRAM FOR PEDIATRIC PATIENTS: A TOOL FOR THE RATIONAL USE OF ANTIMICROBIALS

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### Introduction

*Staphylococcus aureus* (*S. aureus*) is a bacteria found in the human microbiota that may cause serious infections, including osteomyelitis, endocarditis, and bacteremia mainly in hospital environment due to multi-drug resistant strains such as MRSA (Methicillin-Resistant *Staphylococcus aureus*). Vancomycin is a glycopeptide antibiotic used in the treatment of MRSA diseases and remains the drug of choice in many cases. A recent consensus guideline on the use of vancomycin for serious methicillin-resistant *S. aureus* infections recommend specific doses and therapeutic monitoring in different populations. Nomograms have been constructed targeting desirable doses and optimizing the vancomycin use, but there is still a shortage of studies in pediatric patients. Thus, the aim of this study was to develop a vancomycin dosing nomogram for pediatric patients.

### Material and Methods

This is a methodological study to develop a vancomycin dose nomogram for use in pediatrics based on the recent revised consensus guideline, the University of Wisconsin Hospital protocol, and consolidated guides and information sources. The structure of the nomogram was elaborated based on weight and estimated creatinine clearance. The body weight was planned according to the World Health Organization and divided into eight ranges, while the estimated creatinine clearance was divided into five ranges following above mentioned protocol. Loading dose was calculated independently of renal function, considering only the ranges of the weight, and maintenance doses were established considering both body weight and the estimated creatinine clearance. The mean of each range was used for the dose calculation. Vancomycin infusion rate was applied according to doses: 60 minutes of infusion for doses  $\leq 1.0$ g, 90 minutes for 1.1 to 1.5g and 120 minutes for 1.6 to 2.0g. Finally, dosage regimen and calculated doses were planned according to vancomycin 500 mg vial to facilitate drug scheduling for nursing.

### Results and Discussion

A vancomycin dosing nomogram for pediatric patients according to actual body weight and estimated creatinine clearance was developed based on recent literature. In order to facilitate and reduce the user's time to define the dose, the nomogram was inserted into a website (<https://sites.google.com/view/calcvan/>) as well as into a beta mobile app (CalcVAN). The tool supports prescribers and pharmacists by simplifying dose calculations in preliminary stages of infections and in the absence or delay of the therapeutic monitoring in addition to optimizing vancomycin doses.

## Conclusion

Vancomycin dosing nomogram for pediatric patients allows immediate intervention in patient care and optimizes doses being a key tool for the rational use of antimicrobials.

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