

## DoseMe Crunch | Case Study

# Improving vancomycin dosing by shifting to AUC-based dosing

*A prominent Australian teaching hospital partnered with DoseMe Crunch to analyze to what extent the current widespread clinical approach of measuring troughs as a surrogate marker for vancomycin efficacy was as effective as measuring Area Under the Curve (AUC).*

### The Brief

In 2013, the US Centre for Disease Control and Prevention assigned vancomycin-resistant enterococcus to a serious threat. Annually in the US there are 66,000 enterococcus infections resulting in 1,300 deaths. With some enterococcus strains resistant to vancomycin there are few to no treatments left<sup>1</sup>.

Experimental and clinical studies suggest AUC/MIC ratio ( $\geq 400$ ) is the best parameter to predict the effectiveness of vancomycin. While most therapeutic guidelines suggest using a trough as a surrogate measure for AUC, more recent research suggests this may not be clinically appropriate. The difficulty faced in calculating AUC is the most common reason a hospital will elect to monitor troughs over AUC.

The primary research hypothesis investigated is that measuring trough concentrations are not an appropriate surrogate marker for vancomycin efficacy.

### Key Insights



Trough concentrations of 15-20mcg/mL are not an appropriate surrogate measure for almost one third of vancomycin doses.



There were no accurate predictors to identify which particular patients reach a therapeutic target AUC while not achieving a target trough concentration.



Vancomycin dosing and monitoring can be optimized with the aid of dose prediction software to easily measure AUC.

## Our Approach

DoseMe Crunch was engaged to review vancomycin dosing in a retrospective patient cohort. The objective of the review was to determine if the current clinical approach of measuring troughs as a surrogate marker for vancomycin efficacy was as effective as measuring AUC.

The study reviewed retrospective data from 102 patients with vancomycin courses longer than 48hrs (1,594 doses).

The analysis included: administration of an appropriate loading dose; subtherapeutic treatment; rates of acute kidney injury (AKI) during treatment; potential AKI confounders (e.g. hypotension) from medical records. An appropriate loading dose was defined as receiving above 19 mg/kg and provided that the total dose < 2g.

DoseMeRx precision dosing software was used to predict AUC and Cmin for each patient. AUC was normalized to 24h for each patient.

## The Results

While trough and AUC are correlated to some extent, 31% of all doses achieved the target AUC/MIC ( $\geq 400\text{mcg.h/mL}$ ) while not achieving the target trough concentration ( $\geq 15\text{mcg/mL}$ ). Vancomycin dosing guidelines and physician experience would recommend increasing the vancomycin dose in these patients, potentially risking over-exposure.



**Almost one out of every three patients run the risk of acute kidney injury from a vancomycin overdose.**

As there is no suitable predictor able to identify these patients, decision support software that enables AUC-based dosing should be implemented over trough-based dosing to avoid over-exposure and the associated risks.

## Outcome

The client is now pursuing integration of DoseMeRx - the world's first precision dosing tool designed for clinical practice using Bayesian dose individualization to estimate vancomycin AUC for an individual patient - into their clinical workflow.

DoseMeRx complies with federal law and regulations for clinical decision support software in the United States of America, is cleared by the Australian Therapeutic Goods Register as a medical device, and is CE marked in Europe.

## DoseMe

DoseMe is the first company in the world to offer precision dosing software specifically developed for clinical use at the point-of-care. The DoseMeRx platform significantly improves dosing accuracy and patient outcomes by providing real-time dose-related decision support to enable precision medicine using readily available patient data.

DoseMe Crunch is built on the same algorithms that underpin DoseMeRx, to analyze retrospective and previously under-utilized sources of patient data to empower health services to understand and optimize medication use, benchmark clinical dosing practices and monitor medication management performance.

**Find out more at: [doseme-rx.com](https://doseme-rx.com)**