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Predicting vancomycin trough concentrations for increased trough targets in Chinese population: A comparison of five approaches.

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Introduction

In 2009, the American Society of Health-System Pharmacists (ASHP), the Infectious Diseases Society of America (IDSA) and the Society of Infectious Diseases Pharmacists published a consensus review on therapeutic monitoring of vancomycin in adult patients. They recommended that steady state vancomycin plasma trough level (VANT) should always be maintained at greater than 10 mg/L to avoid the development of resistance and treatment failure. The majority of the existing approaches for estimating pharmacokinetic parameters were developed before the revised ASHP/IDSA recommendation for higher target trough level was published. Therefore, their use in regimens targeting higher therapeutic levels, especially 15 – 20 mg/L, is yet to be established.

Objectives

Accuracy and precision of five selected vancomycin trough predictive approaches for determining VANTs at levels greater than 10 mg/L at two hospitals in Hong Kong were evaluated. Using the best approach, nomograms for initiation of vancomycin for local population were constructed.

Methodology

Inpatients aged 18 years or more in Prince of Wales Hospital and Queen Elizabeth Hospital who received intravenous vancomycin therapy between 2009 to 2012 and had at least one steady-state VANT between 10 – 20mg/L measured were included in this retrospective study. Vancomycin clearance and volume of distribution were calculated using the respective equations of the five selected predictive methods. The predictive performances of the five methods were compared.

Result

Of the 596 cases included, 287 VANTs were between 10 – 20 mg/L and were used to evaluate the predictive performances. In VANT range of 10 – 20 mg/L, bias of the Staatz method is closest to zero (Mean Error = 0.50, with 95% confidence interval of -0.17 to 1.17), and it is the only method with confidence interval of bias including zero. With the Staatz method, predictions were within 5 mg/L of measured concentrations 62% of the time. The Staatz method was found to have the best overall combination of precision and the least bias in VANT range of 10 – 15 mg/L, while the Matzke method has the best overall combination of precision and the least bias in cases with measured VANT within 15 – 20 mg/L.