A Web-based Dashboard System for Dose Individualization of Vancomycin

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Objectives: Vancomycin has been widely prescribed as the first-line antibiotic for the treatment of methicillin-resistant *Staphylococcus aureus* and other serious Gram-positive infections. Due to its large pharmacokinetic (PK) variability and narrow therapeutic range, it requires dose optimization to achieve target exposure and response. The objective of this study is to develop an efficient tool for dose individualization of vancomycin by maximum *a posteriori* Bayesian estimation (MAPB).

Methods: The MAPB was developed in the open-source language R with its package *rjags* and validated against NONMEM, the standard software for parametric population PK modelling. The graphical user interface is established in .Net Framework and the data is hosted on SQL Server 2016. Population PK models for pediatric, adult and elderly patients from peer reviewed, published literature were implemented.

Results: A web-based dashboard system is developed and the current version is accessible at http://smartdose.huashan.org.cn:28080/. When the covariate information of a patient, such as age, body weight and renal function estimates, are available, *a priori* estimation is performed. By editing or uploading dose and observation information in given format, individual PK parameters can be estimated by MAPB. Both *a priori* and *a posteriori* estimations are displayed as a series of combinations of proper dose and dosing interval for selection, as well as predicted trough concentrations and concentration-time curves for each combination. This application also provides a user-specified module where concentrations at any pre-defined time can be calculated under specified dose regimen with or without a loading dose.

Conclusions: This dashboard system is an efficient tool for vancomycin dose optimization in routine clinical settings. Further prospective investigations of the clinical outcome of this application are required.

**Figure 1. Workflow of Dashboard System for Dose Individualization of Vancomycin**