The main goal of our study was to characterize the population pharmacokinetics of vancomycin in critically ill Chinese neonates to develop a pharmacokinetic model and investigate factors that have significant influences on the pharmacokinetics of vancomycin in this population. The study population consisted of 80 neonates in the neonatal intensive care unit (NICU) from which 165 trough and peak concentrations of vancomycin were obtained. Nonlinear mixed effect modeling was used to develop a population pharmacokinetic model for vancomycin. The stability and predictive ability of the final model were evaluated based on diagnostic plots, normalized prediction distribution errors and the bootstrap method. Serum creatinine (Scr) and body weight were significant covariates on the clearance of vancomycin. The average clearance was 0.309 L/h for a neonate with Scr of 23.3 mmol/L and body weight of 2.9 kg. No obvious ethnic differences in the clearance of vancomycin were found relative to the earlier studies of Caucasian neonates. Moreover, the established model indicated that in patients with a greater renal clearance status, especially Scr < 15 mmol/L, current guideline recommendations would likely not achieve therapeutic concentrations under the concentration-time curve over 24 h/minimum inhibitory concentration (AUC0-24/MIC) ≥ 400. The exceptions to this are British National Formulary (2016–2017), Blue Book (2016) and NeoFax (2017). Recommended dose regimens for neonates with different Scr levels and postmenstrual age were estimated based on Monte Carlo simulations and the established model. These findings will be valuable for developing individualized dosage regimens in the neonatal ICU setting.

REFERENCES

Disclosure(s) Nothing to disclose