A Closer Look at the Pediatrics PRN

Overview of the PRN

The Pediatrics Practice and Research Network (PRN) includes pharmacists and pharmacy trainees who are passionate about caring for children! PRN members care for patients across childhood, from preterm neonates to adolescents and young adults. The PRN currently has 890 members, with 260 student members, 55 resident members, and 5 fellow members.

Engagement Opportunities and Resources

The Pediatrics PRN has several committees, which trainees are invited to join. The PRN overall greatly appreciates active participation from its student, resident, and fellow members. Committees include Education, Nominations, Professional Advancement, Research, Social Media, and Travel Award. More information on the committees is available at https://www.accp.com/stunet/prncorner.aspx#ctl00_pnlPediatrics_title.

The Pediatrics PRN has several opportunities for student, resident, and fellow members to get involved. Here are some highlights:

- Join the PRN and get involved in a committee!
- Pediatrics PRN Resident and Fellow Journal Club: This journal club is presented three times a year in a webinar format. The journal club is open to ALL resident and fellow members of ACCP, not just members of the PRN, and represents an opportunity to present to a national audience. Two trainees present for 30 minutes during each journal club on a current pediatrics-related article. This year's journal club dates are January 15 and April 2, with application deadlines about 2 months before the dates. For more information, please contact Samie Sabet at samie-sabet@ouhsc.edu or see the online application at https://goo.gl/165pz3.
- The PRN offers two $1000 travel awards, one for students and one for residents/fellows. These awards support attendance at the ACCP Annual Meeting. Awardees also have the opportunity to present their research at the Pediatrics PRN business meeting. For more information, see https://www.accp.com/docs/resfel/Pediatrics_PRN_final.pdf (Resident/Fellow Travel Award) and https://www.accp.com/stunet/award.aspx (Student Travel Award).
- Networking at the PRN business meeting: Trainee members of the PRN attend the PRN's business meeting at the Annual Meeting. Attending is a great way to learn about the PRN and meet experts in the field of pediatric pharmacy.

Current Clinical Issue

Vancomycin is a common, first-line treatment of hospitalized children infected with methicillin-resistant *Staphylococcus aureus* (MRSA).[1] The pharmacokinetic-pharmacodynamic (PK-PD) parameter that best predicts clinical response to vancomycin is the area under the concentration-time curve (AUC) divided by the minimum inhibitory concentration (MIC) – or AUC/MIC ratio. In adults, better clinical and bacteriological response occurs when the AUC/MIC is 400 or greater.[2] These data are often extrapolated to pediatric patients, despite a lack of evidence. Calculating an AUC in clinical practice is not always practical, especially for patients in whom obtaining multiple drug concentration samples may be problematic. Therefore, the vancomycin trough concentration is often used as a more practical surrogate marker for the AUC/MIC. In adults, a vancomycin trough concentration of 15–20 mg/L best correlates with an AUC/MIC of 400 or greater.[2] Data in children are lacking.

A recent review by Tkachuk et al. sought to determine the relationship between vancomycin trough concentrations and AUC/MIC in pediatric patients.[3] Eleven studies met the review's inclusion criteria and included patients who represented general hospitalized (n=6), cardiothoracic surgery (n=1), oncology (n=2), and critical care (n=2) populations. The potential vancomycin trough concentration target varied depending on the population studied, but for the largest group (general hospitalized),

vancomycin trough concentrations of 6–10 mg/L were likely sufficient to achieve an AUC/MIC of 400 or greater.

So, what are the implications of these findings? First, there is a great opportunity for further research regarding the optimal target (vancomycin trough concentration vs. AUC/MIC) in children. Vancomycin has long been associated with acute kidney injury both in adults and children, and there may be negative consequences when targeting higher vancomycin trough concentrations (i.e., greater than 15 mg/L), especially if they are not necessary to achieve the optimal PK-PD parameter. Second, the actual relationship (or lack thereof) between vancomycin trough concentrations and AUC/MIC in children needs further study. Several population PK equations exist to estimate vancomycin clearance, and therefore AUC, in children and may make it more practical to estimate an AUC when one cannot be calculated. However, these remain estimates, and their reliability for predicting clinical response needs to be evaluated. Finally, it's important to keep in mind that vancomycin trough concentrations and AUC/MIC are surrogate markers for efficacy, and other important clinical variables should be considered when evaluating response to therapy in individual patients.

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References:

1. Liu C, Bayer A, Cosgrove SE, et al. Clinical practice guidelines by the Infectious Diseases Society of America for the treatment of methicillin-resistant *Staphylococcus aureus* infections in adults and children. Clin Infect Dis 2011;52:e18-55.
2. Rybak MJ, Lomaestro BM, Rotschafer JC, et al. Therapeutic monitoring of vancomycin in adults summary of consensus recommendations from the American Society of Health-System Pharmacists, the Infectious Diseases Society of America, and the Society of Infectious Diseases Pharmacists. Pharmacotherapy 2009;29:1275-9.
3. Tkachuk S, Collins K, Ensom MHH. The relationship between vancomycin trough concentrations and AUC/MIC ratios in pediatric patients: a qualitative systematic review. Paediatr Drugs 2018;20:153-64.