Vancomycin AUC FAQs

Q: How do I deal with discordance, e.g. trough > 20 but AUC therapeutic?
A: Try to lower the trough in a way that maintains a therapeutic AUC. i.e. Using the same TDD (to maintain same AUC), decrease the dosing frequency to bring the trough <20. Remember, troughs > 15 are associated with increased nephrotoxicity.

Q: What if the level is drawn early/late?
A: There is some flexibility: the 1st level should be drawn ≥1-2 hours after the end of infusion (to avoid the distribution phase) and is likely ok if slightly late, so long as the 2nd level (usually the trough) is drawn ≥1 half-life after the first level.

For q24h regimens, you may even check a “trough” up to 6 hours early so long as this is > 1 half-life (in which case order in EPIC as a “random” level).

For q8h regimens, early/late draws may negatively impact AUC accuracy more significantly and you may need to re-order level(s) to re-evaluate AUC.

Q: What if the lab/nursing missed a blood draw?
A: There are a few options:
1. Re-order a new paired peak/trough.
2. Order the missing lab with the next dose. If you are in steady state, the levels should be close.
3. Alternatively add-on to previous lab if the timing is appropriate.

For #2 and 3, you calculate an extrapolated AUC. Note this on the progress note “Comments” column (see below example and screenshot)

Order new peak after next dose. When entering a date/time into Excel, “fake” the trough entry & move it forward after tomorrow’s dose. Maintain the same time after dose when entering the “fake trough”. Example:

<table>
<thead>
<tr>
<th>Regimen</th>
<th>SCr or dialysis</th>
<th>WBC</th>
<th>Tmax (C)</th>
<th>Levels (peak/trough)</th>
<th>AUC</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>1g q12h</td>
<td>0.48</td>
<td>6.4</td>
<td>abc</td>
<td>T-17.4 P-29.9</td>
<td>564</td>
<td>Missed lab draw. Therefore extrapolated AUC based on trough before 4th peak after 5th dose</td>
</tr>
<tr>
<td>1g q12h</td>
<td>0.46</td>
<td>6.5</td>
<td>abc</td>
<td>T-17.4 P-29.9</td>
<td>564</td>
<td>Missed lab draw. Therefore extrapolated AUC based on trough before 4th peak after 5th dose</td>
</tr>
<tr>
<td>1g q12h</td>
<td>0.47</td>
<td>7.2</td>
<td>abc</td>
<td>T-17.4 P-29.9</td>
<td>564</td>
<td>Missed lab draw. Therefore extrapolated AUC based on trough before 4th peak after 5th dose</td>
</tr>
</tbody>
</table>
Q: What if my peak is high (e.g. >60)?

A: Correlate clinically. Typically, $C_{\text{max}} = \text{Dose} / \text{Vd}$. $Vd = 0.7 \text{ L/kg}$ in general populations. If it looks suspiciously elevated, ensure that it wasn’t drawn from the same line as the vancomycin infusion. Per nursing policy, it is NOT recommended to draw any drug levels from a catheter through which that drug has been infused. Consider a peripheral draw (phlebotomist must perform). Reference: PATIENT CARE MANUAL- CENTRAL VENOUS CATHETERS: MAINTENANCE CARE AND BLOOD DRAWING.

If you think it was accurately drawn, have the RN hold the next dose until the trough comes back, or if this is AKI, triage e.g. dose by level.

Is there a relationship between peak vancomycin levels and the risk of ototoxicity? – courtesy of Nick Alonzo, PharmD, PGY1

Early studies found a correlation between peak vancomycin levels of 80-100 mg/L and an increased risk of ototoxicity [2, 3], likely inflated due to impurities with older formulations. More recent evaluations found that the risk of ototoxicity from vancomycin ranges 1-9% and is increased with levels > 40 mg/L [4]. The true rate from vancomycin monotherapy is low without concurrent use of ototoxic agents.

Hearing loss can range from tinnitus (reversible) to auditory nerve damage affecting high-frequency sensory hairs in the cochlea before the middle and low frequency hairs. High-tone deafness occurs at all frequencies and is permanent. Inability to hear high-frequency sounds and tinnitus are ominous signs that should result in discontinuation of vancomycin.


3. John E. Bennett MD, M., Raphael Dolin MD and Martin J. Blaser MD, *Glycopeptides (Vancomycin and Teicoplanin), Streptogramins (Quinupristin-Dalfopristin), Lipopeptides (Daptomycin), and Lipoglycopeptides (Telavancin)*, in Mandell, Douglas, and Bennett’s *Principles and Practice of Infectious Diseases, Updated Edition*, C.A.A.a.E.C.N. Barbara E. Murray, Editor.: Philadelphia, PA.