VANCOMYCIN DOSING TOOL

**Variables**

- **CrCl** = creatinine clearance (mL/min)
- **Vd** = volume of distribution (L)
- **X0** = dose (mg)
- **Ke** = elimination constant (hr\(^{-1}\))
- **t\(_{1/2}\)** = half-life (hrs)
- **\(\tau\)** = dosing interval (hrs)
- **t’** = infusion time (hrs) (usually 1 hr for each 1 g)
- **TBW** = total body weight (kg)
- **C\(_{\text{min}}\)** = minimum concentration or “trough” (mcg/mL)
- **C\(_{\text{max}}\)** = maximum concentration or “peak” (mcg/mL)

**INITIAL DOSING**

<table>
<thead>
<tr>
<th>Step</th>
<th>Instruction</th>
<th>Formula</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Calculate the initial vancomycin dose and estimate the C(<em>{\text{min}}) and C(</em>{\text{max}}). We need the patient’s CrCl and TBW.</td>
<td></td>
</tr>
</tbody>
</table>
| 2    | Calculate the Ke and the Vd.  
Ke = 0.00083 X CrCl + 0.0044 = ___ hr\(^{-1}\)  
Vd = 0.7 X TBW = ___ L |  |
| 3    | Calculate the dosing \(\tau\).  
Here, the C\(_{\text{min}}\) and C\(_{\text{max}}\) represent the desired C\(_{\text{min}}\) and C\(_{\text{max}}\). The t’ is usually assumed to be 1 hr in this equation. Half-life t\(_{1/2}\) may also be used to guide an appropriate \(\tau\). | \(\tau = \frac{\ln(C_{\text{min}} / C_{\text{max}})}{Ke} + t’ = ___ \text{hrs}\)  
\(t_{1/2} = \frac{\ln2}{Ke} = ___ \text{hrs}\) |
| 4    | Round to a convenient \(\tau\).  
This \(\tau\) goes in the equation to calculate the dose (X0). | X0 = (Ke Vd C\(_{\text{max}}\) \(\tau\)) \(\frac{1 - e^{-Ke\tau}}{1 - e^{-Ke}}\) = ___ mg |
| 5    | Now pick a dose (X0) and interval (\(\tau\)) and check what the estimated C\(_{\text{min}}\) and C\(_{\text{max}}\) are. Play around with this to make sure that you get the desired C\(_{\text{min}}\) and C\(_{\text{max}}\). | C\(_{\text{max}}\) = \(\frac{X0/\tau}{KeVd} \times \frac{1 - e^{-Ke\tau}}{1 - e^{-Ke}}\) = ___ mcg/mL  
C\(_{\text{min}}\) = C\(_{\text{max}}\) \(e^{-Ke(\tau-t’)}\) = ___ mcg/mL |

Notes on initial dosing: Step #4 calculates the suggested dose. If you prefer another way to choose the dose, skip to Step #5 to check the estimated C\(_{\text{min}}\) (trough) and C\(_{\text{max}}\) (peak) with your chosen dose and interval. Note that these equations are only for steady state.

**DOSE CORRECTION WITH ONE TROUGH LEVEL**

After collecting a trough level, simply use the collected trough level (C\(_{\text{min}}\)(drawn)) to calculate a new Ke and subsequently a new t\(_{1/2}\), \(\tau\), and projected C\(_{\text{min}}\) and C\(_{\text{max}}\) levels.  
You will need the X0, \(\tau\), t’, and Vd used earlier.

\[Ke = \frac{\ln(1 + C_{\text{min}}(\text{drawn}) X Vd/X0)}{\tau - t’} = ___ \text{hr}^{-1}\]

Source: Deanna Wung, PharmD