Vancomycin Dosing for Adults
University Health System

**Necessary Patient Information for Dosing**

- Actual body weight – the use of actual body weight is recommend for vancomycin dosing
- CrCl – vancomycin is almost exclusively renally cleared and must be renally adjusted
  - \( \text{CrCl} = \frac{(140 - \text{age}) \times \text{wt in kg}}{72 \times \text{SCr}} \) x 0.85 if female
- Type of infection being treated
  - Are there any cultures?
  - This may affect how aggressively vancomycin is dosed

**Initial Dosing of Vancomycin**

- Loading Doses
  - Some patients may require a loading dose
    - Patients where rapid attainment of therapeutic levels is essential (ie, meningitis or septic shock)
    - Morbidly obese patients that require initial high doses to reach therapeutic levels
  - Loading dose: 25-30 mg/kg x 1, maintenance dose should follow at suggested interval

<table>
<thead>
<tr>
<th>Weight (kg)</th>
<th>Dose (grams)</th>
</tr>
</thead>
<tbody>
<tr>
<td>50-64</td>
<td>1.5 x 1 dose</td>
</tr>
<tr>
<td>65-79</td>
<td>1.75 x 1 dose</td>
</tr>
<tr>
<td>80-94</td>
<td>2 x 1 dose</td>
</tr>
<tr>
<td>95-109</td>
<td>2.5 x 1 dose</td>
</tr>
<tr>
<td>&gt; 110</td>
<td>3 x 1 dose</td>
</tr>
</tbody>
</table>

- Maintenance Doses
  - Follow below algorithm for initial vancomycin doses based on weight and renal function
## GOAL TROUGH: 10-20 mcg/mL

<table>
<thead>
<tr>
<th>ABW* (kg)</th>
<th>Scheduled HD (3 x times weekly)</th>
<th>Creatinine Clearance (mL/min)</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt; 50</td>
<td>1000 mg x 1 dose, then 500 mg 3x week post-dialysis</td>
<td>&lt;30</td>
</tr>
<tr>
<td>75</td>
<td>1000 mg x 1 dose, then 500 mg 3x week post-dialysis</td>
<td>10-15 mg/kg x 1 dose (rounded to the nearest 250mg, max dose: 2000mg)</td>
</tr>
<tr>
<td></td>
<td>1000 mg x 1 dose, then 500 mg 3x week post-dialysis</td>
<td>10-15 mg/kg x 1 dose (rounded to the nearest 250mg, max dose: 2000mg)</td>
</tr>
<tr>
<td></td>
<td>1000 mg x 1 dose, then 500 mg 3x week post-dialysis</td>
<td>10-15 mg/kg x 1 dose (rounded to the nearest 250mg, max dose: 2000mg)</td>
</tr>
<tr>
<td></td>
<td>1000 mg x 1 dose, then 500 mg 3x week post-dialysis</td>
<td>10-15 mg/kg x 1 dose (rounded to the nearest 250mg, max dose: 2000mg)</td>
</tr>
<tr>
<td></td>
<td>1000 mg x 1 dose, then 500 mg 3x week post-dialysis</td>
<td>10-15 mg/kg x 1 dose (rounded to the nearest 250mg, max dose: 2000mg)</td>
</tr>
<tr>
<td></td>
<td>1000 mg x 1 dose, then 500 mg 3x week post-dialysis</td>
<td>10-15 mg/kg x 1 dose (rounded to the nearest 250mg, max dose: 2000mg)</td>
</tr>
<tr>
<td></td>
<td>1000 mg x 1 dose, then 500 mg 3x week post-dialysis</td>
<td>10-15 mg/kg x 1 dose (rounded to the nearest 250mg, max dose: 2000mg)</td>
</tr>
<tr>
<td></td>
<td>1000 mg x 1 dose, then 500 mg 3x week post-dialysis</td>
<td>10-15 mg/kg x 1 dose (rounded to the nearest 250mg, max dose: 2000mg)</td>
</tr>
</tbody>
</table>

*Actual Body Weight

## GOAL TROUGH: 15-20 mcg/mL

<table>
<thead>
<tr>
<th>ABW* (kg)</th>
<th>Scheduled HD (3 x times weekly)</th>
<th>Creatinine Clearance (mL/min)</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt; 50</td>
<td>1000 mg x 1 dose, then 500 mg 3x week post-dialysis</td>
<td>&lt;30</td>
</tr>
<tr>
<td>75</td>
<td>1000 mg x 1 dose, then 500 mg 3x week post-dialysis</td>
<td>10-15 mg/kg x 1 dose (rounded to the nearest 250mg, max dose: 2000mg)</td>
</tr>
<tr>
<td></td>
<td>1000 mg x 1 dose, then 500 mg 3x week post-dialysis</td>
<td>10-15 mg/kg x 1 dose (rounded to the nearest 250mg, max dose: 2000mg)</td>
</tr>
<tr>
<td></td>
<td>1000 mg x 1 dose, then 500 mg 3x week post-dialysis</td>
<td>10-15 mg/kg x 1 dose (rounded to the nearest 250mg, max dose: 2000mg)</td>
</tr>
<tr>
<td></td>
<td>1000 mg x 1 dose, then 500 mg 3x week post-dialysis</td>
<td>10-15 mg/kg x 1 dose (rounded to the nearest 250mg, max dose: 2000mg)</td>
</tr>
<tr>
<td></td>
<td>1000 mg x 1 dose, then 500 mg 3x week post-dialysis</td>
<td>10-15 mg/kg x 1 dose (rounded to the nearest 250mg, max dose: 2000mg)</td>
</tr>
<tr>
<td></td>
<td>1000 mg x 1 dose, then 500 mg 3x week post-dialysis</td>
<td>10-15 mg/kg x 1 dose (rounded to the nearest 250mg, max dose: 2000mg)</td>
</tr>
<tr>
<td></td>
<td>1000 mg x 1 dose, then 500 mg 3x week post-dialysis</td>
<td>10-15 mg/kg x 1 dose (rounded to the nearest 250mg, max dose: 2000mg)</td>
</tr>
</tbody>
</table>

*Actual Body Weight*
Vancomycin Monitoring

- Monitoring consists of troughs; peaks are NOT recommended
  - Troughs should be drawn **30 minutes prior to 4th dose**
    - For patients on every 24 hour dosing troughs prior to 4th dose is still recommended
    - If patient has severe renal failure a trough may be checked prior to 2nd dose; however, this level is NOT at steady state and will go up with subsequent doses
  - Random levels with scheduled vancomycin regimens **cannot be interpreted**
  - Random levels should only be ordered on patients with severe renal impairment not on scheduled vancomycin dosing and dialysis patients
  - Doses **will not be held** awaiting trough level unless specifically requested by the provider
  - Routine monitoring is NOT recommended for patients only on ORAL vancomycin

- **Goal trough**: 10-20 mcg/mL; vancomycin troughs < 10 mcg/mL may lead to resistance
  - Some serious infection may require **higher troughs of 15-20 mcg/mL**
    - Pneumonia
    - Endocarditis
    - Meningitis
    - Bacteremia
    - Sepsis/septic shock
    - Known MRSA infections
  - **NOTE**: For some serious infections Infectious Diseases may even allow a trough of 20-25; please check with them prior to holding doses if they are managing vancomycin

- Key points for dosage adjustment
  - **FIRST**: make sure level was drawn appropriately and all previous doses were given
  - **SECOND**: be aware of changing renal function
    - Today’s level is reflective of how the patient cleared the vancomycin in the past 24-48 hours and may not reflect how it will be cleared tomorrow
    - If renal function is improving/declining, anticipate this in your adjustment
  - **THIRD**: if high levels require holding of doses **DO NOT restart the same regimen**
    - This indicates the patient cannot clear this much vancomycin
    - High levels require a dosage/interval adjustment!!!!!
  - **FOURTH**: adjusting vancomycin is not rocket science, it’s mostly trial and error

- How to adjust vancomycin based on troughs
  - Vancomycin has linear pharmacokinetics
    - Assuming stable renal function, to double the level, double the dose
    - To halve the level, halve the dose
  - **Remember to account for changing renal function!!**
    - If renal function is getting better, add on a little more vancomycin
    - If renal function is getting worse, decrease the dose a little bit
    - Also remember that old kidneys do not clear vancomycin efficiently
Is trough level at goal?

- YES
  - Continue regimen; No adjustment necessary
  - Repeat trough in 3 days

- NO
  - Was it drawn appropriately?
    - YES
      - Use provided adjustment chart to calculate a new dose
      - Record trough before the 4th dose
    - NO
      - Record trough 30 minutes before the next dose

Is trough still at goal?

- YES
  - Monitor trough twice weekly until completion or discontinuation of therapy

- NO
  - Repeat trough in 3 days

<table>
<thead>
<tr>
<th>Trough</th>
<th>Recommended Adjustment</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 5</td>
<td>Decrease the dosage interval to the next frequency AND Consider increasing the dose by 250-500 mg</td>
</tr>
<tr>
<td>5-10</td>
<td>Decrease the dosage interval to the next frequency OR Increase dose by 250-500 mg</td>
</tr>
</tbody>
</table>
| 10-15  | - If goal is 10-15 mcg/mL ➞ No change  
          - If goal is 15-20 mcg/mL ➞ Increase dose by 250-500 mg |
| 15-20  | - If goal is 10-15 mcg/mL ➞ Decrease dose by 250-500 mg  
          - If goal is 15-20 mcg/mL ➞ No change |
| 20-25  | Decrease dose by 250-500 mg OR Increase the dosage interval to the next frequency |
| 25-30  | Increase the dosage interval to the next frequency AND/OR Decrease the dosage by 500 mg |
| > 30   | HOLD VANCOMYCIN UNTIL LEVEL IS < 20 mcg/mL, then restart a modified regimen |
Monitoring of vancomycin in Intermittent hemodialysis (IHD) patients
- Pre-dialysis levels are recommended for IHD patients with following recommendations
- Standard 4 hour dialysis session can remove approximately 30-50% of vancomycin

<table>
<thead>
<tr>
<th>Pre-Dialysis Level (mcg/mL)</th>
<th>Recommendation</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 20</td>
<td>Increase post-dialysis dose by 250-500 mg</td>
</tr>
<tr>
<td>20-25</td>
<td>No change</td>
</tr>
<tr>
<td>&gt;25</td>
<td>Decrease post-dialysis dose by 250-500 mg  If &gt; 30 may consider skipping one post-dialysis dose</td>
</tr>
</tbody>
</table>

Continuous Infusion (CI) Vancomycin
- Occasionally patients may be started on or switched to continuous infusion vancomycin
  - Patients requiring frequent dosing of vancomycin (clearing vancomycin more quickly than expected)
  - Convenience for home infusion therapy
- Initial dosing
  - Loading dose: 15 mg/kg of vancomycin given over 1-2 hours
  - 25-30 mg/kg of vancomycin as a continuous infusion over 24 hours
- Switching from intermittent dosing to CI vancomycin
  - **NOTE** patients on CI vancomycin tend to accumulate vancomycin and require a lower total daily dose than intermittent therapy
  - If patient therapeutic on intermittent therapy:
    - Add up total dose of vancomycin and reduce by 10-20%
    - Round to nearest 250 mg
    - This will be the recommended starting dose for CI vancomycin
  - If patient supra- or sub-therapeutic on intermittent therapy:
    - Estimate intermittent dose needed to make therapeutic and reduce by 10-20%
    - Round to nearest 250 mg
    - This will be the recommended starting dose for CI vancomycin
- Monitoring
  - Random level 24 hours after start of infusion
  - Goal level: 20-30 mcg/mL
  - Ensure level is collected from a site OTHER THAN vancomycin infusion site (preferably a peripheral stick)

Vancomycin Clinical Dosing Pearls
- Adjusting vancomycin dose based on levels is an art...not an exact science
- Always make sure the trough was drawn appropriately and no previous doses were held
- Be aware of changing renal function (improving or declining)
- When an individual dose becomes over 2g start considering every 8 hr dosing rather than increasing the dose every 12 hrs
- When a trough is just above goal (20-25mcg/mL for a goal of 15-20mcg/mL), rather than holding dose, just start the new regimen (this prevents patient from becoming subtherapeutic)
  o [http://www.ajhp.org/content/66/1/82.full.pdf+html](http://www.ajhp.org/content/66/1/82.full.pdf+html)

For questions please contact Kristi Traugott, PharmD, BCPS at 210-358-0421 or 210-203-0297 (pgr).
Last updated: 11/2017