Vancomycin Dosing for Adults
University Health System

**Necessary Patient Information for Dosing**
- Actual body weight – the use of actual body weight is recommended for vancomycin dosing
- CrCl – vancomycin is almost exclusively renally cleared and must be renally adjusted
  - \( \text{CrCl} = \frac{(140-\text{age}) \times \text{wt in kg}}{72} \times 0.85 \) 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>&gt; 95</td>
<td>2.5 x 1 dose</td>
</tr>
<tr>
<td>ABW* (kg)</td>
<td>Scheduled HD (3 x times weekly)</td>
</tr>
<tr>
<td>-----------</td>
<td>---------------------------------</td>
</tr>
<tr>
<td>50</td>
<td>1000 mg x 1 dose, then 500 mg 3 x week post-dialysis</td>
</tr>
<tr>
<td>70</td>
<td>1250 mg x 1 dose, then 750 mg 3 x week post-dialysis</td>
</tr>
<tr>
<td>90</td>
<td>1500 mg x 1 dose, then 1000 mg 3 x week post-dialysis</td>
</tr>
</tbody>
</table>

*Actual Body Weight

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**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>
<th>&lt;30</th>
<th>30-39</th>
<th>40-49</th>
<th>50-59</th>
<th>60-69</th>
<th>70-79</th>
<th>80-89</th>
<th>90-99</th>
<th>≥100</th>
</tr>
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<tbody>
<tr>
<td>50</td>
<td>1000 mg x 1 dose, then 500 mg 3 x week post-dialysis</td>
<td>10-15 mg/kg x 1 dose (rounded to the nearest 250mg, max dose: 2000mg)</td>
<td>750 q24</td>
<td>750 q24</td>
<td>1000 q24</td>
<td>750 q12</td>
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*Actual Body Weight

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**GOAL TROUGH: 15-20 mcg/mL**

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<th>ABW* (kg)</th>
<th>Scheduled HD (3 x times weekly)</th>
<th>Creatinine Clearance (mL/min)</th>
<th>&lt;30</th>
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*Actual Body Weight
- Alternative Dosing Recommendation for Weights < 50kg or > 120 kg
  - Patients Weighing <50 kg

<table>
<thead>
<tr>
<th>Cr Cl (ml/min)</th>
<th>Suggested Dose</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt; 50</td>
<td>15 mg/kg every 12 hours (or 30 mg/kg/d)</td>
<td>- Use ACTUAL body weight - Round to nearest 250 mg</td>
</tr>
<tr>
<td></td>
<td>- Some patients may require initial every 8 hour dosing (young &lt;30yo, burn pts, IV drug users)</td>
<td></td>
</tr>
<tr>
<td>30 – 49</td>
<td>15 mg/kg every 24 hours</td>
<td></td>
</tr>
<tr>
<td>&lt;29</td>
<td>15 mg/kg X 1, then dose by levels</td>
<td>In patients receiving IHD give the “load” dose now followed by “maintenance” dose after subsequent dialysis</td>
</tr>
<tr>
<td>IHD</td>
<td>Load: 15 – 20 mg/kg X 1 Maintenance: 500 mg – 750 mg after each dialysis</td>
<td></td>
</tr>
<tr>
<td>CRRT</td>
<td>15 mg/kg every 24 hours</td>
<td>If patient stopping CRRT for any reason may want to do dose X 1 and follow by levels</td>
</tr>
</tbody>
</table>

- Patients Weighing >120 kg
  - LOAD: 2.5g X 1 dose
  - MAINTENANCE: 10 mg/mg Q12h based on actual body weight for CrCl > 50 ml/min
  - Use above chart for renal adjustment for appropriate frequency

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

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Last updated: 4/2018
Approved by UHS Pharmacy & Therapeutics Antimicrobial Subcommittee 4/2018
Approved by UHS Pharmacy & Therapeutics Committee 5/2018
- **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**
    - Known serious MRSA infections
      - Pneumonia
      - Endocarditis
      - Bacteremia
    - Meningitis
    - Bacteremia
    - Sepsis/septic shock
  - **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
- NO: Was it drawn appropriately?
  - YES: Use provided adjustment chart to calculate a new dose AND Reorder trough before the 4th dose
  - NO: Reorder trough 30 minutes before the next dose

Is trough still at goal?

- YES: Monitor trough twice weekly until completion or discontinuation of therapy
- NO: Reorder trough twice weekly until completion or discontinuation of therapy

If at ANY TIME during therapy, renal function dramatically changes → Check a trough before the next dose

### Trough Level Adjustment

<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 |

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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>
</tbody>
</table>
| >25                         | Decrease post-dialysis dose by 250-500 mg  
  If > 30 may consider skipping one post-dialysis dose

**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)

  - 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).