

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
 - $CrCl = \frac{(140-age) \times (wt \text{ in kg})}{72 \times SCr} \times 0.85$ 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

Weight (kg)	Dose (grams)
50-64	1.5 x 1 dose
65-79	1.75 x 1 dose
80-94	2 x 1 dose
> 95	2.5 x 1 dose

- Maintenance Doses
 - Follow below algorithm for initial vancomycin doses based on weight and renal function

GOAL TROUGH: 10-20 mcg/mL

ABW* (kg)	Creatinine Clearance (mL/min)									
	Scheduled HD (3 x times weekly)	<30	30-39	40-49	50-59	60-69	70-79	80-89	90-99	≥100
50	1000 mg x 1 dose, then 500 mg 3 x week post-dialysis	10-15 mg/kg x 1 dose (rounded to the nearest 250mg, max dose: 2000mg)	500 q24	500 q24	750 q24	750 q24	1000 q24	750 q12	750 q12	750 q12
55			500 q24	750 q24	750 q24	1000 q24	1000 q24	750 q12	750 q12	1000 q12
60			750 q24	750 q24	750 q24	1000 q24	750 q12	750 q12	750 q12	1000 q12
65			750 q24	750 q24	1000 q24	750 q12	750 q12	1000 q12	750 q8	750 q8
70			1000 q24	1000 q24	1000 q24	750 q12	750 q12	1000 q12	750 q8	750 q8
75	1250 mg x 1 dose, then 750 mg 3 x week post-dialysis		1000 q24	1000 q24	1000 q24	750 q12	1000 q12	1000 q12	1000 q12	750 q8
80			1000 q24	1000 q24	1000 q24	1000 q12	1000 q12	1000 q12	1000 q12	1000 q12
85			1000 q24	1000 q24	1000 q24	1000 q12	1000 q12	1000 q12	1000 q12	1000 q12
90			1000 q24	1000 q24	1250 q24	1000 q12	1000 q12	1000 q12	1000 q12	1000 q8
95			1000 q24	1000 q24	1250 q24	1000 q12	1000 q12	1000 q12	1000 q12	1000 q8
100	1500 mg x 1 dose, then 1000 mg 3 x week post-dialysis	1000 q24	1250 q24	1250 q24	1000 q12	1250 q12	1250 q12	1000 q8	1000 q8	
105		1250 q24	1250 q24	1250 q24	1000 q12	1250 q12	1250 q12	1000 q8	1000 q8	
110		1250 q24	1250 q24	1000 q12	1000 q12	1250 q12	1250 q12	1000 q8	1250 q8	
115		1250 q24	1250 q24	1000 q12	1000 q12	1250 q12	1000 q8	1000 q8	1250 q8	
120		1250 q24	1250 q24	1250 q12	1250 q12	1250 q12	1000 q8	1000 q8	1250 q8	

*Actual Body Weight

GOAL TROUGH: 15-20 mcg/mL

ABW* (kg)	Creatinine Clearance (mL/min)									
	Scheduled HD (3 x times weekly)	<30	30-39	40-49	50-59	60-69	70-79	80-89	90-99	≥100
50	1000 mg x 1 dose, then 500 mg 3 x week post-dialysis	10-15 mg/kg x 1 dose (rounded to the nearest 250mg, max dose: 2000mg)	750 q24	750 q24	1000 q24	750 q12	750 q12	750 q12	1000 q12	1000 q12
55			750 q24	1000 q24	1000 q24	750 q12	750 q12	750 q12	1000 q12	1000 q12
60			1000 q24	1000 q24	1000 q24	750 q12	1000 q12	1000 q12	1000 q8	1000 q8
65			1000 q24	1000 q24	1250 q24	1000 q12	1000 q12	1000 q12	1000 q8	1000 q8
70			1250 q24	1250 q24	1250 q24	1000 q12	1000 q12	1000 q8	1000 q8	1000 q8
75	1250 mg x 1 dose, then 750 mg 3 x week post-dialysis		1250 q24	1250 q24	1250 q24	1000 q12	1000 q12	1000 q8	1000 q8	1000 q8
80			1250 q24	1250 q24	1250 q24	1000 q12	1250 q12	1000 q8	1000 q8	1250 q8
85			1250 q24	1250 q24	1000 q12	1000 q12	1250 q12	1000 q8	1250 q8	1250 q8
90			1250 q24	1250 q24	1000 q12	1250 q12	1250 q12	1000 q8	1250 q8	1250 q8
95			1500 q24	1500 q24	1000 q12	1250 q12	1250 q12	1250 q8	1250 q8	1250 q8
100	1500 mg x 1 dose, then 1000 mg 3 x week post-dialysis	1500 q24	1500 q24	1250 q12	1250 q12	1250 q12	1250 q8	1250 q8	1250 q8	
105		1500 q24	1500 q24	1250 q12	1250 q12	1250 q12	1250 q8	1250 q8	1500 q8	
110		1500 q24	1500 q24	1250 q12	1250 q12	1250 q12	1250 q8	1500 q8	1500 q8	
115		1500 q24	1500 q24	1250 q12	1250 q12	1500 q12	1500 q8	1500 q8	1500 q8	
120		1500 q24	1500 q24	1500 q12	1500 q12	1500 q12	1500 q8	1500 q8	1500 q8	

*Actual Body Weight

- Alternative Dosing Recommendation for Weights < 50kg or > 120 kg
 - Patients Weighing <50 kg

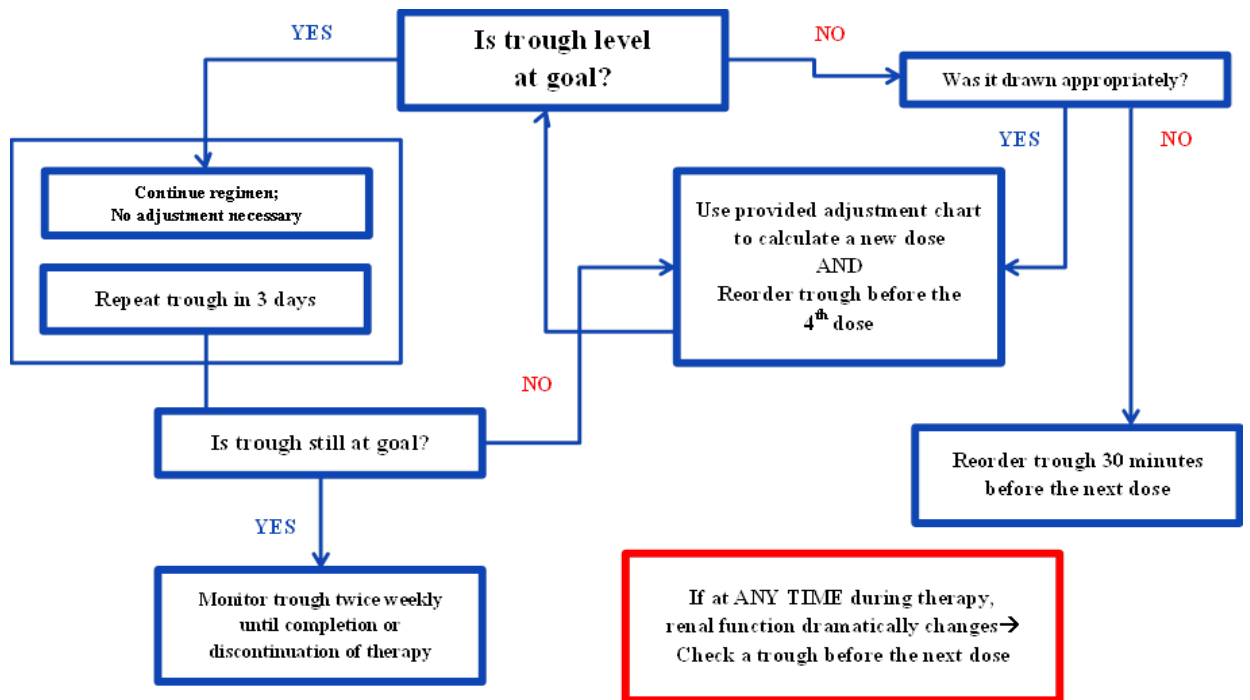
Cr Cl (ml/min)	Suggested Dose	Notes
> 50	15 mg/kg every 12 hours (or 30 mg/kg/d) <ul style="list-style-type: none"> • Some patients may require initial every 8 hour dosing (young <30yo, burn pts, IV drug users) 	-Use ACTUAL body weight -Round to nearest 250 mg
30 – 49	15 mg/kg every 24 hours	
<29	15 mg/kg X 1, then dose by levels	
IHD	Load: 15 – 20 mg/kg X 1 Maintenance: 500 mg – 750 mg after each dialysis	In patients receiving IHD give the “load” dose now followed by “maintenance” dose after subsequent dialysis
CRRT	15 mg/kg every 24 hours	If patient stopping CRRT for any reason may want to do dose X 1 and follow by levels

- 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

- **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



Trough	Recommended Adjustment
< 5	Decrease the dosage interval to the next frequency AND Consider increasing the dose by 250-500 mg
5-10	Decrease the dosage interval to the next frequency OR Increase dose by 250-500 mg
10-15	<ul style="list-style-type: none"> If goal is 10-15 mcg/mL → No change If goal is 15-20 mcg/mL → Increase dose by 250-500 mg
15-20	<ul style="list-style-type: none"> 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

Pre Dialysis Level (mcg/mL)	Recommendation
< 20	Increase post-dialysis dose by 250-500 mg
20-25	No change
>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)

- For more information please refer to: Therapeutic monitoring of vancomycin in adult patients: A consensus review of the American Society of Health-System Pharmacists, the Infectious Diseases Society of America, and the Society of Infectious Diseases Pharmacists. *Am J Health-Syst Pharm.* 2009;66:82-98.
 - <http://www.ajhp.org/content/66/1/82.full.pdf+html>

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