



DOSING AND MONITORING OF VANCOMYCIN IN PEDIATRIC PATIENTS

Patient Population/Unit/Service	Dosing Recommendations
<p>Dosing recommendations for children with normal renal function (CrCl ≥60 mL/min) except in the following situations:</p> <ul style="list-style-type: none"> • Cystic fibrosis patients • CHC patients • ECMO patients • NICU patients • Low muscle mass 	<p><u>Infants >5000 g to children <18 years:</u> 20 mg/kg/dose IV q8h (max initial dose: 1250 mg)</p> <p>*For infants ≤5000 g, refer to NICU dosing</p>
<p>Children with renal insufficiency (CrCl <60 mL/min)</p>	<p><u>CrCl 40 to <60 mL/min:</u> <12 years: 15 mg/kg IV q8h ≥12 years: 10 mg/kg IV q8h</p> <p><u>CrCl 30 to <40 mL/min:</u> <12 years: 15 mg/kg IV q12h ≥12 years: 10 mg/kg IV q12h</p> <p><u>CrCl <30 mL/min:</u> <12 years*: 15 mg/kg IV x1 dose ≥12 years*: 10 mg/kg IV x1 dose</p> <p>*Check random level between 12-24 hours after dose. Redose for level <15 mcg/mL.</p>
<p>Dosing recommendations for children on peritoneal dialysis or hemodialysis</p>	<p><u>Peritoneal dialysis:</u> 10 mg/kg/dose IV q24h</p> <p><u>Hemodialysis:</u> 10 mg/kg/dose IV x1 post dialysis</p>
<p>Cystic Fibrosis</p>	<p><u>Children <12 years:</u> 20 mg/kg/dose IV q6h (max initial dose: 900 mg)</p> <p><u>Children ≥12 years:</u> 20 mg/kg/dose IV q8h (max initial dose: 1250 mg)</p>
<p>CHC Patients</p>	<p><u>Open chest prophylaxis or patients within 72 hours of cardiac surgery:</u> 10 mg/kg/dose IV q12h</p> <p><u>Patients with depressed cardiac function/heart failure* AND ≥72 hours since last cardiac surgery:</u> 15 mg/kg/dose IV q8h</p> <p>*Depressed cardiac function/heart failure indicated by patient being on inotropes (e.g., milrinone) OR at least two of the following: ACE-inhibitor, beta-blocker, digoxin, spironolactone</p>
<p>ECMO (PICU/PCTU)</p>	<p><u>Children with normal renal function (CrCl ≥60 mL/min):</u> 15 mg/kg/dose IV q8h (max initial dose: 1250 mg)</p> <p><u>Children with renal insufficiency (CrCl <60 mL/min):</u> Refer to <i>Children with Renal Insufficiency (CrCl <60 mL/min)</i> section</p>
<p>Low muscle mass (e.g., muscular dystrophy, cerebral palsy, spinal muscular atrophy)</p>	<p>15 mg/kg/dose q8h</p>

Patient Population/Unit/Service	Dosing Recommendations
NICU	<p><u>Less than 1200 g AND 14 days or younger:</u> 15 mg/kg/dose IV q18h</p> <p><u>Less than 1200 g AND older than 14 days:</u> 15 mg/kg/dose IV q12h</p> <p><u>1200-2000 g AND 14 days or younger:</u> 15 mg/kg/dose IV q12h</p> <p><u>1200-2000 g AND older than 14 days:</u> 15 mg/kg/dose IV q8h</p> <p><u>2000-5000 g AND 7 days or younger:</u> 15 mg/kg/dose IV q12h</p> <p><u>2000-5000 g AND older than 7 days:</u> 15 mg/kg/dose IV q8h</p> <p><u>More than 5000 g:</u> 20 mg/kg/dose IV q8h</p> <p><u>ECMO:</u> 15 mg/kg/dose IV q18h</p> <p><u>Therapeutic hypothermia (cooling):</u> 15 mg/kg/dose IV q18h</p> <p><u>Peritoneal dialysis:</u> 10 mg/kg/dose IV q24h</p>

Goals of Therapy for Vancomycin:

	Therapeutic Goals
Vancomycin	<ul style="list-style-type: none"> • AUC is the preferred method of vancomycin monitoring • Goal AUC is 400-600 regardless of MIC and should not be adjusted for MICs less than or equal to 1 • Open chest prophylaxis: <ul style="list-style-type: none"> ○ trough of 5-10 mcg/mL • Pre-dialysis: <ul style="list-style-type: none"> ○ <15 mcg/mL • Dosing by levels: <ul style="list-style-type: none"> ○ trough <15 mcg/mL

Initiating Vancomycin Therapy:

1. If patient recently received vancomycin, review the previous regimen and patient information and initiate most recent therapeutic dose.
2. Doses should be based on ACTUAL body weight
3. Avoid initial doses >3600 mg per DAY.

Monitoring within 48 hours of starting vancomycin:

1. Vancomycin levels should be unnecessary if therapy not anticipated to exceed 48 hours.
2. Do not check vancomycin concentrations within the first 48 hours except in the following situations:

Clinical Situation	Monitoring Recommendation
Approximately 90% of patients will have vancomycin discontinued within 48-72 hours and most patients do not require levels	
Documented gram positive infection	<ul style="list-style-type: none"> • Obtain 2 vancomycin levels at steady state and calculate AUC to achieve goal AUC of 400-600 • Obtain a random level ~2 hours post-infusion and a trough prior to the next dose for most patients
Septic shock	
Weight >100 kg	
Children with low muscle mass (e.g., muscular dystrophy, cerebral palsy, spinal muscular atrophy)	
Significant acute changes in renal function, CrCl <30 mL/min, therapeutic hypothermia, ECMO, AKI, or neonates <72 hours old whose mothers received peri-partum vancomycin	<ul style="list-style-type: none"> • Obtain a vancomycin level and dose per level • Monitor random levels in patients and re-dose when level <15 mcg/mL

Monitoring after 48 hours of starting vancomycin:

1. Use the following table to guide monitoring of vancomycin based on the patient's clinical status:

Clinical Situation	Monitoring Recommendation
Patients with stable renal function (including patients with CKD and receiving CRRT)	<ul style="list-style-type: none"> • Obtain 2 vancomycin levels at steady state and calculate AUC to achieve goal AUC of 400-600 • Obtain a random level ~2 hours post-infusion and a trough prior to the next dose for most patients to calculate AUC • Document individualized trough range that corresponds to AUC of 400-600 for that patient
Patients on conventional dialysis	<ul style="list-style-type: none"> • Check pre-HD level • Target pre-HD levels of <15
CHC patients within 72 hours of surgery	<ul style="list-style-type: none"> • Check trough concentration • Redose for trough <10
Patients who have fluctuating fluid and/or renal status	<ul style="list-style-type: none"> • Use clinical judgement to determine monitoring strategy • It is reasonable to perform AUC or trough-based monitoring. The instability of renal clearance or volume of distribution should be taken into account when evaluating levels and subsequent dosing

2. Dose should not exceed 100 mg/kg/day at any point in therapy.
3. Consider ID consult in patients with confirmed MRSA infection who do not improve on vancomycin. ID consult should be ordered for all patients with MRSA bacteremia.
4. Refer to the following table for recommendations on frequency of ordering vancomycin levels and serum creatinine:

Clinical Situation	Monitoring Recommendation
Subsequent levels should be drawn every 1-7 days, and serum creatinine should be monitored at least every 48 hours during entire course of vancomycin therapy. Avoid evening and overnight levels if clinically stable.	
Patients with changing fluid status or renal function	<ul style="list-style-type: none"> • Obtain levels every 1-3 days • Monitor 2 vancomycin levels to facilitate AUC calculation, when possible • In patients receiving one-time doses (i.e., dosing by level), monitor random levels and re-dose when level <15 mcg/mL
Patients with stable fluid status and renal function requiring long-term therapy	<ul style="list-style-type: none"> • Obtain levels every 5-7 days, after initial level(s) are therapeutic • Once a patient is on a stable dose with an AUC between 400 and 600, monitoring of vancomycin troughs may be acceptable in patients with stable fluid status and renal function

- Red Man's Syndrome is the most common vancomycin reaction, characterized by flushing, redness of the trunk and itching during or shortly after the infusion. Treatment should include prolonging the infusion time (to 2-3 hours). Could also consider diphenhydramine.

Michigan Medicine AUC Calculator:

https://www.med.umich.edu/asp/misc/UMich_PK_Calculator.xlsx

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The recommendations in this guide are meant to serve as treatment guidelines for use at Michigan Medicine facilities. If you are an individual experiencing a medical emergency, call 911 immediately. These guidelines should not replace a provider's professional medical advice based on clinical judgment, or be used in lieu of an Infectious Diseases consultation when necessary. As a result of ongoing research, practice guidelines may from time to time change. The authors of these guidelines have made all attempts to ensure the accuracy based on current information, however, due to ongoing research, users of these guidelines are strongly encouraged to confirm the information contained within them through an independent source.

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