

Vancomycin Dosing in Hemodialysis
Northwestern Medicine West Region
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Background

Vancomycin dosing in hemodialysis (HD) patients is complicated due to variable clearance of vancomycin depending on residual renal function of the patient, type of HD filter used, and duration and settings of the hemofiltration system. Monitoring vancomycin levels in HD patients can be done either prior to a HD session or after the session.

Checking a level prior to HD is more practical in some ways in that it allows for the level to be checked from the am lab draw the day of HD resulting in fewer blood draws and less tube usage, however, this method requires interpretation of the level due to the need to estimate the amount of vancomycin removed by HD. The actual amount removed is affected by the filter used as well as the duration of the HD session. If the session is shortened due to unexpected reasons, less vancomycin will be removed, resulting in potential error in estimation of the true level if not accounted for. It is estimated that approximately 20-40% of vancomycin is removed after a HD session with a high-flux filter. Pharmacists can use this information to estimate a post-HD level from the pre-HD level.

When monitoring post-HD levels, time must be allotted for redistribution of vancomycin to the tissues after HD to avoid a falsely elevated level immediately post-dialysis. A post-HD level should be checked at least 4 to 6 hours post-HD session to account for this redistribution. This usually requires an additional blood draw at a specified time in the evening after HD, resulting in additional tube utilization, time of the phlebotomist/nurse, and inconvenience/discomfort to the patient. This method has the advantage of giving a more precise estimate of the amount of vancomycin left in the patient's system, however.

Protocol

- **Target Vancomycin level:**
 - Non-severe infection: 8-12 mcg/mL
 - Severe infection: 12-18mcg/mL
- **Loading dose:** All HD patients on vancomycin therapy will require a loading dose of approximately 20mg/kg based on actual body weight (rounded to nearest 250mg, maximum dose 2000mg x 1)
- **Maintenance dosing:** Redosing post-HD is based on level per Table 1. Consider using the higher end of the recommended dosing range, when applicable, for obese patients or patients with more severe infections/critically ill. A higher dose may also be necessary in patients with residual renal function, especially when there is a longer interval between HD sessions.
- **Monitoring:**
 - The goal with monitoring is to determine a maintenance dosing schedule that will maintain consistent pre-HD levels within the target range
 - After the initial loading dose, draw a pre-HD level in the am on the day of HD prior to the next two HD sessions and redose with the recommended maintenance dose per the below table (Table 1)
 - Post-HD levels may be considered if deemed necessary by the pharmacist based on patient's clinical status, residual renal function, and/or variations in HD that may affect the level (e.g., critically ill or severe infection)
 - If two consecutive levels result in the same maintenance dose and a schedule can be safely established, once-weekly monitoring of pre-HD levels is recommended
 - Checking a level prior to each HD session in a stable patient is not recommended
 - If a HD session must be stopped early, a planned maintenance dose may need to be held due to the likelihood of less vancomycin being cleared from the blood

Table 1 : Vancomycin Maintenance Dose Recommendations¥

Serum Vancomycin Concentration (mcg/mL)	Mild-Moderate Infection* Post-HD Dose (mg)	Severe/Deep-seated Infection^ Post-HD Dose (mg)
Pre-HD Level		
<10	750	750-1250
10-15	500	500-750
15.1-20	Hold	Consider 500
>20	Hold	Hold
Post-HD Level (4-6 hr post HD)		
<10	500-750	750
10-15	Hold	500
15.1-20	Hold	Consider 500 if making urine
>20	Hold	Hold

¥Recommendations adapted from Appendices A and B in reference 1 with doses reduced to target lower trough levels; consider higher dose if obese, critically ill, or residual renal function, especially when there will be a longer interval between HD sessions (e.g., after Friday session when next session isn't until Monday)

*Mild-moderate infections include urinary tract, skin/soft tissue, uncomplicated blood stream infections

^Severe/Deep-seated infections include septic shock, pneumonia, bone/joint, endocarditis, CNS, complicated blood stream infections

References

1. Crew P, Heintz SJ, Heintz BH. Vancomycin dosing and monitoring for patients with end-stage renal disease receiving intermittent hemodialysis. *AJHP* 2015; 72:1856-64. DOI: 10.2146/ajhp150051.
2. Rybak MJ, et al. Therapeutic monitoring of vancomycin for serious methicillin-resistant *Staphylococcus aureus* infections: a revised consensus guideline and review by the ASHP, the PIDS, and the SIDP. *AJHP* 2020; 77(11):835-864. DOI: 10.1093/ajhp/zxaa036.