

Procedure Title	Vancomycin and Aminoglycoside Therapeutic Drug Monitoring Nursing Procedure	Procedure ID	234
Keywords	vancomycin, vanco, tobramycin, gentamicin, drug, level, peak, trough, streptomycin, tobramycin, gentamicin, drug, level, aminoglycoside		

I. Purpose

To standardize nursing practice around the timing and drawing of serum vancomycin and aminoglycoside drug monitoring levels in order to create an efficient system that:

- Minimizes waste by decreasing the number of repeat drug levels needed due to inaccurate levels.
- Promotes timely administration of antibiotics without delay.

II. Procedure Scope

Applies to all staff who administer vancomycin or aminoglycoside antibiotics and to RNs, phlebotomists and vascular access nurses who draw the serum drug monitoring levels at Mary Hitchcock Memorial Hospital (MHMH).

III. Definitions

Aminoglycoside Antibiotics: A group of antibiotics that include: amikacin, gentamicin, and tobramycin.

Trough Level: A blood test drawn at the time when the drug concentration in the blood is at its lowest level immediately prior to the next scheduled dose. Trough levels should be drawn within 60 minutes prior to the next scheduled dose and ideally at 30 minutes prior to the next scheduled dose.

Peak Level: A blood test drawn at the time when the drug concentration in the blood is near its highest level after administration of an antibiotic dose. Peak levels should be drawn 30 minutes after completed administration of an aminoglycoside, and 60 minutes after completed administration of vancomycin.

Random Level: A blood test drawn after antibiotic administration that is neither a peak nor trough level. Random levels are often utilized with extended interval aminoglycoside dosing or if there is concern for worsening renal function to ensure a patient is not developing toxic levels.

Central Venous Catheter (CVC): Any long-term vascular catheter with its terminal tip residing in the central venous vasculature. This includes PICC lines (peripherally inserted central venous catheters) and centrally inserted venous catheters (including hemodialysis catheters and subcutaneously implanted mediports).

MAR Order Reminder: An eDH order that appears in the medication administration record (MAR) to remind nurses of the date and time that a drug level needs to be drawn at. This MAR reminder requires acknowledgement from the nurses that the drug level order was released.

IV. Equipment N/A

V. Procedure

Printed copies are for reference ONLY. Please refer to the electronic copy for the latest version.

Reference ID # 234, Version # 3

Approval Date: 10/21/2022

A. Determine Timing of Blood Draw

- At beginning of shift, nurse reviews timing of draws and if necessary notifies Phlebotomy or Vascular Access of planned time for the draw (where Phlebotomy or Vascular Access perform draws).
- Draw **trough** levels within 60 minutes (ideally 30 minutes) prior to the next scheduled dose. The new drug level MAR Order Reminder will be scheduled by Pharmacy 30 minutes before the dose of the antibiotic is due.
 1. Nurse: release the order for the PRN trough level in eDH 60 minutes BEFORE the MAR Order Reminder is due to be acknowledged (90 minutes before the dose of antibiotic is due) by the following steps:
 - i. Enter the “active orders” section of eDH and release the PRN trough level order.
 - ii. Acknowledge the MAR Order Reminder and select “lab order released” from the “action” drop down menu.
 - iii. If “lab order not released” is selected from the drop down menu, the nurse needs to enter a reason in the comments field.
 2. Print lab slips and place in the RN, Phlebotomy, or Vascular Access draw buckets.
 3. Page the person performing the blood draw (Phlebotomy or Vascular Access) to notify them of the need for a Timed Lab Draw and specify the time at which the blood draw is due (which is the same time as the scheduled MAR Order Reminder time). Page 60 minutes before the due time.
 4. If the person performing the blood draw hasn’t arrived to draw the blood by 30 minutes prior to the next scheduled dose, page a second time, noting this as the second page.
 5. If the nurse is performing the blood draw, he/she should draw the blood at the scheduled time.
- Draw **peak** drug levels 30-60 minutes after the end of antibiotic infusion (30 minutes for aminoglycosides, 60 minutes for vancomycin). The new MAR Order Reminder will be scheduled by pharmacy for 30 minutes (for aminoglycosides) or 60 minutes (for vancomycin) after the end of antibiotic infusion.
 1. Nurse: release the PRN peak level order in eDH 60 minutes BEFORE the MAR Order Reminder is due to be acknowledged (30 minutes prior to the end of aminoglycoside infusion, or immediately at the end of vancomycin infusion) by the following steps:
 - i. Enter the “active orders” section of eDH and release the PRN peak level order.
 - ii. Acknowledge the MAR Order Reminder and select “lab order released” from the “action” drop down menu.
 - iii. If “lab order not released” is selected from the drop down menu, the nurse needs to enter a reason in the comments field.
 2. Print lab slips and place in the RN, phlebotomy, or vascular access draw buckets.
 3. Page the person performing the blood draw (phlebotomy or vascular access) to notify them of the need for a Timed Lab Draw and specify the time at which the blood draw is due (which is the same time as the scheduled MAR Order Reminder time). Page 60 minutes before the due time.
 4. If the person performing the blood draw hasn’t arrived to draw the blood by 30 minutes after the end of an aminoglycoside infusion, or 60 minutes after the end of a vancomycin infusion, page a second time, noting this as the second page.
 5. If the nurse is performing the blood draw, he/she should draw the blood at the scheduled time.

- Draw **random** drug levels at the specified time according to the MAR Order Reminder.
 1. Nurse: release the random PRN drug level order in eDH 60 minutes **BEFORE** the MAR Order Reminder is due to be acknowledged by the following steps:
 - i. Enter the “active orders” section of eDH and release the PRN random drug level order.
 - ii. Acknowledge the MAR Order Reminder and select “lab order released” from the “action” drop down menu.
 - iii. If “lab order not released” is selected from the drop down menu, the nurse needs to enter a reason in the Comments field.
 2. Print lab slips and place in the RN, Phlebotomy, or Vascular Access draw buckets.
 - i. Page the person performing the blood draw (phlebotomy or vascular access) to notify them of the need for a Timed Lab Draw and specify the time at which the blood draw is due (which is the same time as the scheduled MAR Order Reminder time). Page 60 minutes before the due time.
 - ii. If the person performing the blood draw hasn’t arrived to draw the blood by the scheduled time, page a second time noting this as the second request.
 - iii. If the nurse is performing the blood draw, he/she should draw the blood at the scheduled time.

B. Determine Type of Blood Draw

Special Considerations: Levels should ideally be drawn via a peripheral venipuncture and not through a central venous catheter (CVC). The data is conflictual, but case reports and lower quality studies have shown that drawing blood through a CVC may lead to falsely elevated drug levels adversely affecting clinical management.¹⁻⁸ Drawing blood through a CVC for the purpose of monitoring drug levels is also discouraged by the MHMH Chemistry lab because of the risk for blood sample contamination leading to inaccurate level.⁹

- **Adult** patients: Draw antibiotic drug levels from a peripheral venipuncture for all patients, if possible, even those with an existing mediport, PICC line, or centrally inserted venous catheter.
- **Pediatric** patients: Draw antibiotic levels from an existing PICC line or centrally inserted venous catheter, if available; otherwise the patient will need a peripheral venipuncture.
- Avoid blood draws for antibiotic levels through subcutaneous ports (i.e. Mediports).
- If a CVC is needed for blood level monitoring, perform antibiotic administrations and blood sampling through different ports and flush the catheter by following the procedure below:¹⁰
 - Clearly identify and label the port to be used for drug administration and the port to be used for blood draws.
 - If administering an antibiotic through an existing CVC (from earlier in a hospitalization or from an outside hospital placement), and it is unknown which catheter port has been used to administer antibiotics, pick one port and label it for subsequent future administration.
 - If the patient only has a single port CVC, or if it is unknown which port the antibiotic was infused through, follow the flush procedure below.

- CVC flush procedure:
 - **Adults:** flush the catheter with 20 mLs of sterile normal saline, draw a 6-10 mL discard specimen, then obtain the testing sample per procedure.¹¹
 - **Pediatrics:** For children who weigh more than 10 kg, flush the catheter with 10 mL's of sterile normal saline, draw a 2-3 mL discard specimen, then obtain the testing sample per procedure. For children who weigh less than 10 kg, flush the catheter with 1 mL of sterile normal saline, draw a 2-3 mL discard specimen, then obtain the testing sample per procedure.^{11,12}

C. Administer Antibiotic after a Blood Draw

- Do not withhold a scheduled antibiotic while waiting for the Lab to process the blood sample UNLESS there is an order (verbal or electronic order) from either the responsible healthcare provider or the floor pharmacist. Draw the antibiotic blood level and then give the antibiotic at the scheduled time to avoid delays in antimicrobial therapy.

VI. References

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Responsible Owner:	Antimicrobial Subcommittee of Pharmacy & Therapeutics (P &T)	Contact(s):	Amanda Gilcrest
Approved By:	Nursing Policy Oversight Committee (NPOC) -Inpatient; Office of Policy Support - All Other Documents P & T	Version #	3
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Related Polices & Procedures:	Dosing and Therapeutic Drug Monitoring (TDM) for Intravenous Vancomycin and Aminoglycosides - Provider/Pharmacist Policy Dosing and Therapeutic Drug Monitoring Procedure for Intravenous Vancomycin and Aminoglycosides - Pharmacist		
Related Job Aids:			