UCSF Health

NEONATAL PEDIATRIC NURSING PROCEDURE

ANTIMICROBIAL LOCK THERAPY

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Critical Points

1. Selection and decision to utilize Antimicrobial Lock Therapy (ALT) - antibiotic or ethanol - should be made in conjunction with Pediatric Infectious Diseases and/or Clinical Pharmacy to ensure proper usage and continuity of care upon discharge.
2. ALT is indicated for documented catheter-related infections, and may also be used for prophylaxis in patients with history of central line associated infections. ALT orders require Infectious Disease (ID) consultation and/or Antimicrobial Stewardship Program (ASP) approval.
3. Ethanol lock therapy may be used as an alternative to antibiotic lock based on catheter type and/or organism involved.
4. ALT is not intended for systemic use (i.e., IV infusion or IV push administration).
5. ALT is often used in addition to the same antibiotic given systemically because it achieves high concentrations locally at the desired site of action (i.e., biofilm within catheter lumen).
6. ALT will be used for a minimum duration of 4 hour dwell time, however a longer duration is desirable to a maximum of 24 hours. The ALT may be used to fill additional windows of available time of >/= 4 hours in the catheter lumen(s), dependent on clinical status of patient. Frequency and dwell time should be determined in multidisciplinary discussion that includes bedside nurse. This may be an exception to the CVC heparin flush lock critical point that describes any CVC that must be accessed more than twice in 24 hours is to be maintained as a continuous infusion to avoid multiple entries.
7. If a central line has more than one lumen, and regardless of which or how many of the lumens cultured positive, *all* lumens should be treated with ALT.
8. Any lumen that does not have an available minimum of 4 hours for ALT, the infusion going through that lumen should be moved on a 24 hour schedule to allow every lumen to receive ALT (Exception: IV Tacrolimus and CSA must remain in dedicated lumen and this lumen will not receive ALT).
   Example: ALT once or three times daily:
   a. Day 1:
      i. Lumen 1: 30 min Cefazolin IV Q8h, ALT Q24h during one or all three 7.5 hour periods of time.
      ii. Lumen 2: Continuous TPN
   b. Day 2:
      i. Lumen 1: Continuous TPN

Antibiotic and Ethanol Lock Administration *(continued)*

ii. Lumen 2: 30 min Cefazolin IV Q8h, ALT Q24h during one or all three 7.5 hour periods of time.

9. Contraindications:

a. Antibiotic locks containing heparin should not be used in any patients with heparin-induced-thrombocytopenia (HIT).

b. Ethanol locks are not to be used:

i. In polyurethane (i.e., power) catheters; ethanol locks are only compatible with silicone catheters
ii. In patients < 5 kg
iii. In patients who are pregnant or breastfeeding
iv. In patients allergic to ethanol
v. Concurrently with oral or intravenous metronidazole (within 48 hours), disulfuram (within 7 days), isoniazid (within 24 hours), or any ethanol-containing medication
vi. In patients with unstable hepatic function or hepatic dysfunction
vii. In patients receiving concurrent heparin or citrate anticoagulant fluid (i.e., CRRT, TPN with heparin) through same catheter; ethanol and heparin/citrate combination may form a precipitate
viii. In patients with personal or religious exclusion to ingestion of ethanol

Supplies

- Saline flush syringes
- Disinfection swabs (alcohol or CHG)

Procedure

Ordering and Dosing

1. Pharmacy and nursing determine the ALT dosing based on type of central line and patient weight. The antibiotic may be mixed with a solution (e.g., heparin or sodium citrate) to maintain lumen patency.
2. Pharmacy will send a syringe with the appropriate ALT dose and dwell time instructions.
3. Dose/volume of antimicrobial lock:

Antibiotic Lock

Patient weight	Volume of lock to instill
</= 2.5 kg	1 mL
> 2.5 kg with PICC, tunneled or non-tunneled CVC	2 mL
> 2.5 kg with implanted vascular access port	5 mL

Ethanol Lock

Patient weight	Volume of lock to instill
>/= 5 kg	1 mL
>/= 10 kg with PICC, tunneled or non-tunneled CVC	2 mL

Antibiotic and Ethanol Lock Administration *(continued)*

>/= 20 kg with implanted vascular access port	5 mL
>/= 40 kg	5 mL

Administration

1. Verify patient and procedure using two patient identifiers.
2. Perform hand hygiene and don clean gloves.
3. Disinfect injection cap and allow to dry for requisite time period.
4. Attach pre-filled saline syringe and flush CVC with 1-10 mL (follow unit guidelines); remove and discard syringe.
5. Disinfect injection cap and allow to dry for requisite time period.
6. Attach ALT syringe to injection cap.
7. Instill ALT and discard syringe.
8. Clamp catheter and allow ALT to dwell in catheter for ordered amount of time.
9. Document in patient's medical record which catheter and/or lumen received ALT.

Post- ALT Steps

10. When dwell time complete, flush ALT through catheter lumen (do not aspirate) by attaching a pre-filled saline syringe to flush lumen with 1-10 mL of saline (follow unit guidelines); then remove and discard syringe.
11. Resume IV therapy or flush-lock catheter as per orders.

Troubleshooting

Problem	Suspected issue	Action
Continuous IV Tacrolimus or Cyclosporine infusing	• Movement of Tac or CSA to alternate lumen will prevent ability to draw levels from those lumens	• Dedicate lumen to Tac/CSA and that lumen will not receive ALT
Power catheter and desire ethanol lock therapy	• Polyurethane (i.e., power) catheters are not compatible with ethanol locks	• Select alternate ALT; specifically, antibiotic
Very short or no window of time to allow ALT to dwell	• Frequency of IV medications do not allow for ALT dwell time	• Multidisciplinary team to discuss changes in frequency of IV meds, or plan to readdress access availability on a daily basis

Antibiotic and Ethanol Lock Administration *(continued)*

References

Level of Evidence (FAME*)	Level*	Reference
	E1	Bookstaver, B., & Justo, J. A. (2014). Antibiotic lock therapy: review of technique and logistical challenges. Infection and Drug Resistance, 343. https://doi.org/10.2147/idr.s51388
	E1	Bookstaver, P. B., Rokas, K. E. E., Norris, L. A. B., Edwards, J. M., & Sherertz, R. J. (2013). Stability and compatibility of antimicrobial lock solutions. American Journal of Health-System Pharmacy, 70(24), 2185–2198. https://doi.org/10.2146/ajhp120119
	E4	Centers for Disease Control and Prevention. Guidelines for the Prevention of Intravascular Catheter-Related Infections, 2011.

* FAME Scale details: See nursing policy *Policy, Procedure, & Competency Development, Review, & Approval*

Procedure History

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	Ethanol Lock Guidelines: 02/14, Jane Huh, PharmD and Dominic Chan, PharmD
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