

Antibiotic Lock Therapy Guideline

I. PURPOSE

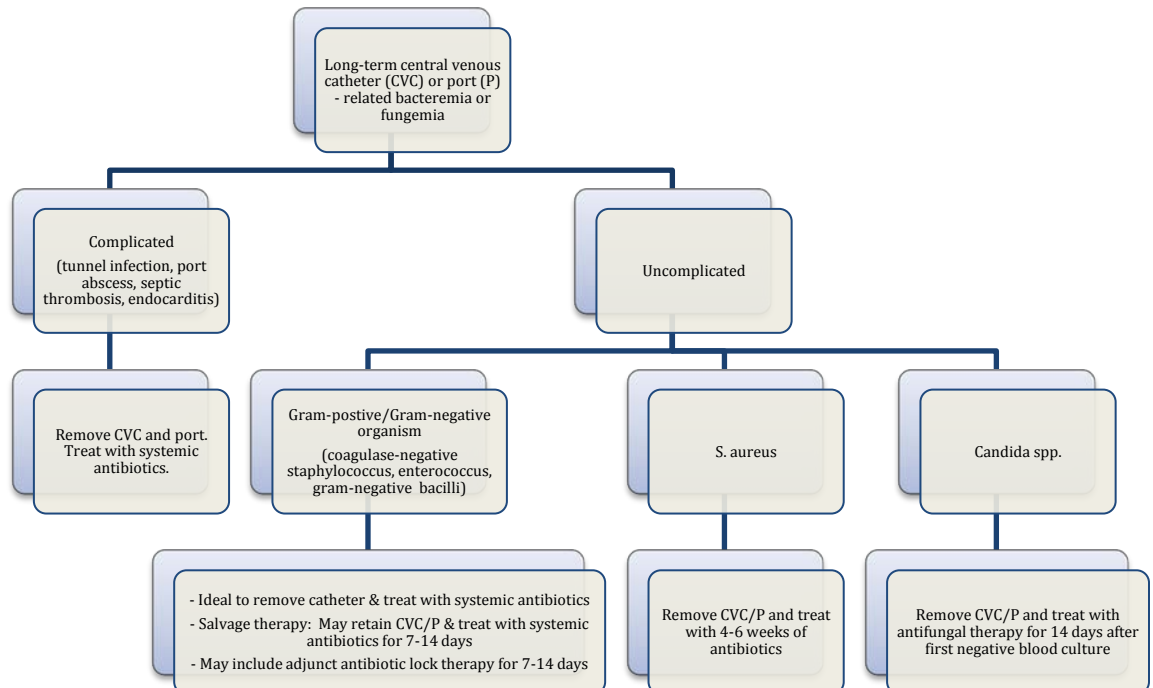
Central venous catheters are an integral part in medical management for patients requiring long-term total parenteral nutrition, chemotherapy, or hemodialysis, however their use carries the risk of developing catheter-related bloodstream infections (CRBSI). Antibiotic lock therapy, a method for sterilizing the catheter lumen, involves instilling high concentrations of antibiotics into the catheter lumen for extended periods of time. Results from in vitro studies demonstrate stability of antibiotics while maintaining high concentrations for prolonged periods of time. In vivo studies show antibiotic lock technique as an effective and safe option for both prevention and treatment of CRBSIs.

II. POLICY

A. Indications:

- Antibiotic lock is indicated for patients with catheter related bloodstream infections involving long-term catheters with no signs of exit site or tunnel infection for whom catheter salvage is the goal
- For CRBSI, **antibiotic lock therapy should not be used as monotherapy**; It should be used in conjunction with systemic antimicrobial therapy
- Dwell times for an antibiotic lock solution should not exceed 48 hours before reinstallation of lock solution; preferably reinstallation should take place every 12-24 hours
- Catheter removal is generally recommended for CRBSI due to *S.aureus* and *Candida* species instead of treatment with antibiotic lock and catheter retention

B. IDSA Treatment Guideline Algorithm:¹



III. PROCEDURES

A. Antibiotic Lock Solutions¹

Antibiotic	Concentration (mg/mL) in NS	Heparin (units/mL)
Vancomycin	2.5	2500
Cefazolin	5.0	2500
Ceftazidime	0.5	100
Ciprofloxacin	0.2	5000
Gentamicin	1.0	2500
Ampicillin	10.0	5000

ID consult required for antimicrobial locks that are not listed

B. Pharmacy Technician Preparation Instructions

Antibiotic Solution final concentration	Pharmacy preparation instructions
Vancomycin 2.5 mg/mL + heparin 2500 units/mL	<ol style="list-style-type: none"> 1. Dilute 500 mg of vancomycin with 10 mL of NS (50 mg/mL) 2. Remove 1 mL and further dilute with 9 mL of sodium chloride resulting in a vancomycin concentration of 5 mg/mL – Label as “solution A” 3. Draw up 1.5 mL of 5,000 units/mL heparin into a syringe and mix with 1.5 mL of solution A (vancomycin 7.5mg) for 3 mL of final solution *If a precipitate appears when mixing vancomycin with heparin, continue agitating the solution for ~10 seconds until the precipitation resolves
Cefazolin 5 mg/mL + heparin 2500 units/mL	<ol style="list-style-type: none"> 1. Dilute 500 mg cefazolin vial with 10 mL of normal saline (50mg/mL) 2. Remove 1 mL of the cefazolin 50mg/mL solution and further dilute with 4 mL of NS resulting in a cefazolin concentration of 10 mg/mL – Label as “Solution A” 3. Draw up 1.5 mL of heparin 5,000 units/mL into a syringe and mix with 1.5 mL of Solution A (cefazolin 15mg) 4. Dispense 3mL of the final solution
Ceftazidime 0.5 mg/mL + heparin 100 units/mL	<ol style="list-style-type: none"> 1. Dilute 1000 mg ceftazidime product with 10 mL of NS, for a concentration of 100 mg/mL – Label as “solution A” 2. Remove 1 mL of solution A (ceftazidime 100mg) and further dilute with 19 mL of sodium chloride resulting in a ceftazidime concentration of 5 mg/mL – Label as “Solution B” 3. Withdraw 1 mL of solution B (5 mg) and further dilute with 5 mL of NS for a final concentration of 1 mg/mL – Label as “Solution C” 4. Withdraw 1.5 mL of solution C (ceftazidime 1.5mg) and add 0.3 mL of heparin 1,000 units/mL 5. QS to 3 mL with NS
Ciprofloxacin 0.2 mg/ml + heparin 5000 units/mL	<ol style="list-style-type: none"> 1. Starting with a ciprofloxacin 200mg/20mL vial, withdraw 0.06 mL of ciprofloxacin solution (ciprofloxacin 0.6 mg) – label as “solution A” 2. Add 1.5 mL of heparin 10,000 units/mL to solution A (ciprofloxacin 0.6 mg) 3. QS to 3 mL with NS
Gentamicin 1 mg/mL + heparin 2500 units/mL	<ol style="list-style-type: none"> 1. Using 10 mg/mL (2 mL vial) gentamicin, withdraw 1 mL (10mg) and further dilute with 4 mL of NS for a final concentration of 2mg/mL – Label as “solution A” 2. Withdraw 1.5 mL of solution A (gentamicin 3mg) 3. Add 1.5 mL of heparin 5,000 units/mL to the 1.5 mL of solution A, for a total volume of 3 mL
Ampicillin 10 mg/mL + heparin 5,000 units/mL	<ol style="list-style-type: none"> 1. Dilute 1000 mg of ampicillin in 10 mL of NS (100 mg/mL) 2. Withdraw 0.5 mL of the ampicillin 100 mg/mL solution (ampicillin 50mg) 3. Add 1.5 mL of heparin 10,000 units/mL 4. QS to 5 mL with NS 5. Dispense 3mL of final solution

C. Administration Instructions:

1. Prior to installation of antibiotic lock, withdraw contents from catheter lumen
2. Flush catheter with normal saline
3. Instill antibiotic lock solution to fill catheter lumen
 - a. Refer to Table 2 for catheter volumes
 - b. Dialysis catheters have catheter volumes written on the catheter “legs”
4. Label the catheter: “DO NOT USE- Antibiotic Lock”
5. Allow lock solution to dwell for a period of time specified by the physician order
 - a. Usual treatment duration: 6-12 hours twice daily
6. After dwell time is complete, aspirate antibiotic lock solution from catheter lumen
7. Flush catheter with normal saline before using line to administer medication

D. Storage & Stability:²

Lock Solution	Stability
Vancomycin	72hr at room temp ³
Cefazolin	72hr at room temp ³
Ceftazidime	7 days at room temp ⁴
Ciprofloxacin	7 days at room temp ⁵
Gentamicin	72hr at room temp ³
Ampicillin	24hr at room temp ^{6,7}

E. Precautions/Contraindications

- a. Documented allergy/hypersensitivity reaction to the specific antibiotics
- b. Documented allergy/hypersensitivity reaction to heparins (Heparin-induced-thrombocytopenia)

F. Catheter Volumes for Commonly Used Central Line Catheters

Please note: The volumes listed are for full catheter length; catheters may be shortened when placed

Tunneled Catheters (Hickman, Broviac, Leonard Catheters (Note: Volumes listed are for full catheter length; catheters may be shortened when placed))	
Catheter	Catheter Volume Per Lumen
9 Fr Single Lumen	1.8 ml
9 Fr Double Lumen (small lumen)	0.6 ml
10 Fr Double Lumen	1.3 ml
10 Fr Triple Lumen	
Red	1.4 ml
Blue	0.8 ml
White	0.8 ml
12 Fr Double Lumen	1.8 ml
12.5 Fr Triple Lumen	
Proximal	1 ml
Mid	1 ml
Distal	1.5 ml

Venous Access Devices “Port-a-caths” (Note: Volumes listed are for full catheter length; catheters may be shortened when placed)	
Catheter	Catheter Volume Per Lumen
Bard MRI Ports	
Single lumen	2.1 ml
Double lumen	1.8 ml
MRI low-profile, single and double lumen	1.6 ml
Bard Rosenblatt “ Slim Port ” double lumen (Differentiation between proximal and distal lumens may be impossible once port is in place)	
Proximal lumen	0.64 ml
Distal lumen	0.57 ml

Power Ports Catheters	
Ports	Volume Per Lumen
DL Power port	1.5 ml
8 Fr SL Power port	1.5 ml
6 Fr SL Power port	1.22 ml
9.5 Fr SL Power port	1.5 ml
8 Fr SL Groshong Power port	1.5 ml
Catheters	
5 Fr SL Power Hohn	0.62 ml
6 Fr DL Power Hohn	0.61 ml
5 Fr SL Power Line	0.62 ml
6 Fr DL Power Line	0.61 ml
8 Fr SL Power Hickman	1.5 ml
9.5 Fr DL Power Hickman	1.3 ml

IV. DOCUMENT INFORMATION

A. Original Author/Date

- i. 06/2011 – Emily Mui, PharmD, BCPS

B. Gatekeeper

- i. Pharmacy Department
- ii. Antimicrobial Stewardship Program

C. Distribution and Training Requirements

- i. This policy resides in the Policy and Procedure Manual located in the Department of Pharmacy

D. Review and Renewal Requirements

- i. This document will be reviewed every three years. The Antimicrobial Subcommittee must approve any changes

E. Revision/Review History

- i. 05/2013 – Emily Mui, PharmD
- ii. 01/2015 – Emily Mui, PharmD

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