

# ADULT VENTRICULAR ASSIST DEVICE-SPECIFIC INFECTIONS

#### I. Purpose

A. This guideline provides recommendations for clinicians caring for adult patients with a left ventricular assist device (LVAD) who have suspected device-specific infection, irrespective of device type. These recommendations will be implemented as per individual patient and physician needs.

#### II. Background

A. Epidemiology: infection is a common complication following LVAD implantation. The reported incidence of has ranged from 28-66%. The most common pathogens are *Staphylococcus* spp, *Pseudomonas aeruginosa*, and *Enterococcus* spp.

# B. Definitions:

- i. VAD-specific infection may involve any aspect of the device (pump, cannula, pocket or driveline) and may cause sepsis
- ii. Culture-positive clinical signs of infection with supporting culture data (e.g., positive wound or blood cultures)
- iii. Culture-negative clinical signs of infection with negative or no culture data (e.g., erythema at driveline site without drainage)
- iv. Serous drainage non-purulent drainage with no clinical signs of infection, antibiotic therapy not warranted as likely non-infectious etiology
- v. SIRS (systemic inflammatory response syndrome) criteria presence of two or more of the following: temperature greater than 38°C or less than 36°C; heart rate greater than 90 beats/min; respiratory rate greater than 20 breaths/min; WBC greater than 12 K/uL, less than 4 K/uL, or greater than 10% bands
- C. Pathogenesis: Infection may be introduced intra-operatively in the pump, cannula or pocket, may enter via the driveline exit site, or may occur as a result of a bloodstream infection (BSI) from another focus of infection.
- D. Risk factors may include the following: older age; diabetes; renal failure; severity of heart failure; malnourishment; indwelling lines, drainage tubes, urinary catheters, endotracheal tubes, and pulmonary artery catheters; obesity; delayed sternal closure; prolonged hospitalization/ICU stay; longer duration of MCS support; trauma to driveline; exposed velour

#### III. Prevention

- A. Utilize driveline immobilization
  - i. Anchor(s) for all patients
  - ii. Binders as determined necessary by VAD team
- B. Dressing procedures
  - i. See the following source for exit site care guideline and video:
    - a. <u>https://cardiac-surgery.i.medicine.umich.edu/vad-program/staff-education</u>
  - ii. Frequency
    - a. New implant driveline exit site dressing changes will occur every 3 days. Dressing changes may occur more frequently if deemed clinically appropriate by the VAD team (for example, in the setting of significant drainage).
    - b. Dressing changes will be transitioned to weekly dressing changes at the discretion of VAD team at follow-up clinic visits.
- C. Hygiene/Bathing
  - i. Patients may shower once driveline is fully incorporated and well healed, when deemed appropriate by the VAD team. This assessment will be made at follow-up VAD clinic appointments.
    - a. For weekly dressing changes, patients may shower up to twice weekly (patients are allowed two dressing kits per week)
  - ii. Peripherals must be covered with appropriate protection provided by the VAD team
  - iii. Use appropriate waterproof dressing (e.g. water tight plastic wrap or a shower shield) as recommended by the VAD team to cover driveline exit site during bathing
  - iv. After bathing, driveline should be cleaned and fully dry. Apply new dressing per exit side care guideline above.
- D. Driveline Assessment and Follow-up
  - i. Each clinic visit and as needed
  - ii. Assessment: signs of infection, trauma, line damage, or torsion



iii. Masks and gloves should be worn when assessing the driveline exit site

# IV. Empiric Treatment

Driveline infection           New or increased drainage from exit site with local signs of infection (increased pain, erythema, warmth around exit site) ± SIRS criteria         • In clinically stable patients, "Watch and culture" method is preferred. Send drainage for culture and use, results to guide antibiotic thrapy.         • In patients with persistent the end of treatment course         • In patients with persistent drainage or culture" method is genered. Culture" negative: First line: Culture negative: First line: Doxycycline 100 mg P0 TID High-risk allergy to cepholospoints**: Doxycycline 100 mg P0 TID High commend inpatient admission or 1 Cr(TTF/TEE recommended if blood cultures are positive)         • In patients with persistent drainage but no local signs of infection as described here, continuation of antibiotics may be appropriate on t recommended.           Siss Scriteria Settic shock!         • Recommend inpatient admission or 1 (TTF/TEE recommended if blood cultures are positive)         • In patients with persistent drainage but no local signs of infections are on culture results. MID to moderate, purulent; Mid to moderate,	Clinical Setting	Recommended Therapy	Duration	Comments		
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Clinical Setting	Recommended Therapy	Duration	Comments
pocket site ± SIRS criteria) OR <b>Pump Infection</b> OR <b>Cannula Infection</b>	<ul> <li>Recommend consulting infectious diseases and cardiothoracic surgery</li> <li><u>Empiric:</u> Vancomycin IV (pharmacist to dose) + cefepime* 2 g IV q8h</li> </ul>		<ul> <li>in patients who are critically ill and failing to respond to antibiotic therapy.</li> <li>The final antibiotic treatment plan will be individualized for patients with bacteremia and recurrent infections by the infectious diseases consult</li> </ul>
	Alternative for vancomycin, if documented severe allergy (not vancomycin infusion reaction): Daptomycin* 6 mg/kg IV q24h Alternative for cefepime, if high-risk allergy**: Aztreonam* 2 g IV q8h		team.

\* Dose adjustments necessary in patients with renal insufficiency. See <u>Antimicrobial Dosing Recommendations</u>.

\*\* See <u>Beta-lactam Allergy Evaluation and Empiric Therapy Guidance</u>. High-risk allergies are defined as: respiratory symptoms (chest tightness, bronchospasm, wheezing, cough), angioedema (swelling, throat tightness), cardiovascular symptoms (hypotension, dizzy/lightheadedness, syncope/passing out, arrhythmia), anaphylaxis. If a patient has a high-risk allergy to penicillins, cephalosporins, or carbapenems, the only beta-lactam antibiotic that can be safely used without Allergy consult is aztreonam (if the allergy is to ceftazidime or aztreonam, aztreonam should be avoided as well).

#### V. References

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# VI. Authors & Consultants

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# VII. Approval

- A. Medical VAD committee meeting 10/17/19
- B. Antimicrobial Subcommittee 11/18/19
- C. Pharmacy and Therapeutics Committee 2/18/2020

Antimicrobial Subcommittee Approval: 11/2019	Originated: 02/2020
P&T Approval: 02/2020	Last Revised: 03/2022

**Revision History:** 

09/21: Updated vancomycin infusion reaction terminology

03/22: Revised Prevention section

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.

If obtained from a source other than med.umich.edu/asp, please visit the webpage for the most up-to-date document.