ORANGE COUNTY EMERGENCY MEDICAL SERVICES
BASE HOSPITAL TREATMENT GUIDELINES

VENTRICULAR ASSIST DEVICE – PEDIATRIC

BASE GUIDELINES

1. Monitor any cardiac rhythm Note: The ECG heart rate will be different from the pulse rate since the VAD is not synchronized with the native heart. The pulse rate reflects the rate supporting perfusion.
2. Establish IV access.
3. Treat symptoms and signs according to applicable treatment guidelines.
4. Defibrillation/cardioversion pads placement is not affected by the LVAD.
   - ▶ VAD patients may also have an Implanted Cardioverter-Defibrillator (ICD) or pacing ICD.
5. Ventricular dysrhythmias may continue to perfuse through the VAD pump.
6. For pulmonary edema with hypotension and 'red heart' alarm initiate hand pumping in first generation (displacement pulsatile) VADs.
   - ▶ Thoratec HeartMate™ VADs operated either as a pulsatile displacement pump (first generation) or as a nonpulsatile axial turbine (second generation).
7. Loss of cardiac output from VAD failure and a 'red heart' alarm may present as dyspnea, nausea, hypotension, syncope, loss of consciousness or pulmonary edema. In the absence of a 'red heart' alarm look for other causes.
8. For hypotension with lungs clear and no signs of CHF/pulmonary edema:
   - ▶ **Normal Saline, infuse 20 mL/kg** (maximum single bolus of 250 mL), may repeat twice to maintain perfusion.
9. Collect all VAD equipment including the power base unit, spare batteries, spare controller unit and hand pump (for first generation VADs) as directed by the caregiver and VAD Program Coordinator (if on the telephone) and transport with the patient and caregiver.

ALS STANDING ORDER

1. Assess patient and establish telephone contact with the patient's Left Ventricular Assist Device (LVAD) coordinator to determine a pre-established treatment management plan.
2. Contact Base Hospital/CCERC (pediatric base preferred) and provide report of event and pre-established treatment plan.
3. If patient is **apneic and unresponsive or unconscious:**
   - ▶ **Initiate CPR** (including chest compressions)
4. Vital sign measurements may be misleading or not possible to measure; indications of poor perfusion (poor cardiac output) include:
   - Altered level of consciousness
   - Dyspnea
   - Nausea, vomiting
   - Poor skin perfusion signs, diaphoresis
5. For hypotension with clear lungs and no signs of CHF/pulmonary edema:
   - ▶ **Normal Saline, infuse 20 mL/kg**, may repeat 2 times to maintain perfusion.
6. Obtain blood glucose and document finding, if **blood glucose equal to or less than 60**, administer one of:
   - ▶ **Oral glucose** preparation, if awake, can tolerate, and airway reflexes are intact.
   - ▶ **10% Dextrose 5 mL/kg IV/IO** (maximum dose 250 mL)
   - ▶ **Glucagon 0.5 mg IM** if unable to establish IV
7. Remain in contact with Base Hospital/CCERC for further orders and destination.

Approved: [signature]

Reviewed: 11/2016; 9/2017; 9/2019
Final Date for Implementation: 04/01/2020
OCEMS copyright © 2019

BASE GUIDELINES

10. Do not separate the patient from the caregiver. The caregiver will be trained in managing the VAD equipment.
11. Transport to the CCERC.

ALS STANDING ORDER

TREATMENT GUIDELINES

1. Upon arrival, the patient or caregiver will likely be in telephone contact with the LVAD program coordinator. LVAD Automatic Paramedic Alarms may be set up to alert both 911 and the patient's LVAD coordinators.
2. Upon arrival of a two paramedic team, have one member of the team assess the patient and the other member initiate or continue telephone contact with the patient LVAD coordinator to plan management. Providers may only take orders from the Base Hospital, not the LVAD Coordinator.
3. During initial patient assessment, the LVAD coordinator may assist in determining the cardiac output and the function of the LVAD.
4. Depending on the remaining function of the native heart, several vital sign measurements will be misleading or not possible to measure:
   - Peripheral and central pulses may be weak or absent
   - Auscultated and palpated BP may not be possible.
   - Pulse oximetry may not record a pulse wave and may underestimate SpO2.
   - ECG may show the rate and rhythm of the native heart.
5. Some LVAD devices are equipped with an alarm and red heart shaped LED indicator that will flash or become visible with audible alarm when CPR is indicated (pump failure).
6. Common emergencies in LVAD patients include:
   - GI bleed and epistaxis (from anticoagulation)
   - Stroke; ischemic and hemorrhagic
   - LVAD hardware and systemic infection
   - Equipment malfunction (the patient, caregiver, or LVAD coordinator can help assess the equipment and any alarms)

Approved: Carl Schultz, MD

OCEMS copyright © 2019