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 operate 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.*

ALS STANDING ORDER

1. Assess patient and establish telephone contact with the patient's Left Ventricular Assist Device (LVAD) coordinator to plan management. However, all patient care is directed by the Base Hospital.
2. If patient is apneic and unresponsive or unconscious:
   ► initiate CPR (including chest compressions)
3. Contact Base Hospital for further orders and CCERC destination.
4. Vital sign measurements may be misleading or not possible to measure; indications of hypotension or reduced circulatory (cardiac) function include:
   - Altered level of consciousness
   - Syncope, near-syncope, dizziness
   - Dyspnea
   - Nausea, vomiting
   - Poor skin perfusion signs, diaphoresis
5. For hypotension with lungs clear and no signs of CHF/pulmonary edema:
   ► Normal Saline, infuse 20 mL/kg, may repeat 2 times to maintain perfusion.
6. Blood glucose analysis, if blood glucose less than 80, administer one of:
   ► *Oral glucose preparation, if tolerated and airway reflexes are intact.*
   ► *10% Dextrose 5 mL/kg IV (maximum 200 mL)*
   ► *Glucagon 0.5 mg IM if unable to establish IV.*

   Note: IO access may be used for dextrose administration when patient is unconscious with blood glucose < 80, unable to establish IV and there is no response to IM glucagon.
7. Routine resuscitation measures apply including medications and defibrillation. The Base Hospital Physician will assist in guiding the resuscitation.
8. Transport LVAD supporting equipment and caregiver trained in LVAD operation to the CCERC with the patient.

Approved: 

Review Dates: 11/16
Final Date for Implementation: 04/01/2017

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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.
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.

3. During initial patient assessment, the LVAD coordinator will 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 & 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 an audible alarm when CPR is indicated (pump failure).

6. Common emergencies in LVAD patients include:
   a. GI bleed & epistaxis (from anticoagulation)
   b. Stroke; ischemic & hemorrhagic
   c. LVAD hardware & systemic infection
   d. Equipment malfunction (the patient, caregiver or LVAD coordinator can help assess the equipment and any alarms)

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