ORANGE COUNTY EMERGENCY MEDICAL SERVICES
BASE HOSPITAL TREATMENT GUIDELINES
ADULT/ADOLESCENT
VENTRICULAR ASSIST DEVICE

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. For cardiac arrest (non-perfusing state) initiate chest compression and usual CPR actions.

3. 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). 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.

4. Treat symptoms and signs according to applicable treatment guidelines.

5. Defibrillation/cardioversion pads placement is not affected by the LVAD.

   → VAD patients may also have an Implanted Cardioverter-Defibrillator (ICD) or pacing ICD.

6. Ventricular dysrhythmias may continue to perfuse through the VAD pump.

7. For hypotension with lungs clear and no signs of CHF/pulmonary edema:
   ▶ *Normal saline, infuse 250 mL, may repeat 3 times (total 1 Liter) to maintain perfusion.*

8. 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.

9. Do not separate the patient from the caregiver. The caregiver will be trained in managing the VAD equipment.

ALS STANDING ORDER

1. Assess patient and establish telephone contact with the patients 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. 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

4. Contact Base Hospital for further orders and CVRC destination.

5. For hypotension with lungs clear and no signs of CHF/pulmonary edema:
   ▶*Normal saline, infuse 250 mL, may repeat 3 times (total 1 Liter) to maintain perfusion.*

6. For altered level of consciousness or unresponsiveness, consider obtaining blood glucose:
   Adult/Adolescent: treat a blood glucose of 60 or less using an option listed below. If hypoglycemia is suspected and blood glucose is in the range of 60 to 80, treatment based on field impression is appropriate.
   - ▶ *Oral glucose preparation, if airway reflexes are intact.*
   - ▶ *10% Dextrose 250 mL IV/IO (titrated for effect to improve consciousness.*
   - ▶ *Glucagon 1 mg IM if unable to establish IV*

Approved: Carl Schultz, MD

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BASE GUIDELINES

10. Common emergencies in LVAD patients include:

    - GI bleed and epistaxis (from anticoagulation)
    - Stroke; ischemic &hemorrhagic
    - LVAD hardware &systemic infection
    - Equipment malfunction (the patient, caregiver, or LVAD coordinator can he assess the equipment and any alarms)

11. Transport to the closest appropriate CVRC. This may be a CVRC with which the patient has a relationship through the VAD program.

12. If an LVAD patient is exhibiting stroke symptoms, transport to the closest appropriate SNRC with CVRC capabilities.

13. In some cases, the patient's original hospital (UCLA, USC, Scripts, or others) may arrange for emergency air transport to that original facility. This can be facilitated by providing field units with destination information to the helicopter transfer site (landing zone or LZ). The LZ should be predetermined by the helicopter transport provider.

ALS STANDING ORDER

7. Routine resuscitation measures apply including medications and defibrillation. The Base Hospital will assist in guiding the resuscitation.

8. Transport LVAD supporting equipment and caregiver trained in LVAD operation to the CVRC with the patient.

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 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 SpO_2.
    - 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 an audible alarm when CPR is indicated (pump failure).

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