**SUBJECT:** Left Ventricular Assist Device

**PURPOSE:** To clearly establish the Department’s position on the clinical care and treatment of patients with a left ventricular assist device (LVAD).

**SCOPE:** This Operating Guideline shall be applicable to all personnel; paid and volunteer, operating as an agent of Shamong EMS

**RESPONSIBILITY:** All Department Officers will ensure overall compliance with this operating guideline. The primary responsibility of the emergency care and treatment of medical and trauma patients falls under Emergency Medical Technicians, paid and volunteer, operating as an agent of Shamong EMS

**Overview of the LVAD:**

The LVAD or Left Ventricular Assist Device is a mechanical device that takes over some or all of the pumping function of the heart's left ventricle. This device is used for patients of any age or gender with advanced heart failure who would not otherwise survive without this device.

Some LVAD patients will have an LVAD while they are waiting for a heart transplant (called Bridge-to-Transplant). Other LVAD patients, who are not eligible for a heart transplant for some reason, will live with the device for the rest of their lives (called Destination Therapy or Lifetime use)

**How the Heart Works versus How LVADs Work:**

The normal pumping function of the heart is achieved by the contraction of the left ventricular muscle which pushes a bolus of blood forward in the cardiovascular system with each contraction. This contraction is what we feel when checking a pulse, and what we hear when taking a blood pressure.

If the heart is not contracting, blood is not moving forward in the system, and we do not feel or hear a pulse. The LVAD, in contrast, flows constantly and, therefore, creates no "pulse" to feel or hear.

The LVAD is a tube that is about one (1) inch in diameter with a pump in the middle. One end of the tube (inflow) is surgically inserted into the left ventricle, and the other end (outflow) is sewn into the aorta, just above where it exits the heart.

The pump on the LVAD spins constantly. The right side of the heart still pushes blood through the lungs and back to the left ventricle, but then the LVAD pump pulls the blood out of the left ventricle and pumps it out to the body, taking over most or all of the failed pumping action of the left ventricle.

**NOTE: The pump is a constant flow pump. There is no rhythmic pumping, as there is with the ventricle, and therefore there is little to no pulse. This can result in having a perfectly stable and healthy looking person who has no palpable pulse, and whom you may or may not be able obtain an accurate blood pressure on.**

**PROCEDURE:**

1. **Assessment**
   1. Recognize you have an LVAD patient.
      1. The LVAD patient has a control unit attached to their waist or in a shoulder bag.
      2. The control unit will be attached to batteries mounted to the belt, in shoulder holsters, or in a shoulder bag. At home, it could be attached to a long cord that connects to a large power unit.
   2. Decide if you have a patient with an LVAD problem or a patient with a medical problem who just happens to have an LVAD. Patients with LVADs will have all the same illnesses and injuries as any other patient you see. The LVAD may have nothing to do with the reason they called. If the reason the patient called is related to an issue with their LVAD, follow the procedures below.
      1. LOOK:
         1. Alarms on the control unit will most likely indicate an LVAD problem. Follow resource guides with the patient to trouble shoot.
         2. Skin color and mental status are the most reliable indicators of patient stability for the LVAD patient.
      2. LISTEN
         1. Listen over the LVAD pump location to make sure you can hear it running. This will be just to the left of the epigastrium, immediately below the base of the heart.
         2. The patient and their family are experts on this device. Listen to what they have to say about any problems with the LVAD.
      3. FEEL:
         1. Feel the control unit. A hot control unit indicates the pump is working harder than it should and often indicates a pump problem such as a thrombosis (clot) in the pump.
         2. The use of pulse and blood pressure to assess stability can be unreliable in an LVAD patient, even if they are very stable.
      4. VITALS:
         1. Pulse: Generally you will be unable to feel a pulse.
         2. Blood Pressure: You may or may not be able to obtain a BP. Standard readings are unreliable and may vary from attempt to attempt.
         3. Pulse Oximetry: Readings seem to be fairly accurate and consistent, according to data, despite the manufacturer stating that pulse oximetry often does not work.
         4. Temperature: Infection and sepsis are common.
2. **Treatment**
   1. Administer and maintain appropriate dose of oxygen based on patient’s condition.
   2. Generally, treatments for an LVAD patient will follow the current AES Protocols. However, there are a few special considerations to keep in mind. Do not let the LVAD distract you from treating the patient!
   3. Paramedics will be dispatched with basic life support (BLS) units regardless of the patient’s complaint.
      1. Due to the high risk of complications, paramedics are **not** to be recalled, regardless of the patient’s complaint or physical presentation.
   4. The best medical resource available to you for LVAD related problems is the patient's LVAD coordinator. The patient will have a contact sheet with LVAD coordinators contact information with them at all times.
   5. **Contact the LVAD coordinator as soon as you make patient contact.**
   6. If you are assisting patient to change batteries or power source, **never** remove both batteries at the same time. This will cause the LVAD pump to immediately stop.
   7. Sepsis and stroke are leading causes of death for LVAD patients.
   8. LVAD patients are always on anticoagulant medications. Even minor appearing chest or abdominal trauma, such as a seatbelt mark, could be hiding a very serious injury.
   9. LVAD manufacturers currently recommend against CPR, especially if there is any evidence the pump is still functioning. There currently are no published studies or published consensus statements regarding whether and under what circumstances to perform CPR on a deceased LVAD patient. LVAD devices are not all the same and, if at all possible, clinical decisions regarding LVADs should be made in consultation with the patient's VAD coordinator. The decision to perform CPR should be made based upon best clinical judgment of the provider in consultation with the patient's family and the **VAD coordinators or Medical Command.** In any event, CPR should be initiated only where:
      1. You have confirmed the pump has stopped (by listening for pump sounds) AND all trouble shooting efforts to restart it (connect wires, batteries, new control unit, etc.) have failed, AND:
      2. The patient is unconscious, unresponsive, and has no detectable signs of life (no pulse, no blood pressure, no pulse oximetry reading, AND:
      3. The patient does not have a valid DNR in place.
      4. Patients should not be pronounced dead if LVAD continues to function, unless they have obvious factors of death such as decapitation, rigor mortis, or dependent lividity.
3. **Transporting the LVAD Patient**
   1. Patients without an LVAD problem should be transported to the closest appropriate hospital for their condition.
   2. When in doubt, transport to the closest hospital to access more transport resources and support.
   3. Always bring the patient's resource bag with you. It should have spare batteries, possibly a spare control unit, contact sheets for the VAD coordinator, and directions for equipment and system alarms.
   4. Always bring spare batteries for the LVAD with the patient, even if it is not an LVAD problem. Fresh batteries generally last 3 - 5 hours.
   5. **Dead batteries mean a dead patient**!
   6. If you have a long transport or expect that the patient may be away from home for more than 4 - 5 hours, then try and bring the patient's power base unit.
   7. Use your patient and their family as a resource. They are experts about this device and can help you assist the patient.
4. **Documentation**
   1. All physical findings noted during the primary and secondary assessment.
   2. Type of LVAD.
   3. Time at which the VAD coordinator was contacted and the details regarding instructions provided by the VAD coordinator.
   4. All Pertinent negatives such as the absence of recent trauma, illness, change in medications, etc.
   5. Pertinent past medical history, including medications and allergies.
   6. Treatment rendered.
      1. Repeat vital signs.
      2. Responses to treatment

**Enforcement**

Failed compliance with the policy and procedures outlined in this document may result in the employee’s entry to the department’s progressive counseling and discipline process.