

Patients With A HeartMate (LVAD)

Patient has either electrically driven **HeartMate (VE, vented electric)** or pneumatically driven **HeartMate (IP, implanted pneumatic & HeartPak driver)**

1. **Contact mechanical heart specialist on call: (509) 474-7266 or 474-7326** If no answer, contact Sacred Heart Medical Center Operator (509/474-3131) who will locate the call person.

2. **Initiate ALS response**

3. **Establish large bore peripheral IV access if within EMS providers scope of training.**

4. **Emergency Scenarios**

A. LVAD Failure (LVAD has stopped): Hand pumping should be started if the HeartMate Driver cannot be restarted. Hand pump at rate of 60-90 strokes per minute or compress hand pump as soon as bulb refills completely. LVAD blood flow is approximately 50-ml times hand pump rate. Patient has backup equipment (Controller for VE or HeartPak driver for IP - it may be necessary to transport patient to location of backup HeartPak.) [If blood is seen in hand pump tubing, **DO NOT HAND PUMP**, assume failure of internal LVAD components. **Initiate appropriate therapy to stabilize patient.**] Fully monitor patient during transport.

B. LVAD Working - Blood Flows Low. Apply AED and defibrillate if indicated. ECG Abnormal

The HeartMate LVAD is dependent on right ventricular function. With arrhythmia, decreased function of right ventricle will affect LVAD flows. The LVAD may be able to maintain flow high enough to keep patient from going into shock. **If patient has rapid ventricular arrhythmia or ventricular fibrillation countershock both stable and unstable patients and give large amounts of IV fluids if within EMS providers scope of training.**

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5. Initiate routine CODE procedure, if indicated, including cardiac compressions.

HeartMate IP, HeartPak Specifics: The HeartPak supplies air pressure to pump the IP LVAD. It can be powered by 4 batteries located within case. If Power Base Unit gray cable is connected to HeartPak, ensure 4 batteries installed and unplug gray cable from HeartPak prior to transport. Blood flow is read on Heartpak display. Open case to view R=LVAD Rate, S=Stroke Volume, and F=LVAD Flow. Alarms located under the handle are: Red Heart = Low Flow, or major HeartPak malfunction. Yellow wrench = minor HeartPak malfunction, still pumping normally. Red or Yellow battery = low battery voltage (change batteries). Silence alarms by pressing white rectangle located top center of alarm panel.

Hand Pumping:

- A. Hand pumping is only to be performed on the IP if both primary and backup Heartpaks fail to operate or are unavailable. Patient or companion to hand pump LVAD should driver fail to function.
- B. Attach the hand pump to the percutaneous line: Disconnect patient driveline by unscrewing round nut, then connect hand pump.
- C. While depressing the white purge valve, collapse black bulb, release white purge valve, release bulb. Bulb should remain collapsed. This applies vacuum to LVAD blood pump chamber to ensure it is full prior to hand pumping.
- D. Wait 5-10 seconds, then depress purge valve to fully inflate bulb. This ensures a full charge of air to drive the LVAD.
- E. Using handles compress the bulb at approximately the same rate that the patient was running (60 to 90 compressions per minute if in doubt).

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- F. Check radial pulse: should correspond to rate of bulb compressions.
- G. Patient should be transported to Sacred Heart Medical Center if possible.

HeartMate VE Specifics: If patient's VE controller (small box attached to percutaneous driveline) is connected to Power Base Unit, the VE Display Unit will display FLO(w) and error messages. If VE controller is connected to batteries, this information is not available. Patient's companion will plug 2 batteries/clips into the VE controller before transporting. Do not disconnect VE controller from patient unless instructed by mechanical heart specialist. If the VE is running (air heard in and out of vent line fitting) and controller shows Red Heart, assume low flow.

Hand Pumping:

- A. Hand pumping is only to be performed if LVAD has stopped (no air in/out of vent fitting). Patient or companion to hand pump LVAD should driver fail to function.
- B. Attach hand pump to percutaneous line: Disconnect both power leads or remove both batteries, press clear tab and remove vent filter, then connect hand pump.
- C. While depressing the white purge valve, collapse black bulb, release white purge valve, release bulb. Bulb should remain collapsed. This applies vacuum to LVAD blood pump chamber to ensure it is full prior to hand pumping.
- D. Wait 5-10 seconds, then depress purge valve to fully inflate bulb. This ensures a full charge of air to drive the LVAD.
- E. Using handles, compress bulb at approximately same rate that the patient was running (60-90 compressions per minute if in doubt).
- F. Check radial pulse: should correspond to rate of bulb compressions.
- G. Patient should be transported to Sacred Heart Medical Center if possible.

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