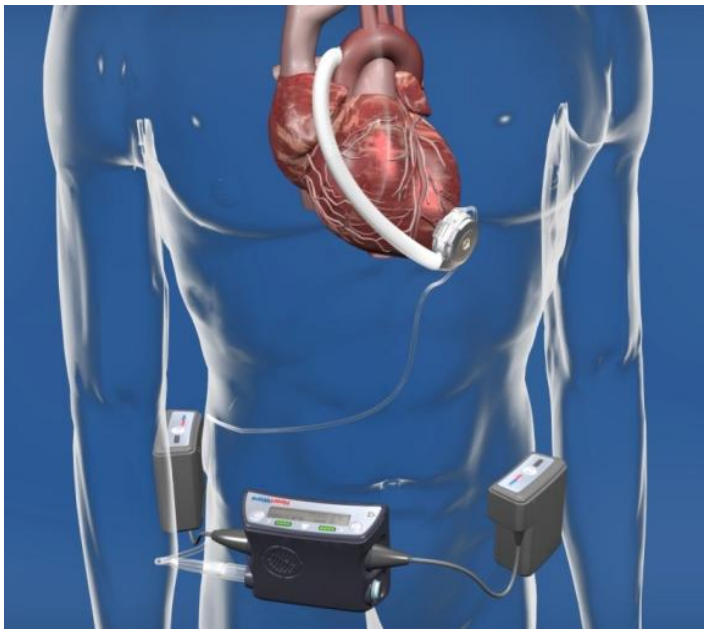
About the Hartware LVAD



Pump flow is continuous & non-pulsatile.

The patient may NOT HAVE A PULSE.

Automatic blood pressure machines may NOT provide an accurate BP.

Rely on other signs of hemodynamic compromise such as:

-Level of Consciousness
-Mean Arterial Pressure
-Skin Temperature & Color
-Cyanosis
-Respiratory Distress
-LVAD Low Flow Alarms

- A HeartWare LVAD is an internal, centrifugal pump implanted in the pericardial space, driven by an external computer and batteries carried in a waist pack. Blood flows into the pump via a cannula that is in the left ventricle and blood is ejected into a second cannula which is connected to the ascending aorta.

- The LVAD maintains continuous flow, therefore the patient MAY NOT HAVE A PULSE and automated blood pressure machines will not provide an accurate reading. Doppler ultrasound is required to obtain a mean arterial pressure.

- The pump flow is continuous at a fixed speed and is dependent on adequate preload; therefore patients frequently require increased fluid volume.

- The patient & family are trained in the management of the pump should it fail. If the pump fails, the patient & family will change the external controller to a back-up controller. Please allow them to do this in an emergency.

- **Call the VAD HOTLINE 24 hours a day for an immediate response at:**

604-250-2658

HeartWare: A New Left Ventricular Assist Device

A ventricular assist device (VAD) is a mechanical pump used to circulate blood when the heart fails. The primary indication for VADs is as a “bridge” to transplantation, allowing patients to wait at home and regain fitness while a donor heart is found. Patients are often able to lead near-normal lives on a VAD and are sometimes able to resume work. St Paul’s Hospital in Vancouver is the only program in British Columbia to implant (VADs).

Recently, St. Paul’s Hospital started implanting a new Left Ventricular Assist Device (LVAD) called HeartWare. It is a small, internal mechanical pump powered by batteries and controlled by a small computer worn on the waist. Blood flows into the pump via a cannula connected to the left ventricle and blood is ejected into a second cannula connected to the ascending aorta, completely replacing the work of the left ventricle.

The HeartWare LVAD: The pump is implanted in the pericardial space with the inflow cannula inserted into the apex of the left ventricle and the outflow cannula anastomosed to the ascending aorta. Blood exits the left ventricle and into the pump, which uses a centrifugal impeller to propel blood into the aorta. The impeller typically spins at 2400 to 3200 rpm to provide up to 10L/min of cardiac output. A percutaneous lead (“driveline”) exits the abdomen – please be careful not to cut this lead when removing the patient’s clothing in an emergency. This lead carries the electrical wires to the external computer and batteries.

Although the HeartWare is a new LVAD, the principles of managing these patients are the same as the previous HeartMate 2 LVADs. The HeartWare LVAD is a centrifugal pump creating continuous, non-pulsatile blood flow. Therefore these patients may not have a palpable pulse or measurable blood pressure. It is important to rely on other signs of hemodynamic compromise such as level of consciousness, skin temperature and color, etc. LVAD’s are preload dependent, therefore if the pump output is lower than 3L/min, the device will alarm signaling low flow. The administration of volume and restoration of cardiac rhythm and will often restore pump flow and resolve the alarm. If the pump stops, the patient will suffer from extreme hemodynamic compromise. Again, the device will alarm in the event of pump failure. The patient and family have been trained in how to change the external computer to a back-up computer to restore the pump.

In terms of emergency management, all standard BLS and ACLS guidelines apply with one important consideration. The patient’s level of consciousness should guide your management in an emergency:

- If the patient is conscious and talking, disregard the absence of pulse, BP and/or cardiac rhythm.
- Chest compressions should be performed if there is loss of consciousness **and** either non-perfusing cardiac rhythm or the pump is stopped
- Only defibrillate if the patient is unconscious or if advised by the VAD medical team.
- Ventilate and/or intubate as necessary

Appendix II – Procedures

Patients discharged home with a VAD will have an information sheet designed by the VAD program and BCAS Medical Programs with instructions for you to follow. If you are not presented with the sheet on arrival, please ask for it. Whenever attending a patient with a VAD, please call the **24-hour VAD Hotline at 604-250-2658** for immediate support from a VAD expert. They can walk you through what actions to take over the phone. Also, remember that family members are fully trained to care for and monitor the device. We advise that they travel in the ambulance with the patient. For further information, please call the VAD Hotline at 604-250-2658 or visit the HeartWare website at http://www.heartware.com.au/IRM/content/international/home.html# to watch a 3 minute video clip illustrating the device.

The HeartMate II: A New Ventricular Assist Device

A ventricular assist device (VAD) is a mechanical pump used to circulate blood when the heart fails. The primary indication for VADs is as a “bridge” to transplantation, allowing patients to wait at home and regain fitness while a donor heart is found. Patients are often able to lead near-normal lives on a VAD and are sometimes able to resume work. St Paul’s Hospital in Vancouver is the only program in British Columbia to implant (VADs).

The most common VAD used in BC is a new device called the HeartMate II Left Ventricular Assist Device (LVAD). It is an internal mechanical pump powered by batteries slung over the shoulders. Blood flows into the pump via a cannula connected to the left ventricle and blood is ejected into a second cannula connected to the ascending aorta, completely replacing the work of the left ventricle.

The HeartMate II is a unique device, as it is non-pulsatile, creating axial or continuous blood flow. These patients may not have a palpable pulse or measurable blood pressure. It is important to rely on other signs of hemodynamic compromise such as level of consciousness, skin temperature and color, etc. LVAD’s are preload dependent, therefore if the pump output is lower than 3L/min, the device will alarm signaling low flow. The administration of volume and restoration of cardiac rhythm and will often restore pump flow and resolve the alarm. If the pump stops, the patient will suffer from extreme hemodynamic compromise. Again, the device will alarm in the event of pump failure. The patient and family have been trained in how to change the external controller to a back-up controller to restore the pump.

In terms of emergency management, all standard BLS and ACLS guidelines apply with one important consideration. The patient’s level of consciousness should guide your management in an emergency:

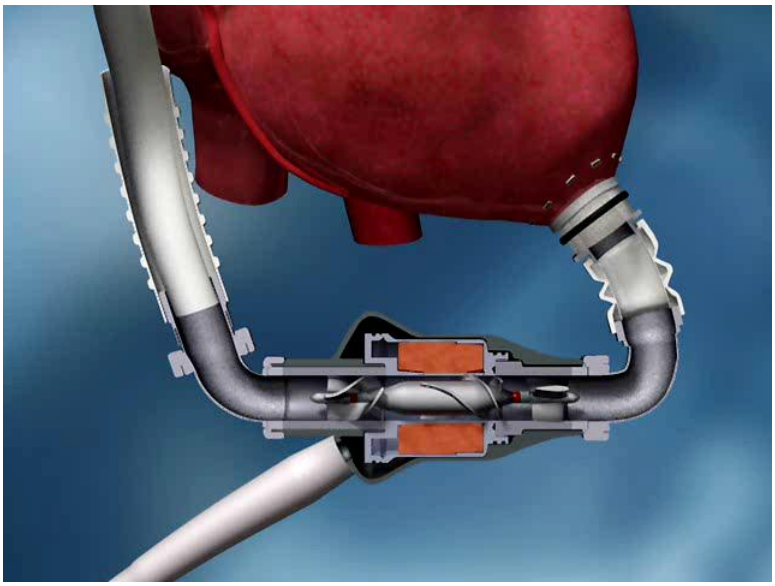
- If the patient is conscious and talking, disregard the absence of pulse, BP and/or cardiac rhythm.
- Chest compressions should be performed if there is loss of consciousness **and** either non-perfusing cardiac rhythm or the pump is stopped
- Only defibrillate if the patient is unconscious or if advised by the VAD medical team.
- Ventilate and/or intubate as necessary

Patients discharged home with a VAD will have an information sheet designed by the VAD program and BCAS Medical Programs with instructions for you to follow. If you are not presented with the sheet on arrival, please ask for it.

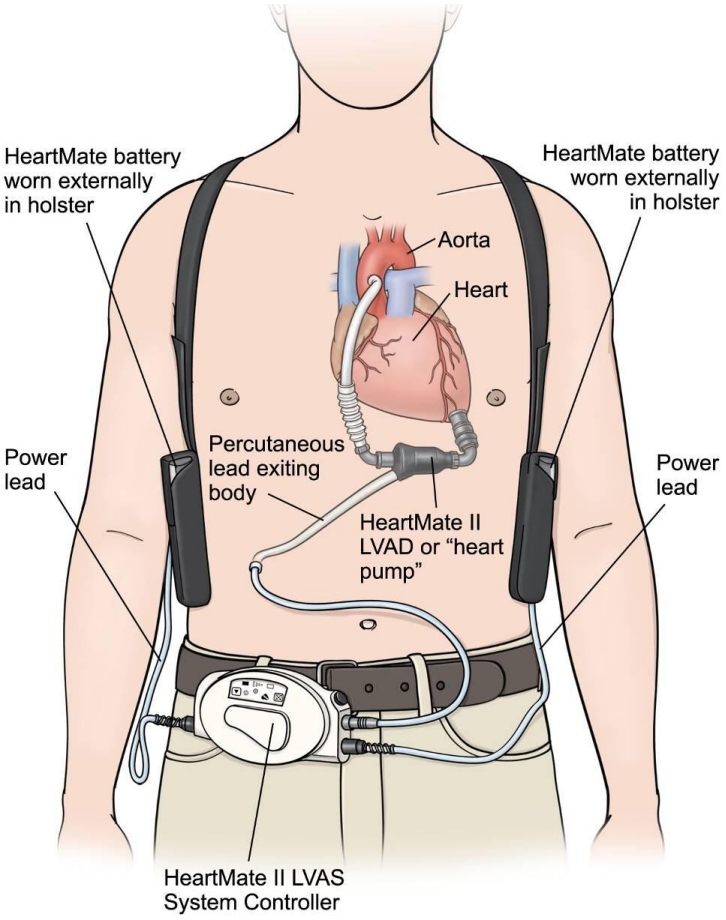
Whenever attending a patient with a VAD, please call the **24-hour VAD Hotline at 604-250-2658** for immediate support from a VAD expert. They can walk you through what actions to take over the phone. Also, remember that family members are fully trained to care for and monitor the device. We advise that they travel in the ambulance with the patient.

Appendix II – Procedures

For further information, please call the VAD Hotline at 604-250-2658 or visit the Thoratec website at www.thoratec.com.



HeartMate II Pump: The inflow cannula is inserted into the apex of the left ventricle and the outflow cannula is anastomosed to the ascending aorta. Blood exits the left ventricle and into the pump, which uses a rotor to propel blood into the aorta. The rotor typically spins at 8,000 to 10,000 rpm to provide up to 10L/min of cardiac output.



Components of the HeartMate II LVAD: The pump is implanted intra-abdominally, below the diaphragm. A percutaneous lead exits the body on the right-side of the abdomen. This lead carries the electrical wires to the external system controller and batteries.