

# **VAD Program Alert:** **Practice Change regarding CPR**

March 2018

Advanced Heart Failure Program



# Background

The left ventricular assist device (LVAD) is a mechanical internal heart pump used to treat heart failure. The pump provides **continuous** blood flow from the left ventricle to the aorta and requires an external controller and power source to run the pump. The UR VAD program has been implanting various types of LVADs since 2001.

Over the past 15 years, this technology has continued to evolve as well as our understanding of how to care for this population. In the absence of evidence based data, the UR VAD Program historically has advised *against* chest compressions in LVAD patients if the pump was on.

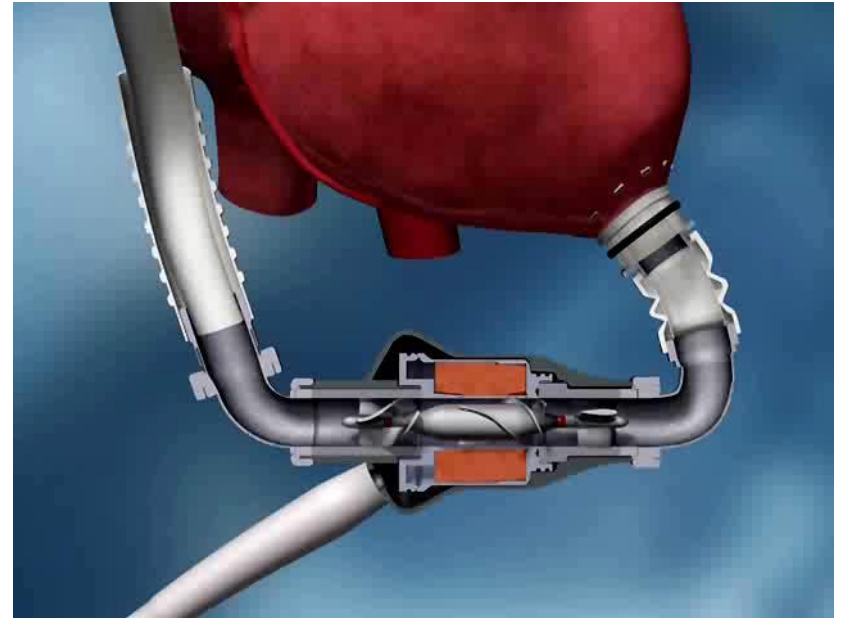
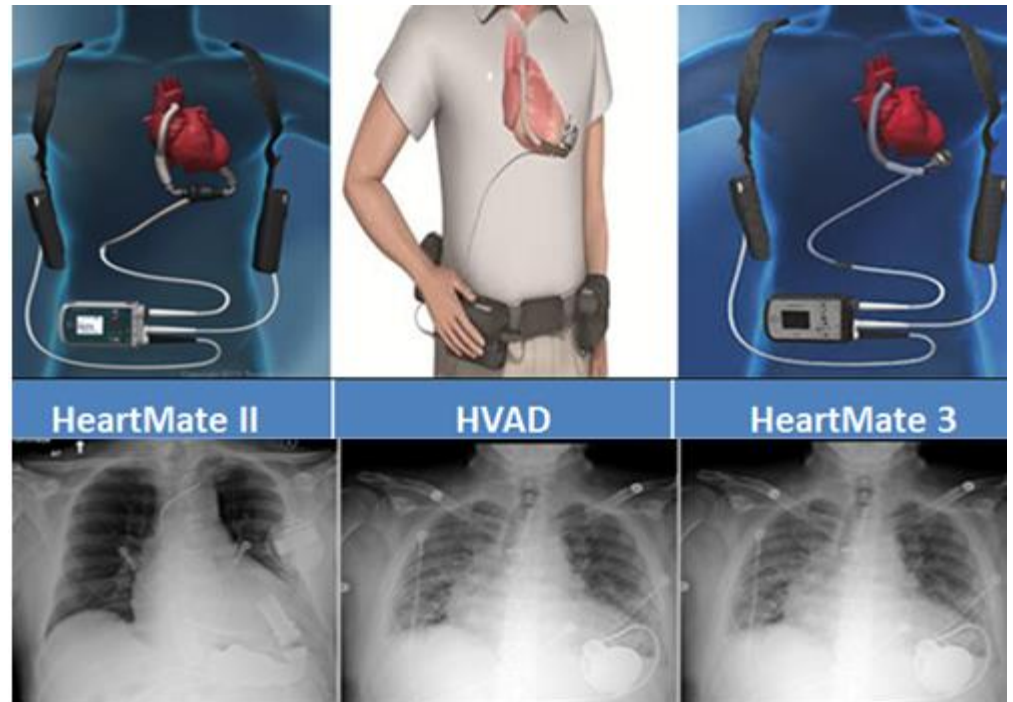


Image: HeartMate II LVAD courtesy of Abbott

In May 2017 the AHA published a scientific statement regarding CPR in adults and children with Mechanical Circulatory Support. The UR VAD Program has reviewed this expert consensus statement and has adopted the recommendations regarding CPR in the LVAD population.

Effective immediately, **external chest compressions are advised** for LVAD patients with signs of *inadequate perfusion* even when the pump is noted to be working (+ hum chest).

## Types of LVAD pumps implanted at UR

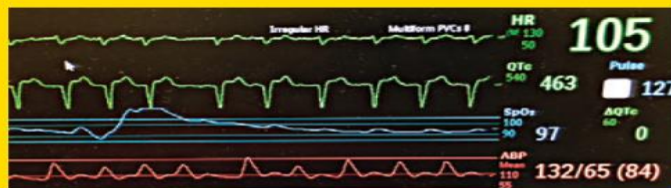


Link to Circulation: <http://circ.ahajournals.org/content/135/24/e1115.long>

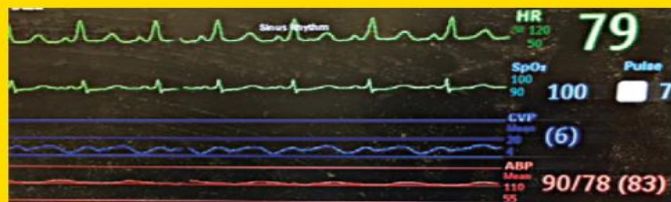
The UR VAD program supports approximately 200 LVAD patients. On a daily basis about 25% of these patients can be seen on the medical campus in various areas such as Eastman Dental, outpatient clinics, procedural areas, or inpatient units. While code situations are rare, it is important for all medical center staff to understand how to respond to an LVAD patient in an emergency.

LVADs provide continuous blood flow; as such palpable pulses are often absent in these patients and blood pressure measurement by an automated cuff may be inaccurate. Pulse oximetry readings also can be inaccurate due to the lack of pulsatile flow. A normal pulse ox reading is likely true, however a low pulse ox reading may not indicate true hypoxemia and the probe should be repositioned.

### Understanding LVAD Vital Signs

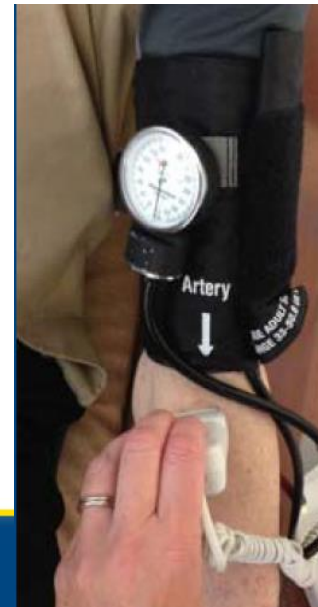


Patient *without* LVAD:  
MAP 84, pulse pressure 67



Patient *with* LVAD:  
MAP 83, pulse pressure 12

### Standard BP monitoring by Doppler

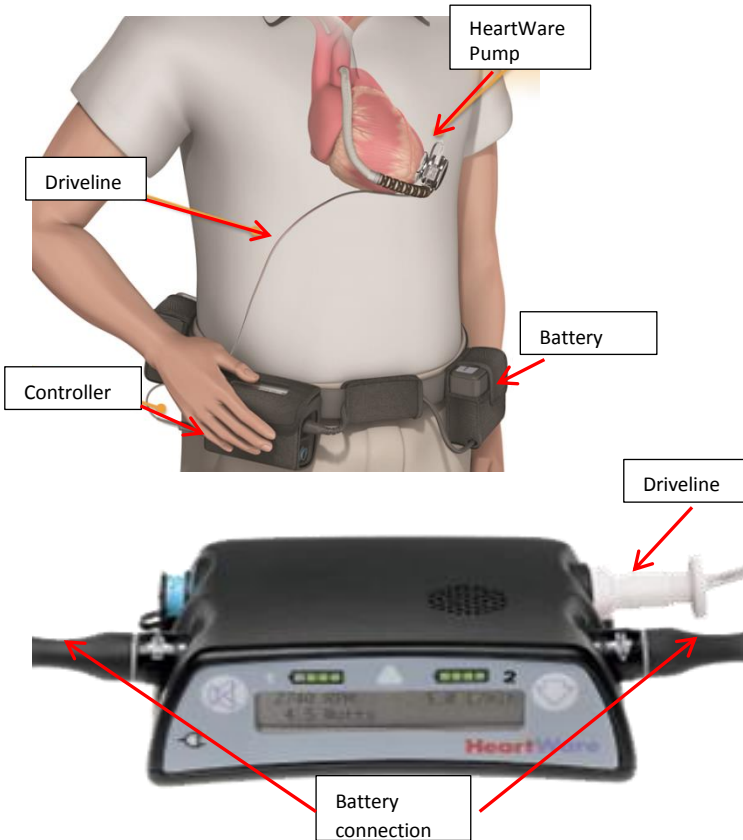


1. Find arterial flow with Doppler
2. Increase cuff pressure till signal goes away
3. Decrease pressure till signal returns.

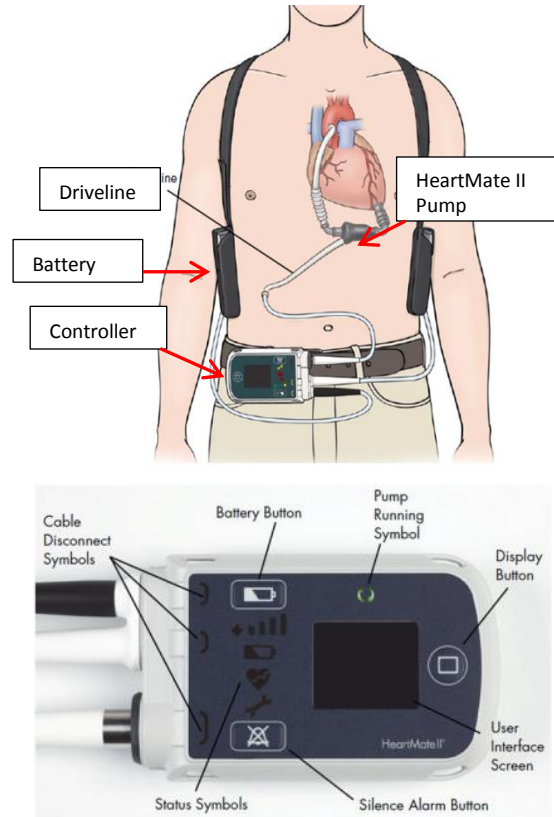
This pressure is the patient's mean pressure. Normal is 70-80mm/Hg

# Closer look at LVAD pumps and controllers

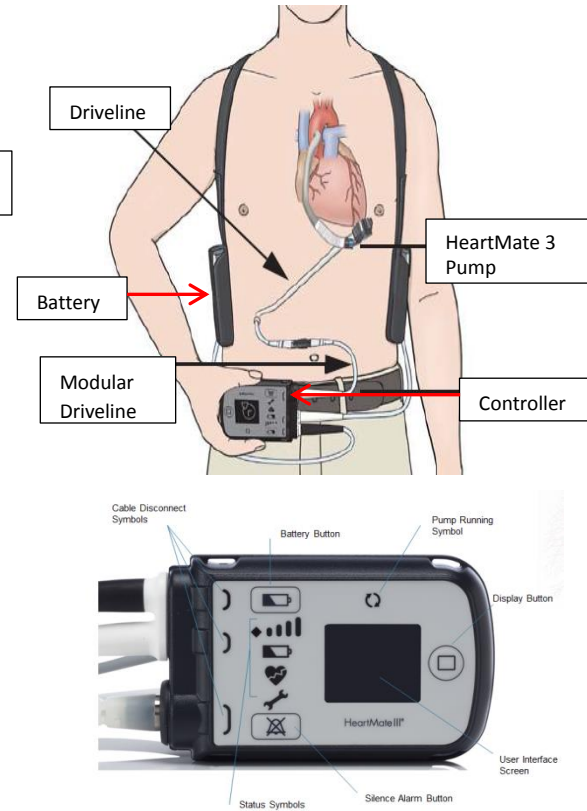
## HeartWare HVAD



## HeartMate II



## HeartMate 3



# Comparison of LVAD Pumps and Parameters

## Types of Continuous Flow Left Ventricular Assist Devices

		
HeartMate II	HVAD	HeartMate 3
Axial Flow Pump	Centrifugal Flow Pump	Centrifugal Flow Pump
FDA Approved BTT/DT	FDA Approved BTT/DT	Investigational & FDA Use
Speed: 8000-10000	Speed: 2400-3200	Speed: 4800-6500
Flow: 4-6 lpm	Flow: 4-6 lpm	Flow: 4-6 lpm
PI: 4-7	PI: Not Applicable	PI: 2-6
Power: 4-6 watts	Power: 3-5 watts	Power: 3-5 watts
MAP: 70-90	MAP: 70-90	MAP 70-90
Warfarin/Aspirin	Warfarin/Aspirin	Warfarin/Aspirin
Pair Batteries=10-12 hrs	Pair Batteries=8-12 hrs	Pair Batteries=15 hrs
Backup Emergency 15 min. Battery in Controller	<b>No</b> Emergency Battery in Controller	Backup Emergency 15 min Battery in Controller

# Assessment of the LVAD patient

- *Assess adequate perfusion based on mentation, skin color, capillary refill.*
  - *If patient has signs of adequate perfusion, assess and treat for non-lvad causes for patient deterioration.*
  - *If patient does not have signs of adequate perfusion, check LVAD system*
    - Check connections: Is the driveline connected to the controller?
    - Is the controller connected to power?
    - Listen for a humming sound where the heart is.
      - *If there is no VAD hum after thorough check of connections and change of power, the controller will need to be changed out.*

## **Links to Controller Change out Videos:**

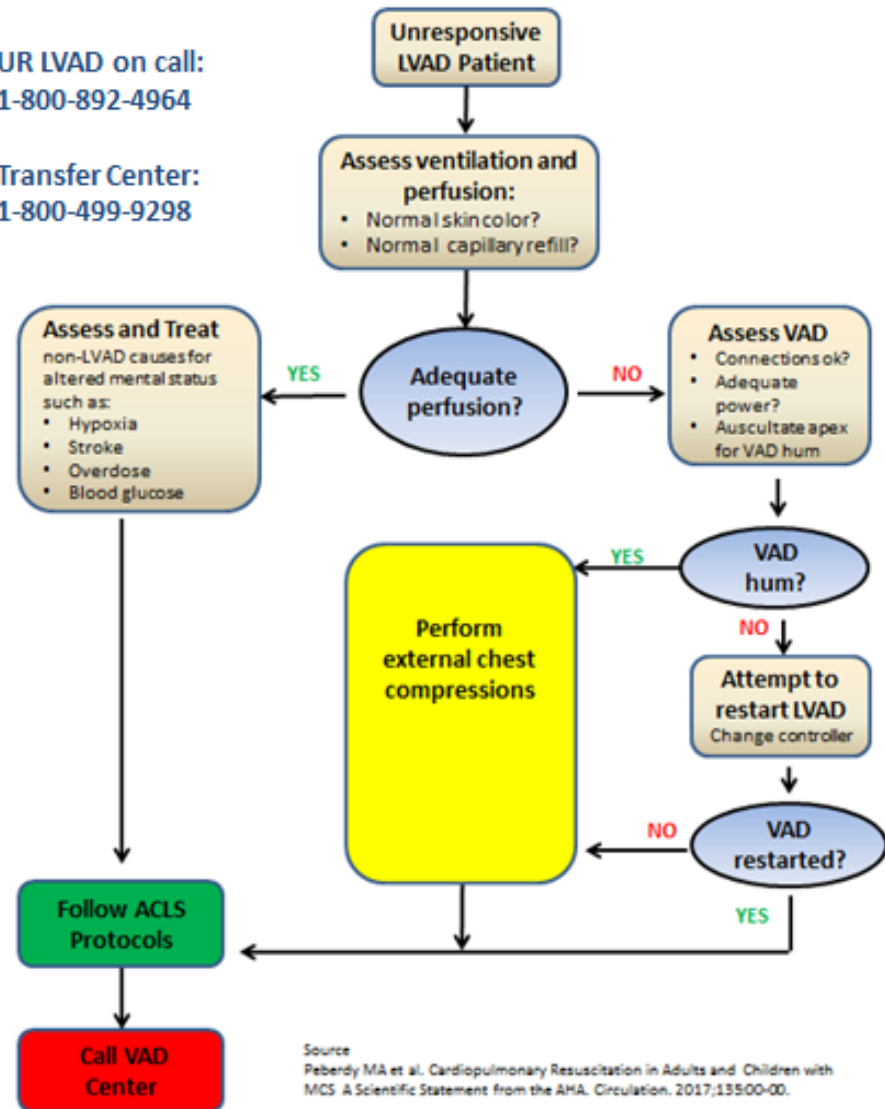
- HM2/HM3 Change out: <https://vimeo.com/256842958>
- HVAD Change out: <https://vimeo.com/256850229>

# Summary

LVAD patients are prevalent in the community and on the URMICampus. Assessment of adequate tissue perfusion and a check of the VAD connections is the key to determining if a patient requires chest compressions.

UR LVAD on call:  
1-800-892-4964

Transfer Center:  
1-800-499-9298



Source  
Peberdy MA et al. Cardiopulmonary Resuscitation in Adults and Children with MCS: A Scientific Statement from the AHA. Circulation. 2017;135:00-00.



# Resources

Additional LVAD resources can be found on [www.vadresources.urmc.edu](http://www.vadresources.urmc.edu)

## References:

Peberdy, M et al. Cardiopulmonary Resuscitation in Adults and Children with MCS. *Circulation* 2017;135:e1115-e1134

Yuzelfpolskaya, M et al. Advanced cardiovascular life support algorithm for the management of the hospitalized unresponsive patient on CFLVAD support outside the intensive care unit. *European Heart Journal: Acute Cardiovascular Care* 2016. Vol. 5(8) 522-526.

HeartMate II Left Ventricular Assist System Instructions for Use: Thoratec Corporation, 2016.

HeartMate III Left Ventricular Assist System Instructions for Use: Thoratec Corporation, 2017

HeartWare Left Ventricular Assist System Instructions for Use: HeartWare Corporation, 2017.