



# The Commonwealth of Massachusetts

Executive Office of Health and Human Services

Department of Public Health

Office of Emergency Medical Services

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## ADVISORY

**TO:** All Massachusetts Ambulance Services  
**FROM:** Jon Burstein, MD, State EMS Medical Director  
Abdullah Rehayem, Director  
**DATE:** December 15, 2011  
**RE:** Ventricular Assist Devices

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The purpose of this advisory is to provide you with clinical information regarding patients with Ventricular Assist Devices (VADs), whom your EMS personnel may encounter in the field.

The VAD is an implanted mechanical device that takes over the pumping function of one or both ventricles in chronic advanced heart failure patients. This device is commonly referred to as the LVAD because the device is often implanted in the left ventricle, taking over for a weakened heart and pumping the oxygenated blood to the rest of the body. The VAD allows patients to be discharged from the hospital with a fully portable, wearable system that is used long term or for patients waiting for heart transplants. In the event the VAD's systems malfunction, the VAD is equipped with its own internal back-up system which will maintain some function until the system is properly restored.

To date, to the best of our knowledge, there are approximately 35 patients in Massachusetts with a VAD device, and three hospitals - Brigham and Women's Hospital, Tufts Medical Center, Massachusetts General Hospital - that accept and treat VAD patients. Each patient is assigned a VAD Coordinator by the hospital that performed the surgery and the VAD Coordinator should be contacted by an EMS provider at the earliest opportunity when an emergency is occurring. We anticipate that in the future, there will be more of these patients sent out of hospitals to live in the community. It is important to realize that these patients with an implanted VAD have full mobility to travel and may be encountered by EMS personnel and systems anywhere in our communities, not just the community where the patient lives.

The American Heart Association, on whose standard cardiopulmonary resuscitation (CPR) in Massachusetts is based, has not yet put forth clinical standards for prehospital patient care and provider training for VAD patients. **The key point to remember for CPR in patients with VADs is not to perform chest compressions.** For patients who are experiencing a dysrhythmia, or even cardiac arrest, all clinical management and care should be in accordance with the Statewide Treatment Protocols, with the exception that external chest compressions are not performed. External chest compressions could compromise the attachment of the VAD and are contraindicated in the VAD patient. In the event the VAD is present but not functioning at all, chest compressions can be performed and will not cause any further harm in this instance. A consultation by EMTs with the VAD Coordinator should be a priority in the event of any malfunction of the VAD in order to properly troubleshoot the system.

The VAD should be used in accordance with the manufacturer's instructions. The patients themselves and sometimes a caregiver are fully trained in the operation of the particular VAD being used before the patient is discharged from the hospital. The contact information for the patient's VAD Coordinator can be found in the front pocket of the travel bag for the VAD. The first priority for patients with a VAD in place is to maintain the operation of the VAD device and to not compromise its function.

Adequate pump flow is dependent on the patient having adequate preload and appropriate afterload. Pump flow will decrease if the patient is dehydrated or has significant bleeding. It will also decrease if the patient is hypertensive. All of these patients are on medications to prevent hypertension and to prevent clotting and are at risk for bleeding.

The VAD does not have valves as does the normal heart; it provides a constant nonpulsatile flow of circulating blood. If the pump stops working it may result in retrograde back flow and the patient may show signs of heart failure, pulmonary congestion or cardiogenic shock. Restoring the VAD to proper working order with the assistance of an educated caregiver and the VAD Coordinator is a priority for these conditions caused by the VAD not functioning properly or at all. An EMT can assess the patient for VAD function by auscultating over the VAD pocket on the patients torso to listen for a distinct "hum" indicating that the VAD is functioning.

In patients with an implanted VAD, normal patient assessment data -- such as blood pressure, pulse oximetry and palpable peripheral pulses -- may not be detected at all, or if detected, may not be accurate because of the constant pumping of blood by the VAD. Other means of assessing a patient for adequate perfusion are necessary in order to thoroughly assess and determine the extent of the medical problem the patient may be having. For these patients, assessing skin color, temperature and moisture; observing for mental status changes, and checking the patients' nail beds and mucosal membranes for evidence of cyanosis are more accurate and reliable measurements of the patients perfusion and should be used as primary assessment information when making a decision on how to treat the patient.

The Department is encouraging hospitals to notify local EMS agencies when VAD patients are discharged to home. Currently, the HeartMate II is the VAD that is most commonly used for these patients with left ventricular deficiency and the manufacturer's web site has useful information regarding the device and its operation. Educational videos can be found there, at <http://www.thoratec.com/videos/mp-mcs.aspx> and <http://www.thoratec.com/medical-professionals/vad-training.aspx> and may be helpful resources in EMT training.

If you have any further questions about EMS response to VAD patients, please consult your affiliate hospital medical director, or you may contact Renée Lake, EMT-P and DPH/OEMS Compliance Coordinator, at [renee.lake@state.ma.us](mailto:renee.lake@state.ma.us).