

# Ventricular Assist Device (VAD)

*Pre-operative Education Handbook*



FHTransplant.com

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# Contact Information

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# Advanced Heart Failure, Cardiac Transplant and Circulatory Assist Device Program

You have been referred to Florida Hospital's Advanced Heart Failure, Cardiac Transplant and Mechanical Circulatory Assist Device Program for evaluation and treatment of your advanced heart disease with advanced therapies that may include a Ventricular Assist Device (VAD). It is important for you to understand these therapies, the evaluation process, surgical procedure, treatment course and potential risks and benefits of having this type of device implanted inside your body. If you have any questions, please do not hesitate to ask.

## Heart Failure

The heart is responsible for pumping blood to all organs in the body. When the heart is unable to pump enough blood throughout your body, other vital organs, such as the liver and kidneys, begin to fail. One type of heart disease is known as cardiomyopathy, which can affect the ventricles of your heart, weakening its ability to pump blood. This can cause you to feel tired and short of breath. Some patients accumulate fluid in their lungs, abdomen and/or extremities; these symptoms are known as congestive heart failure. When heart failure no longer responds to advanced heart failure treatment and medication, this is known as end-stage heart failure.

## End-stage Heart Failure

There is no cure yet for end-stage heart failure; however, there are several therapies available, such as the insertion of a VAD. A VAD is essentially a pump that assists your heart with pumping blood through your body, allowing your heart's ventricle to rest and helping not only to prolong your life but also improve your quality of life. It does not replace your own heart. There are several types of VADs that can be used to support your heart. The two devices most commonly used at Florida Hospital are the HeartMate II LVAD and Heartware HVAD.

## Eligibility

To determine whether you are eligible to receive a VAD, several factors must be considered. The first step in the process is a thorough medical-records review that we will obtain from your referring physician(s). Following this, an insurance verification of benefits is completed. If you are accepted into the LVAD Program, an evaluation process begins, to determine if a VAD would be a good option for you.

## Evaluation

The evaluation process begins once you give consent. Evaluation involves various exams, tests and assessments. Patients who are listed for heart transplant may become eligible for a VAD device as a "bridge to transplant" — meaning that your weakened heart may need temporary support while waiting for a donor heart to become available. Patients who are not candidates for heart transplant may be eligible for a VAD and require a thorough evaluation to determine if this is a viable option.

# Meeting the Team

The Advanced Heart Failure/Ventricular Assist Device team is comprised of highly trained and committed clinicians who are dedicated to providing our patients with the best care available.

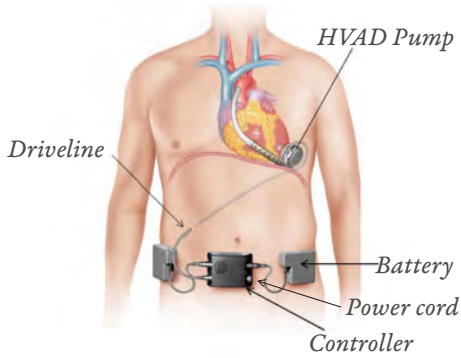
## Advanced Heart Failure/VAD Team

Heart Transplant/ VAD Surgeon	Performs the heart transplant/VAD surgery and will see you in the hospital and may see you periodically in the clinic for follow up to make sure you are healing properly.
Heart Failure/ VAD Cardiologist	Specializes in advanced heart failure and heart transplantation and manages your medical care, before your implant surgery, while in the hospital and in the clinic post-discharge.
VAD Coordinator	Responsible for evaluation and coordinating the implant surgery, providing VAD education and managing your follow-up care after discharge.
VAD/Heart Failure Nurse Practitioner	Works with the transplant physicians in the hospital, coordinating and assisting with needed medical care.
Transplant Pharmacist	Monitors your medications and educates you and your caregiver(s) about your medication.
Social Worker	Evaluates psychosocial and emotional needs, including financial, housing, medications and caregiver needs.
Registered Dietician	Instructs you and your family about healthy nutrition prior to and after VAD implantation
Financial Coordinator	Reviews your insurance coverage and all costs associated with your transplant. It is important that you understand the costs that may not be covered by insurance.
Physical Therapist	The physical therapist meets with you to evaluate your exercise capacity. They will recommend and teach you specific exercises to maintain optimal health pre and post VAD Implant.
Respiratory Therapist	Teaches deep-breathing exercises and use of incentive spirometer; performs chest physiotherapy and pulmonary function tests.
Cardiac Rehab Specialist	Will help design a cardiac rehab program during the pre-transplant, hospitalization and post-transplant phases.
Primary Care Physician	Works with the transplant team to continue to care for you after transplant.
Pastoral Care Staff	Will help address your spiritual needs and are available 24 hours a day, seven days a week. They will also consult with members of your church, as requested.
Palliative Care	Provides consultation services to help you face the complex physical, psychological, social and spiritual problems that often accompany advanced illness.

# HeartMate II LVAD and HeartWare HVAD

## A Closer Look at the Components

HEARTWARE HVAD



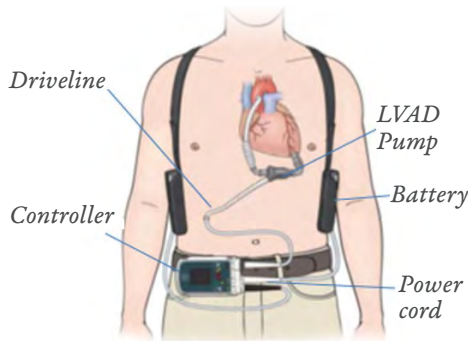
**Implanted heart pump:** The pump is designed to support the left ventricle of your heart, which is responsible for pumping blood throughout your body via arteries.

The pump is surgically implanted inside your chest, below your heart, and is attached to both the left ventricle and the ascending aorta (the large blood vessel that carries blood to the rest of your body).

Blood travels through your left ventricle into the heart pump, which then ejects the blood into your aorta, and from there, the rest of your body.

**Cannulas (tubes):** The cannulas/ tubes are inserted in your chest, connecting your heart to the blood pump. There are different ways to connect the tubing to your heart, and the surgeon will decide which way is the best for you.

HEARTMATE II LVAD



**Driveline:** The driveline (cable) passes through the skin and connects the pump inside your chest to the system controller, and power source outside of the body.

The driveline exits the skin of your abdomen. The exit site is covered by a sterile dressing. This dressing needs to be changed initially every day, until the skin shows signs of healing, and then may be done less frequently, as directed by your doctor.

You and your support person will learn how to change the dressing and will be responsible for dressing changes after discharge.

**System controller:** The system controller is a small computer that tells the pump how to run and continually monitors the pump to alert you if there are any problems.

**Power source:** The VAD can be powered by portable lithium batteries or AC electricity by connecting to a power module.

The wall outlet must be grounded and NOT connected to a wall switch. You connect to the power module at night for sleeping.

Two portable batteries that power the pump can be worn in a holster, vest, pants pockets or shoulder bag to allow great mobility for activities.

The batteries are rechargeable and can provide power to the pump for eight to 10 hours.

## Surgical Procedure

The VAD is implanted during open-heart surgery, which can take up to six hours. An incision is made through your sternum (breast bone) in the middle of your chest that extends down to your abdomen. You will be placed onto a heart/lung bypass machine that will support your circulation so that your heart can be stopped for a short period of time while the pump is implanted.

One part of the mechanical pump will be attached to your left ventricle, and the other end attached to your aorta. The driveline will be placed through your skin on the chosen abdominal site.

Once the VAD pump is in place, the heart/lung machine will be stopped and the pump will assist your own heart to pump blood throughout your body.

Following surgery, you will be taken to the Intensive Care Unit (ICU) for recovery. You will have a tube in your throat connected to a ventilator (breathing machine) until you wake up from anesthesia and begin breathing on your own. At that time, the breathing tube will be removed. Until the tube

is removed, you will not be able to talk but can communicate by writing or other means. You will receive medicine for pain while you recover.

Nitric oxide, a form of inhaled gas, or epoprostenol (Flolan<sup>®</sup>), may be used during surgery, along with oxygen in your breathing tube. They dilate blood vessels in your lungs to allow the right side of your heart to pump blood to your lungs more efficiently and help prevent right heart failure. They may be used for about 24 to 48 hours after surgery, until your vital signs are stable, and then are weaned off (similar to the oxygen weaning from your breathing tube before it is removed).

Throughout the procedure, surgeons will monitor your heart function using an echocardiogram via a tube placed down your esophagus. By recording your heart's pumping action and movement of the heart valves, this ultrasound test allows the surgical team to monitor your heart during surgery and shows the placement of the ventricular assist device, allowing the physicians to optimize the pump settings after implantation. The tube is removed at the end of the procedure.



## VAD Benefits

The device can help your heart function and pump more blood to your body. This increase in blood supply or cardiac output can improve other vital organ function such as kidney and liver, and give you more energy which, in turn, may improve your quality of life.

In some cases, VAD implantation can help candidates become more suitable for heart transplantation and prolong life.

## VAD Risks

The success of the device implantation depends on several factors, including your physical condition at the time of surgery, and other underlying medical conditions.

Right heart failure can sometimes occur during or after the VAD surgery and may require the use of a temporary right-sided ventricular assist device (RVAD).

There are also potential psychosocial risks that may include, but are not limited to, depression, post-traumatic stress disorder (PTSD), generalized anxiety, anxiety regarding dependence on others and feelings of guilt.

Other potential complications that may occur during this surgery include, but are not limited to, the following:

- Bleeding/hemorrhage
- Damage to red blood cells
- Blood clots in veins or lungs
- Blood clotting problems
- Respiratory failure
- Neurological dysfunction
- Stroke
- Partial or permanent disability
- Need for additional surgery
- Driveline or pocket infection
- Sepsis (severe blood infection)
- Psychiatric episodes
- Infection
- Cardiac arrest
- Death
- Pleural effusions (extra fluid in lungs)

- Esophageal (swallowing tube) perforation from transesophageal echocardiogram
- Kidney failure
- Thromboembolic event (blood clot that breaks loose and plugs a blood vessel)
- Myocardial infarction (heart attack)
- Liver dysfunction and/or failure
- Device malfunction and/or failure
- Hemolysis (destruction of red blood cells)
- Increased antibodies that may prolong waiting time for heart transplant

## Caring for Your VAD After Surgery

You and your caregiver will receive detailed instructions on VAD care and receive training on the system controller, power module and battery operations in preparation for going home.

You will be required to come to the clinic for frequent appointments to assess the VAD function, driveline exit site, tests and/or procedures, and have weekly blood draws for laboratory testing. We will explain how to care for the surgical site and review other topics, such as personal hygiene, activity and hydration.

Your home environment must be able to support your VAD equipment with constant and reliable electricity and telephone services. The electric outlets that support your power module must be three-pronged, grounded and not controlled by a wall switch.

You will be able to return to a fairly normal lifestyle with some limitations.

- VAD equipment is electrical and **cannot** be immersed in water.
- You may resume taking showers once your driveline has healed and with surgeon's permission. The equipment is placed in a specially designed, water-resistant shower bag, keeping equipment safe and dry.
- You must not participate in contact sports or engage in activities that can cause impact to the area where the VAD connects to your heart, this can cause damage to the pump or the driveline or cause bleeding. Damage to the cannulas, driveline or pump may require re-operation to replace the damaged part.



## Pregnancy

If you are a woman of childbearing age, you must not become pregnant. The growing fetus can dislodge the pump, causing catastrophic bleeding and death. Required medication can cause birth defects.

## Anticoagulants (Blood Thinners)

To prevent blood clot formation inside the pump or other areas of the body, the long-term use of blood thinners, such as warfarin (Coumadin®) will be necessary. Frequent blood tests are required to monitor for potential clot formation.

One of the main risks of blood thinners is bleeding. The other risk is clotting. Even after a minor accident, you may need to be checked by a healthcare provider for signs of bleeding that may not initially be visible, but could still lead to serious complications and even death.

## Precautions

VAD patients **MUST NEVER** have magnetic resonance imaging (MRI) testing. MRI uses large magnets that will damage the pump, cause the pump to stop and could lead to death.

Do not touch tube television or computer screens or engage in activities that may create static electricity, such as vacuuming. Strong electrical shocks can cause the pump to stop and could lead to death.

## Trained Caregiver

You and your caregiver will receive instructions and training on the use and care of your VAD components. It is required that you have a trained caregiver within visual or hearing distance of you for the first few weeks after discharge from the hospital.

## Lifestyle Changes

### Diet

A balanced diet is essential for good health. The key to a healthful diet is eating sensibly. A well-balanced diet includes foods that have protein, fats and carbohydrates. A nutritionist is available to make suggestions and teach the patient and family members how this can be achieved.

Eating healthy, nutritious meals will help you maintain a recommended weight and may help you lose extra weight. Drink plenty of fluids. You need an optimal blood volume for the VAD to adequately pump blood to your body.

### Exercise

Follow the exercise program that was prescribed by your physician.

### Smoking

Smoking constricts blood vessels and is an independent risk factor in coronary artery disease. All patients must stop smoking prior to VAD surgery and maintain abstinence afterwards. Cigarette withdrawal at the time of surgery is an undue stress.

Your home must be a smoke-free environment, and family members must support a smoke-free environment around you.

Smoking cessation resources are available for you and your caregiver(s).

### Alcohol/Drugs

VAD patients must not drink alcohol or take illicit drugs, including marijuana. Alcohol interferes with the absorption of some medications.

Use of prescription medications, including narcotics, must only be taken in the prescribed amounts indicated by the physician.

Those identified by the team with alcohol or illicit drug use issues must regularly attend a chemical dependency group, such as Alcoholics Anonymous or Narcotics Anonymous, and will be subjected to random drug screening.

## Medication

You must adhere strictly to your medication regimen, with no alteration in the schedule, unless prescribed by a physician. You must take all medications on time as directed. If you have side effects from the medication, discuss this with your physician so he/she can attempt to minimize any negative effects.

## Clinic Appointments

There are many clinic appointments, consults and testing for evaluation. It is your responsibility to attend all appointments.

You must also be prepared to attend frequent follow-up visits, as needed, at the Florida Hospital Transplant Institute. You may need to come to the VAD clinic more frequently if there is a change in your condition.

You are responsible for arranging reliable transportation.

## Social Support

Family and persons of support can make a big difference in the long-term success of VAD therapy. It is necessary to enlist the assistance of available family and friends to support you following VAD surgery. You may need help with:

- Transportation to the clinic
- Diet and medications
- Encouragement and emotional support
- Chemical dependency and smoking cessation treatment (if needed)

## Alternative Treatment Options

If you decide that a VAD is not the best option for you or you are not a candidate for VAD therapy, you will continue to receive medical care. Medical treatments are available to reduce symptoms and other complications of heart disease. Heart failure therapies, such as cardiac medications, may increase your quality of life. However, these interventions will not cure your underlying heart disease.

## VAD Data

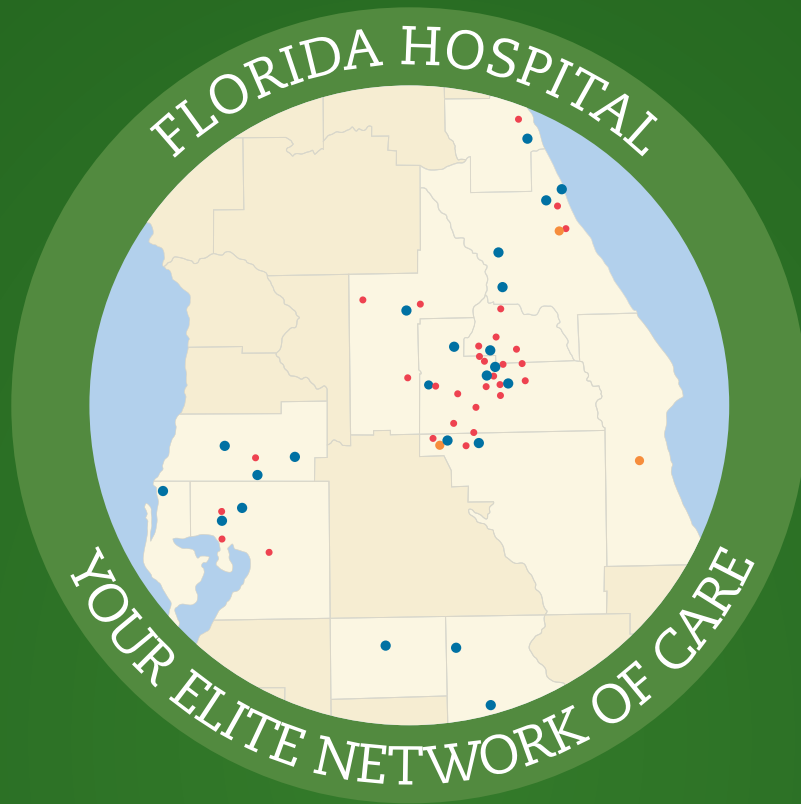
Your VAD device may be registered with INTERMACS, a registry that tracks all mechanical assist device implants. The purpose of the registry is to collect and analyze clinical data from patients who are receiving ventricular assist devices.

## Suggested Internet Resources

- Thoratec Device Information:  
[Thoratec.com](http://Thoratec.com)
- American Heart Association:  
[Heart.org](http://Heart.org)
- American Diabetes Association:  
[Diabetes.org](http://Diabetes.org)
- Nutrition:  
[Nutrition.gov](http://Nutrition.gov)
- United Network for Organ Sharing (UNOS):  
[UNOS.org](http://UNOS.org)
- Organ Procurement and Transplantation Network (OPTN):  
[OPTN.Transplant.HRSA.gov](http://OPTN.Transplant.HRSA.gov)
- Scientific Registry of Transplant Recipients (SRTR):  
[SRTR.org](http://SRTR.org)
- National Institutes of Health:  
[NIH.gov](http://NIH.gov)

**For more information,  
call (407) 303-2474**





The Florida Hospital Transplant Institute is a trusted member of one of America's largest, not-for-profit healthcare systems.



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