

LVAD Rehabilitative Care and Outcomes

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Acute Inpatient Rehab



- 89-bed Rehab Unit located within an Acute Care Hospital
- Over 2,000 admissions in 2023
- 7 CARF accredited programs
 - Comprehensive Integrated Inpatient Rehab Program
 - Stroke Specialty
 - Brain Injury Specialty
 - Cancer Specialty
 - Pediatric Specialty
 - Outpatient Medical Rehab Program – Adult
 - Outpatient Medical Rehab Program – Pediatric
- Ranked 2nd in Florida and 24th in the nation by US News and World Report - 2023-2024
- 14 employed Psychiatrists & Extenders
- 16 PM&R residents
- Over 100 nurses Rehab Nurses
- Over 80 Therapists
- 1 Therapy Dog...





Mesa Verde Resident Therapy Dog



**Patient
First
Award
Winner for
Service!!**

LVAD Patients in a Rehab Setting

Amelia Vargas, BSN, RN

Heart Failure in the United States

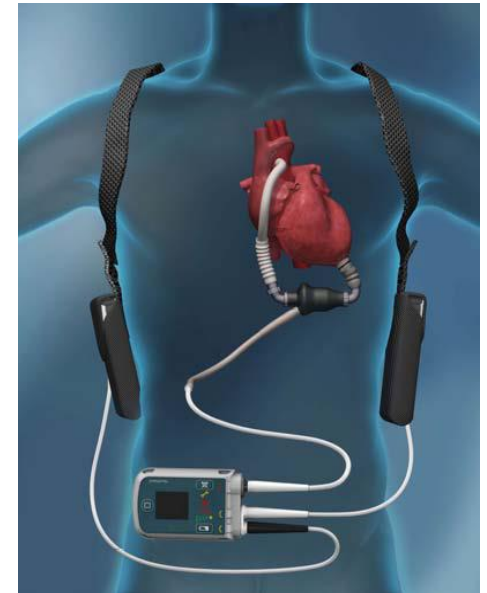
- 2020, approximately **6.7 million out of 339 million** adults
- 10% have advanced heart failure (HF)
- **1 in 4** people will develop HF
- **About half** of people with HF **die within 5 years**
- 2030: estimated 8.5 million HF cases
- National treatment cost: estimated **\$30.7 billion yearly**
- Ventricular Assist Device (VAD) therapy





What is a VAD?

- Electromechanical device implanted in ventricle of the heart
- Replaces the function of a failing heart
- Provides cardiac circulation support
- Used in case of acute or chronic heart failure





TYPES of VADs

- Left Ventricular Assist Devices (LVAD)
 - Most common: 2020, over 3,000 implants in US
 - Myocardial Infarction
- Right Ventricular Assist Devices(RVAD)
 - Pulmonary Arterial Hypertension
- Biventricular Assist Devices (BiVAD)
- Percutaneous Ventricular Assist Devices
 - Tandem Heart & Impella
- Total Artificial Heart



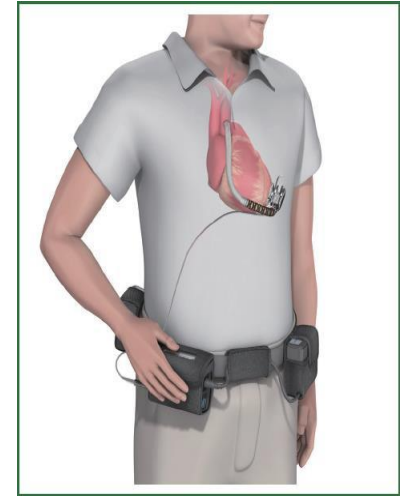
VAD Therapies

- **Destination Therapy** - patients who are not eligible to receive a heart transplant may be supported on a VAD indefinitely
- **Bridge to transplant** - medical condition can be stabilized while patient waits for a donor heart
- **Bridge to Recovery** - in rare circumstances, a heart may recover its strength after being given time to “rest” with the help of an LVAD. In most cases, however, advanced heart failure is a permanent and irreversible condition.



Advanced Heart Failure Therapy Option

- Ventricular Assist Devices
 - Destination Therapy
 - HeartMate II
 - HeartMate III
 - HeartWare (disc.)
 - Bridge to Transplant
 - HeartMate II
 - HeartMate III
 - HeartWare (disc.)





LVAD Pumps



Heart Mate II



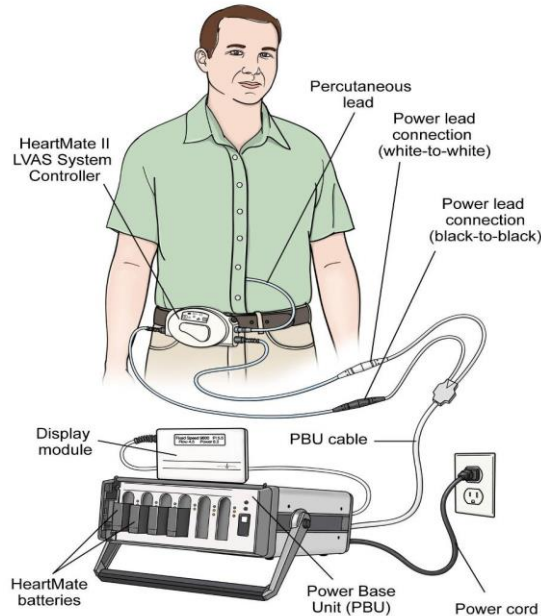
Heart Mate 3



HeartWare



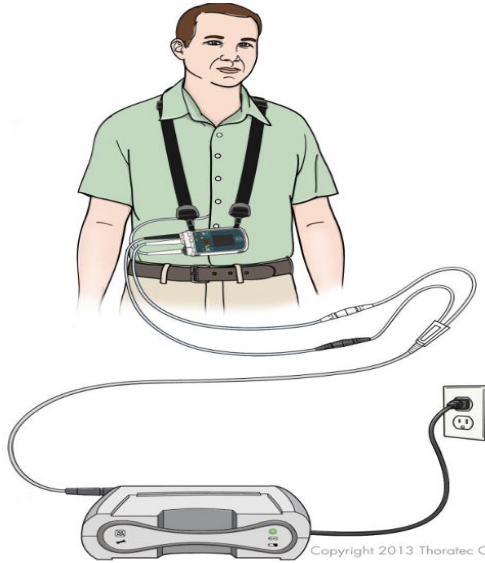
HeartMate II & III – Equipment





Operation Options

Tethered Operation



Batteries and Clips





Controller Compatible Wear and Carry Accessories



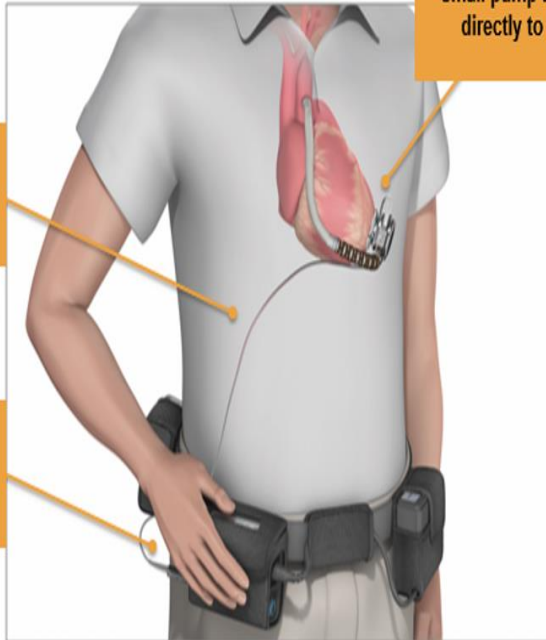


HeartWare

Small pump attaches directly to heart

Thin, flexible driveline cable exits skin

A small controller & batteries run the pump



LVADs in Rehab



Admitted to Medically Complex Rehab/Tele Unit



3 hours daily therapy



Telemetry Monitoring



Assigned to VAD competent staff (Nursing & Therapy)



Rehab Physician works in collaboration

- VAD Team at implanting facility
- Internal Medicine
- Cardiology



Continuous Monitoring:

- Labs (PT, INR, CMP, CBC)
- VAD Parameters
- Driveline exit site
- Vital Signs (MAP vs BP)



LVAD Trained RNs

- ACLS Certified
- Basic Arrhythmia Course
- Progressive Care Course
- Initial LVAD Training Class
- Annual Mechanical Circulatory Support LVAD Update
- Initial RN Orientation LVAD Competencies
- Annual RN LVAD Competencies
- Hands-on Training



LVAD Trained Therapists

- Initial Orientation Competency
- Annual Competency
- VAD Awareness Learning
- PT/OT Preceptor Checklist
- LVAD Super user Therapists
- Extensive Chart Review
- Knowledge of:
 - Equipment
 - Device parameters
 - Alarm and alarm management
 - Map Measurement



Patient Monitoring Considerations

Pulse

- No change in EKG
- May or may not have a pulse
- Doppler

Blood Pressure

- Mean Arterial pressure MAP 65-85
- Automated BP may not be accurate
- Manual BP recommended

Pulse Oximetry

- May not be reliable

Telemetry Monitoring

- Due to possible arrhythmias
- Defibrillators/ICDs



Patient Monitoring Considerations

Heart Sounds

- Auscultate “heart sound”
- Humming, whirling, or swooshing sound

Daily Weights

- Contact VAD Coordinator if pt has had a weight gain >2-3 pounds in 1-2 days

Urine

- Urine should not be dark in color such as coca cola color



Patient Management

- Device Parameters/ Alarm Assessment
 - Flow
 - Speed
 - Pulse Index
 - Power
- Driveline Exit Site Assessment
 - Daily dressing change
 - Kinks and cuts
 - Pain
 - Redness
 - Drainage
 - Induration
 - Fever
- VAD/ Transplant Team Communication



Driveline Assessment





Driveline

1



Appearance:

- little or no redness
- no drainage
- skin is incorporated (stuck) to the driveline
- no tenderness

2



Appearance:

- initial tear or trauma to exit site (ex. dropped controller), skin pulled away from driveline
- slight tenderness
- drainage - note amount, color, odor
- slight redness

Page an MCS Nurse immediately, take pictures if possible

3



Appearance:

- redness increasing
- drainage increasing- note amount, color, odor
- tenderness
- skin pulled away from driveline

4



Appearance:

- large amount of redness
- large amount of drainage
- painful
- skin is pulled away from the driveline



Medications

- Beta-Blockers
- Anti- Arrhythmic
- Ace-Inhibitors
- Calcium Channel Blockers
- Diuretics
- PDE5 Inhibitors (Revatio)

- Aspirin
- Supplements
- Coumadin
- Midodrine
- Statins
- Milrinone IV Infusion
- Dobutamine IV Infusion



Anticoagulation Therapy

- INR Goals:
 - INR Goal: 2-3
 - Patient specific (Co-morbidities)
- Medication options:
 - **Most Common: Coumadin (Warfarin)**
 - Aggrenox
 - ASA 81mg plus Clopidogrel
 - Persantine

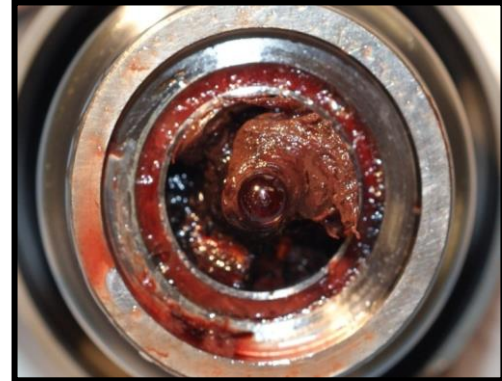


Potential Risks Unique to LVAD Pt

- GI bleed
- Right Heart Failure
- Pulmonary Edema
- Thromboembolism
- Aortic Insufficiency
- Stroke
- Infection (driveline/local/sepsis)
- Arrhythmia
- Hypovolemia
- Hypertension
- System controller malfunction
- Loss of power
- LVAD malfunction
- Low flow condition
- Pump Thrombus



Pump Thrombus



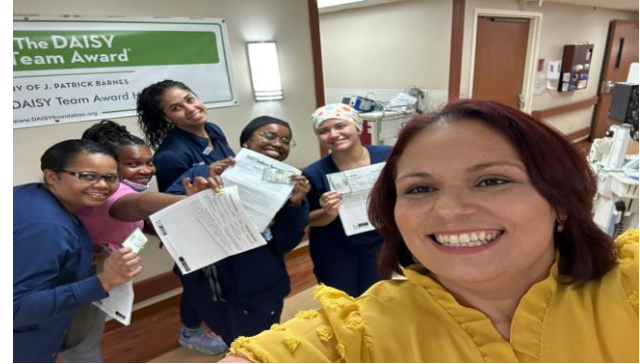


Arrhythmias/Cardiac Arrest Management

- Arrhythmias
 - Anti-arrhythmic drugs, pacemakers, and ICDs
- Defibrillation/Cardioversion
- Cardiac Arrest
 - ACLS protocols as needed
 - Chest compressions may be done
 - Verification pump placement post compressions (chest x-ray)
 - **VAD Transplant Coordinator/Team**



Rehab/ Tele Team



Case Studies

Leslie Schlang, BSN, CRRN

Statistics

- Accepted our first LVAD patient in **April 2016**
- Between 2020 – 2023 treated over 50 LVAD patients
 - Over 28 Male
 - Over 11 Female
- Average age was 70 years
- Average length of stay was 12.8 days
- Disposition:
 - Home Health Care
 - Discharged back to Acute Care



Case Study: GEORGE

George is a 63-year-old male, who is married with three daughters. He is retired. He had an LVAD implant secondary to Ischemic Cardiomyopathy with severe left ventricle dysfunction as destination therapy on 12/23/2016.

He was admitted to the Memorial Rehabilitation Institute two months later. Within one week, he became unstable, c/o SOB, dizziness and CP and was transferred back to the acute care hospital. Potential source of symptoms was dehydration and low mean arterial pressure. He was stabilized and readmitted to Rehab on three days later.

George stayed on Rehab for 25 days. Functionally he went from requiring maximum assist to dependent for all mobility and ADLs to moderate assistance to supervision and was successfully discharged home with his wife and home health care.

In April 2018, George was readmitted to Rehab following a left below the knee amputation due the wounds on his left leg progressing to gangrene and MRSA. He was discharged home twelve days later minimal assist to supervision with home health care PT and OT and IV antibiotics for one month.

82 days after his last Rehab stay, George had an LVAD explant and a heart transplant. He returned to the Memorial Rehab Institute and was discharged home on August 9, 2018, with home health care PT and OT as well as close follow up with his medical team.



Case Study: FRANCINE



Francine is a 71-year-old female who is married and is a retired secretary. She had an elective LVAD placed in June 2019. She admitted to the Memorial Rehabilitation Institute on July 3, 2019.

Required maximal assist to dependent with most ADLs, and mobility and transfers on admission to Rehab and was discharged home at minimum assist level using a rolling walker fourteen days later with her husband and home health care therapy.

Admitted to the hospital in August of 2021 following a fall; sustained a traumatic brain injury as well as a left femur fracture. She was admitted to Rehab and stayed for thirteen days. Upon admission required maximum assistance to dependent; discharged to home at minimum assistance.

Francine was again admitted to the hospital in September 2023 due to low flow alarms from her LVAD. Diagnosed with an LVAD obstruction due to a thrombus in the outflow tract. An LVAD replacement was performed on October 5, 2023.

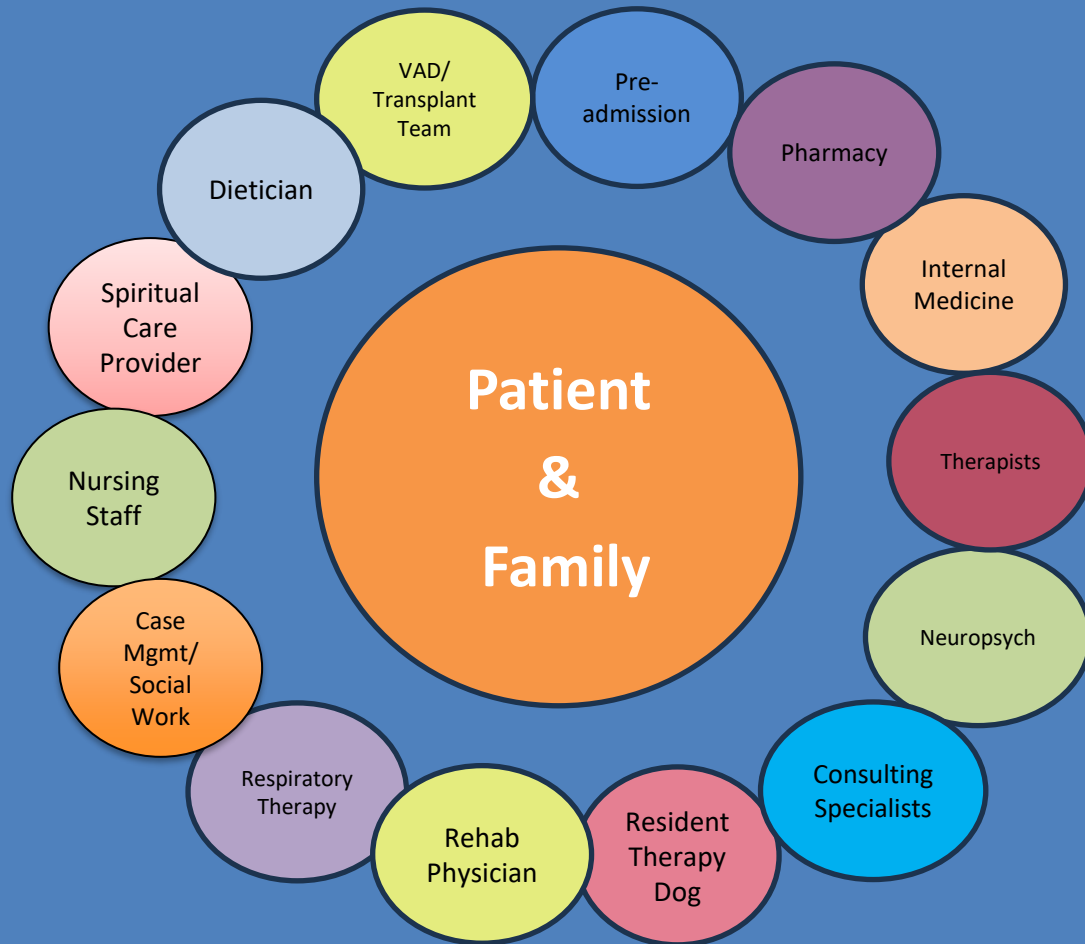
She was admitted to Rehab on October 19, 2023 at maximum to dependent for all ADLs, transfers and ambulation. She was discharged home on two weeks later with HHC PT and OT and hired a private aide for 4 hours per day, requiring min assist to supervision at time of discharge.



KEY TAKE AWAYS

We selected these two patients for case studies to show how complex these cases can be and how multifaceted our patients are.

Multidisciplinary Care Team





Acknowledgements

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Questions

