Advanced Heart Failure Options

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Objectives

- Overview and Indications for CardioMEMS
- Overview and Indications for Ventricular Assist Devices (VAD)
- Understanding basic VAD function

Disclosures

- I have none

Classification of HF: stages and Functional Class

- ACC/AHA HF Stages

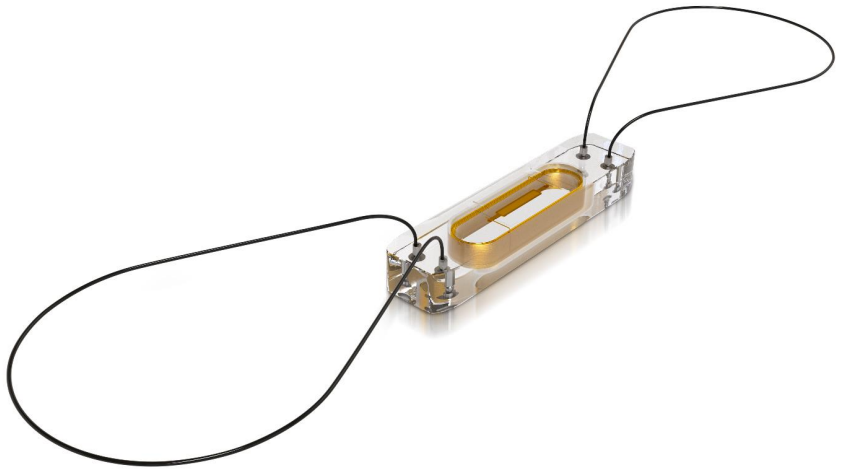
AHA/ACC Heart Failure Stages	
Stage	Description
A	Presence of heart failure risk factors but no heart disease and no symptoms
B	Heart disease is present but there are no symptoms (structural changes in heart before symptoms occur)
C	Structural heart disease is present AND symptoms have occurred
D	Presence of advanced heart disease with continued heart failure; symptoms requiring aggressive medical therapy

- NYHA Functional Class

Class	Patient Symptoms
Class I (Mild)	No limitation of physical activity. Ordinary physical activity does not cause undue fatigue, palpitation, or dyspnea (shortness of breath).
Class II (Mild)	Slight limitation of physical activity. Comfortable at rest, but ordinary physical activity results in fatigue, palpitation, or dyspnea.
Class III (Moderate)	Marked limitation of physical activity. Comfortable at rest, but less than ordinary activity causes fatigue, palpitation, or dyspnea.
Class IV (Severe)	Unable to carry out any physical activity without discomfort. Symptoms of cardiac insufficiency at rest. If any physical activity is undertaken, discomfort is increased.

CardioMEMS - Overview

- https://www.cardiovascular.abbott/us/en/campaigns/stay-ahead-of-hf.html



CardioMEMS - Indications

- When should I patient be considered for device
  - Having trouble or need for increasing doses of diuretics
  - Concern for worsening symptoms or fluid retention

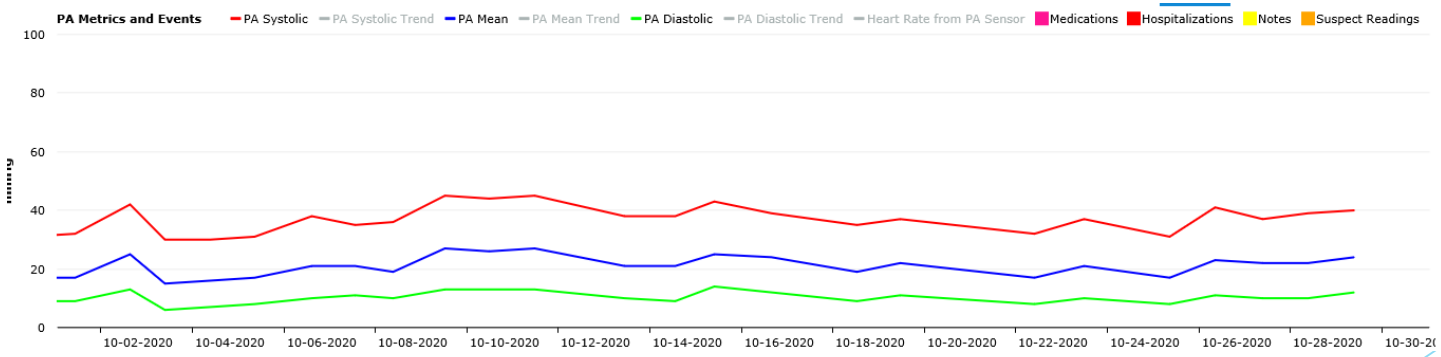
- Eligibility
  - no age limit, however patient life expecting should be >1 year
  - One or more Heart Failure related admissions to the hospital in the last 12 months
  - New York Heart Association Class III symptoms

CardioMEMS – Referral and Evaluation

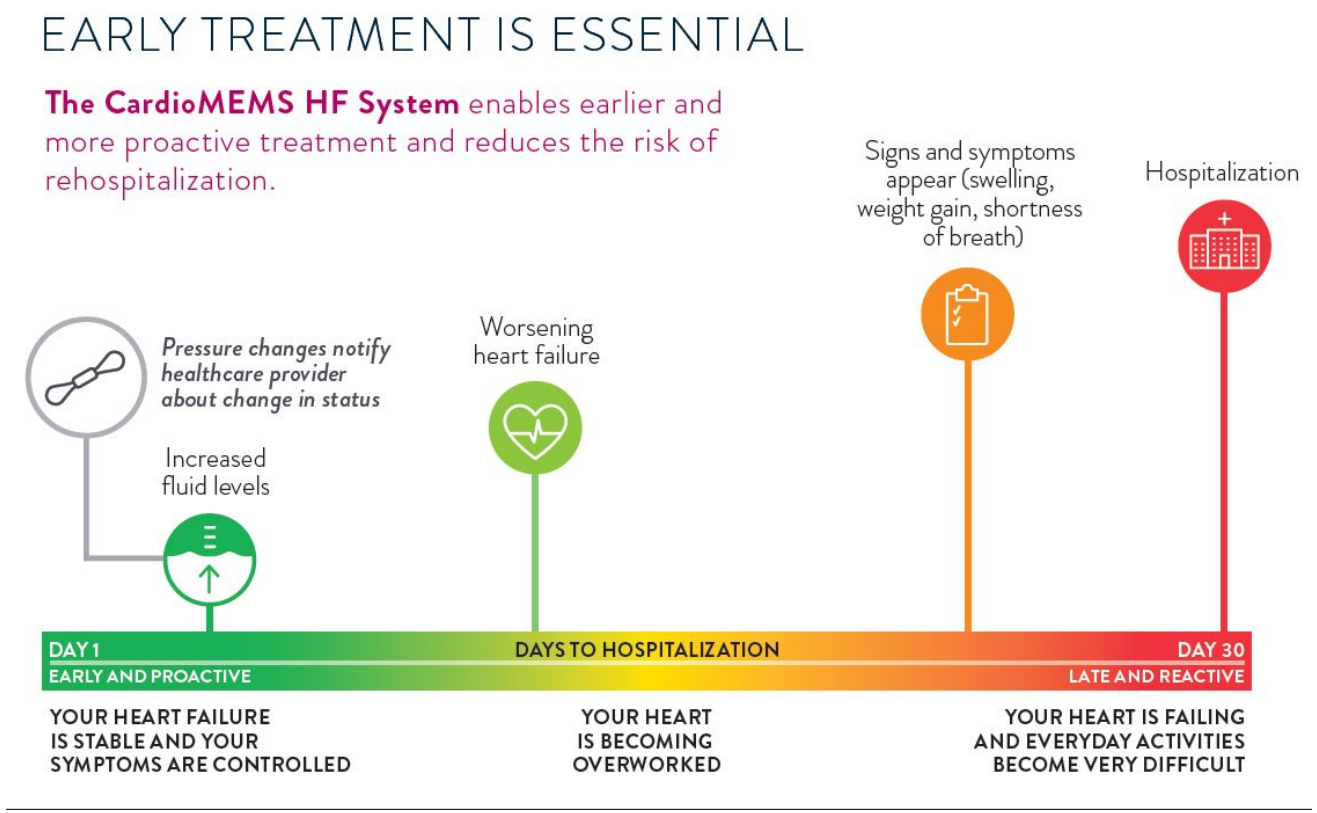
- What happens after patients are referred
  - Patients are screened for eligibility
    - Medical chart is reviewed
    - Patient measurements are collected if necessary
    - Patient meets with Nurse Practitioner in the Heart Failure clinic
      - Procedure is explained, questions are answered, and patient is shown demo model of device and home unit
- Meets eligibility
  - Prior Authorization is completed
  - Procedure is schedule

CardioMEMS – At Home Monitoring

b



CardioMEMS


EARLY TREATMENT IS ESSENTIAL
The CardioMEMS HF System enables earlier and more proactive treatment and reduces the risk of rehospitalization.
Pressure changes notify healthcare provider about change in status
Increased fluid levels
Worsening heart failure
Signs and symptoms appear (swelling, weight gain, shortness of breath)
Hospitalization
DAY 1
EARLY AND PROACTIVE
DAYS TO HOSPITALIZATION
DAY 30
LATE AND REACTIVE
YOUR HEART FAILURE IS STABLE AND YOUR SYMPTOMS ARE CONTROLLED
YOUR HEART IS BECOMING OVERWORKED
YOUR HEART IS FAILING AND EVERYDAY ACTIVITIES BECOME VERY DIFFICULT

Advanced Heart Failure - Overview

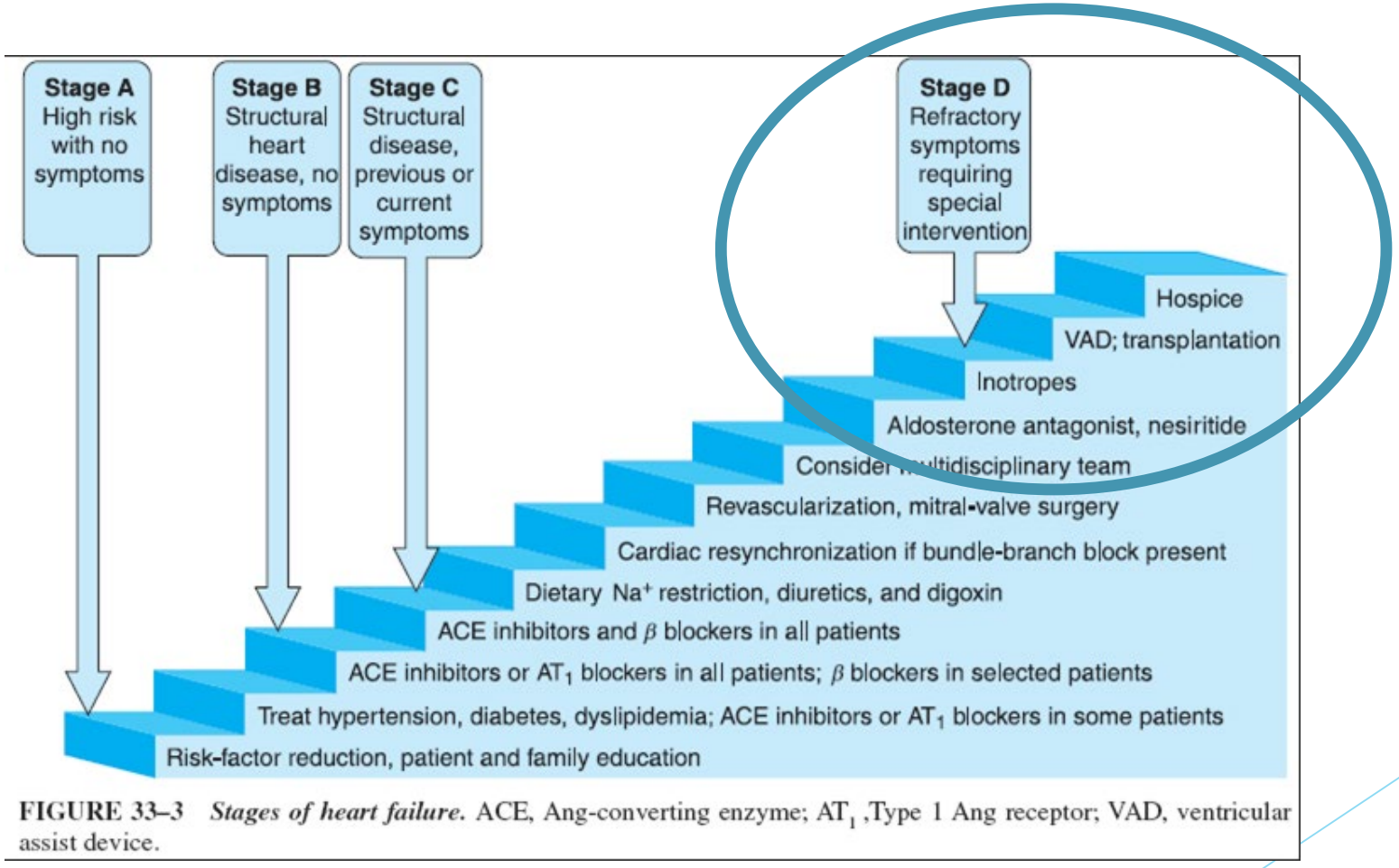
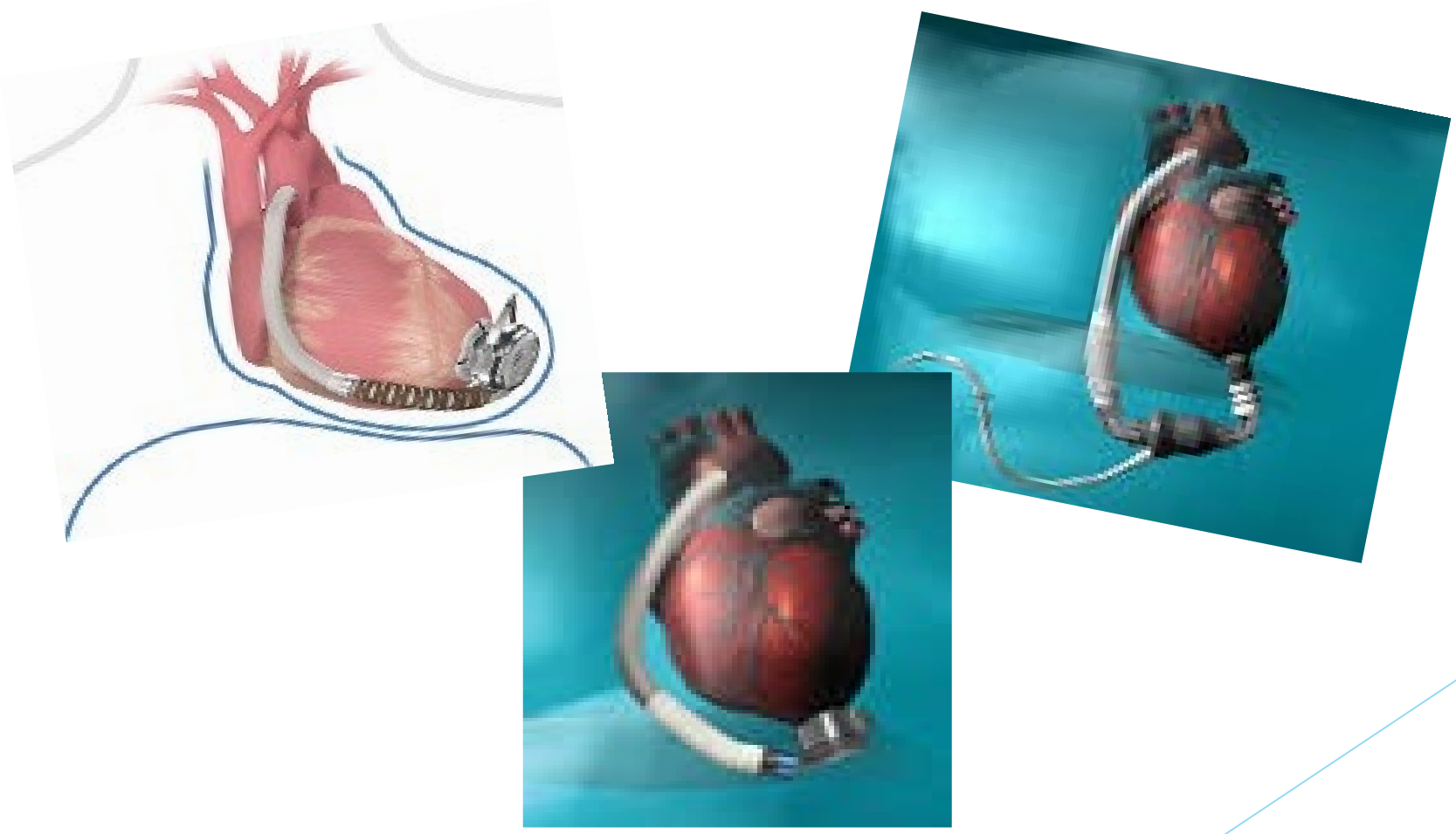


FIGURE 33–3 *Stages of heart failure.* ACE, Ang-converting enzyme; AT_1, Type 1 Ang receptor; VAD, ventricular assist device.

Advanced Heart Failure Therapies

- Inotrope Infusion Therapy
  - Started during and hospitalization
  - Maybe continued and patient discharged home with continuous infusion
    - This allows for physical and nutritional rehabilitation
    - Can also be used as a palliative measure
- Mechanical Circulatory Support
  - Ventricular Assist Devices (VAD)
    - LVADs or RVADs or BiVADs
    - Temporary Support
      - Impella Device or ECMO
- Cardiac Transplantation

Ventricular Assist Device (VAD)



VAD - Overview

- • A ventricular assist device (VAD) is a mechanical device that helps a weak heart (heart failure) pump blood throughout the body

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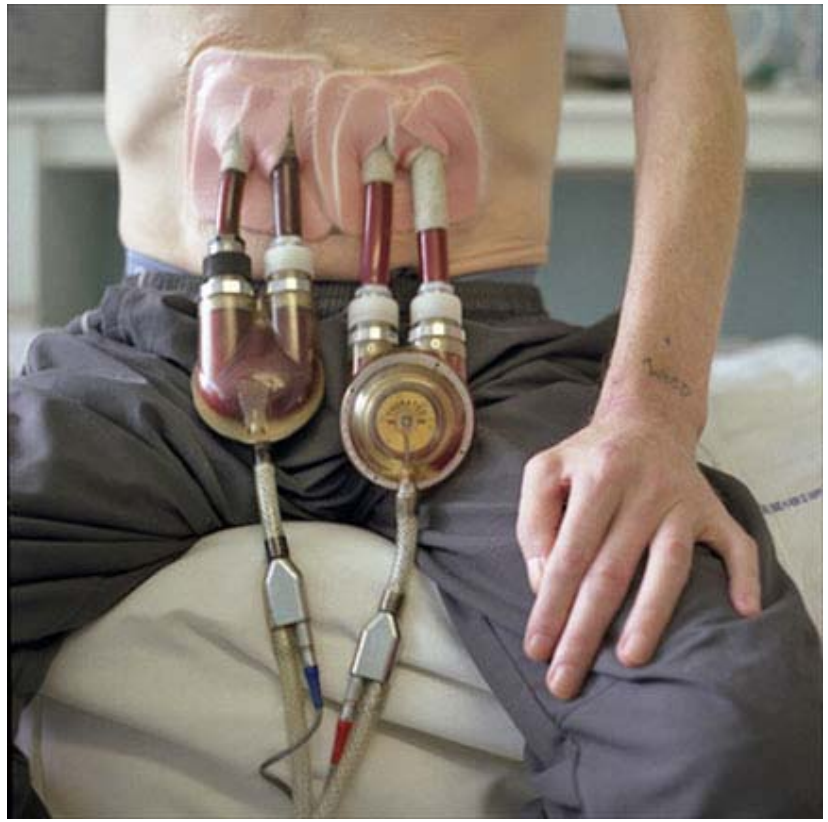
Heart & Vascular

Technology Evolution



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VAD – Overview cont.

- Continuous blood flow device
- Surgically implanted in the LV Apex (inflow) cannula with an outflow annula anastomosed to the ascending aorta
- Surgically implanted via sternotomy or thoracotomy
- Helps to circulate oxygenated blood from the LV to the rest of the other end-organ systems

VAD - Indications

Clinical Events and Findings Useful for Identifying Patients with Stage D HF

- Worsening functional status
- Recurrent HF Hospitalizations
- Increasing Diuretic requirements
- Poor exercise tolerance
  - Peak VO2 <12-14
  - 6 MWT <300 meters
  - SOB <1 block walking
- Intolerance to HF medications
  - Hypotension
  - Increasing creatinine
- Decline in Renal Function
- Hyponatremia
- Refractory ventricular arrhythmias/ICD shocks
- Cardiogenic shock.

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VAD - Referral

When should patients be considered for LVAD therapy?

Patients with the following should be referred for evaluation for advanced heart failure therapies, including LVAD therapy.

1 NYHA CLASS IIIB OR IV HEART FAILURE (INTERMACS‡ 1-6):

NYHA CLASS	CLASS III		CLASS IIIB/IV		CLASS IV			
		7	6	5	4	3	2	1
INTERMACS‡ registry advanced heart failure profiles		Advanced NYHA III symptoms. *Living comfortably with limited physical activity*	Exertion limited. *Walking wounded*	Exertion intolerant. *Housebound*	Resting symptoms. *Frequent flyer*	Stable but inotrope dependent. *Dependent stability*	Progressive decline on inotropic support. *Sliding on inotropes*	Critical cardiogenic shock. *Crash and burn*

2 ANY ONE OF THE FOLLOWING HIGH-RISK CLINICAL TRIGGERS:

I	IV Inotropes - Milnirone, Dobutamine
N	NYHA IIIB/IV or persistently elevated natriuretic peptides
E	End-organ dysfunction (Cr > 1.8 mg/dL or BUN > 43 mg/dL)
E	Ejection fraction ≤ 35%
D	Defibrillator shocks
H	Hospitalizations - Frequent
E	Edema (or elevated PA pressure) despite escalating diuretics
L	Low blood pressure, high heart rate
P	Prognostic medication — decreasing goal directed medical therapy due to hypotension

Additional patient referral considerations:

- CRT nonresponder
- Physical activity limited or impaired quality of life

Ventricular Assist Device (VAD) - Referral con't

NYHA CLASS	CLASS III		CLASS IIIB/IV		CLASS IV			
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VAD – What happens after referral?

- Multidisciplinary Evaluation
  - Advanced Heart Failure Cardiologist
  - Cardiac Surgeon
  - Psychosocial
  - Nutrition
  - Palliative Care
  - Social Work
  - Financial Evaluation

VAD Surgery

- Costly
- Patients are admitted to post operative cardiac surgery unit - ICU and Floor
- Typical length of stay is 21 days
  - Education on VAD
  - Patient and Family must demonstrate understanding of device and how to take care at home
  - Objective Testing after device is implanted

Potential Risks Associated with VAD Therapy

- Bleeding (head, GI, nose)
- Infection (blood and/or driveline exit site)
- Thrombus/Embolus
- Stroke (hemorrhagic or Embolic)
- Hemolysis
- Renal Failure
- Arrhythmias
  - Cardiac Arrest
  - MI
- VAD suction Events
- Right Ventricular Failure
- LVAD Device Failure (Any Component of the VAD device)
- Ventral Hernia
- Loss of limb

VAD – Why do it?

- Patient goals are to:
  - Resolve HF symptoms (NYHA IV to I or II)
  - Improved quality of life
  - Resume ADLs (return to work, drive, take care of the family)
  - Remain free of VAD complications

Thank you!!

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