Ventricular Assist Device Workshop

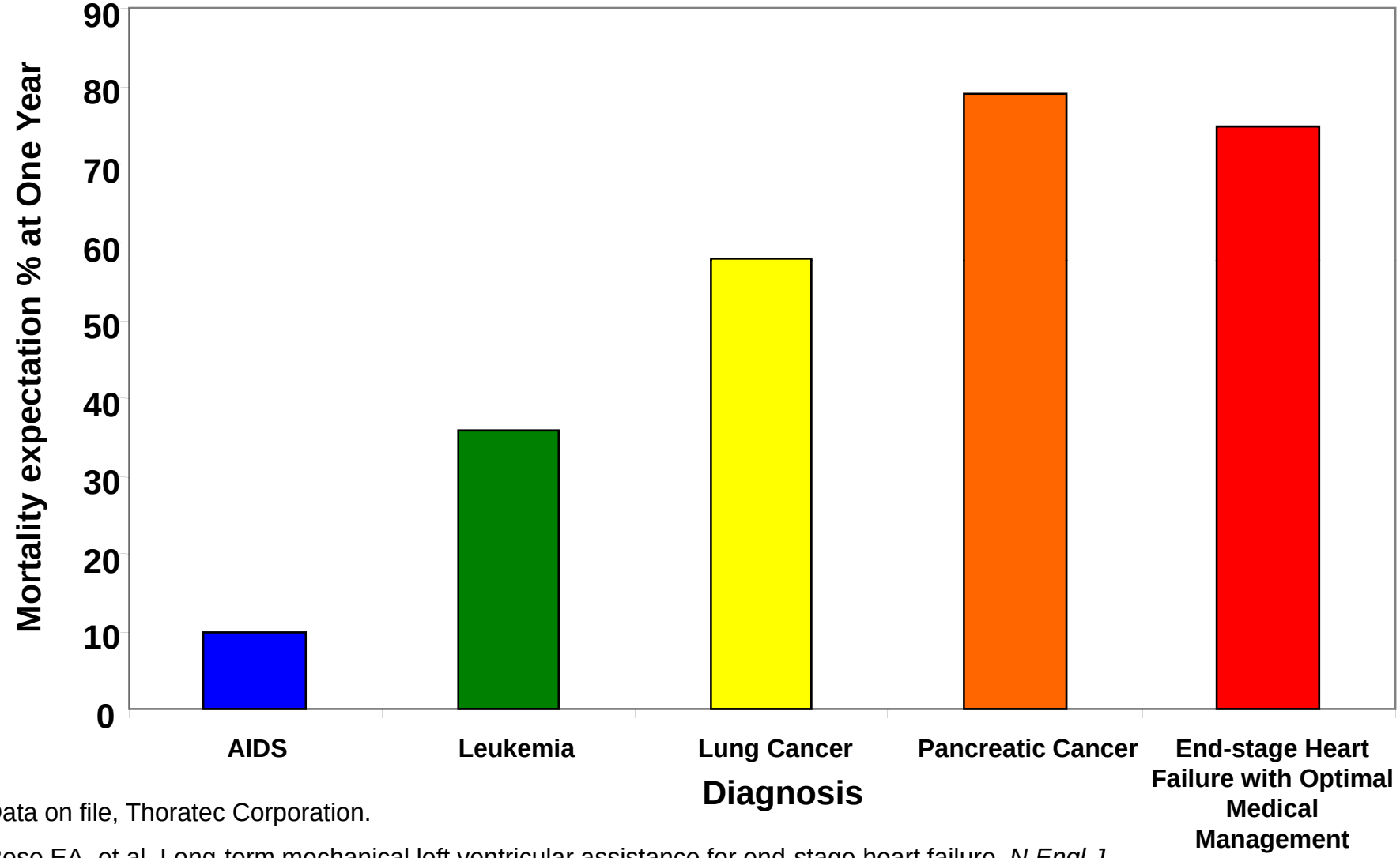
1:30 – 2:00	**Welcome, Review of Heart Failure and Terminology.**	**Allen Wolfe**
2:00 – 2:45	First Rotation	VAD Coordinators
3:00 – 3:45	Second Rotation	VAD Coordinators
4:00 – 4:35	Third Rotation	VAD Coordinators
4:45 – 5:00	Comments	Attendees

Heart Failure Prevalence

- 300,000-800,000 Americans have advanced heart failure.
- Over 250,000 patients die of heart failure each year
- By year 2030, estimated 10 million Americans will be affected

1 Rosamond, W, Flegal K, Furie K, et al. Heart Disease and Stroke Statistics—2008 Update: A Report From the American Heart Association Statistics Committee and Stroke Statistics Subcommittee. Circulation 2008;117:e25-e146.
2 Adams KF, Zannad F. Clinical definition and epidemiology of advanced heart failure. *Am Heart J* 1998;135:S204-S215.
3 Russell, SD, Miller L, Pagani F. Advanced Heart Failure: A Call to Action. *Circulation* 2008. Publication Pending

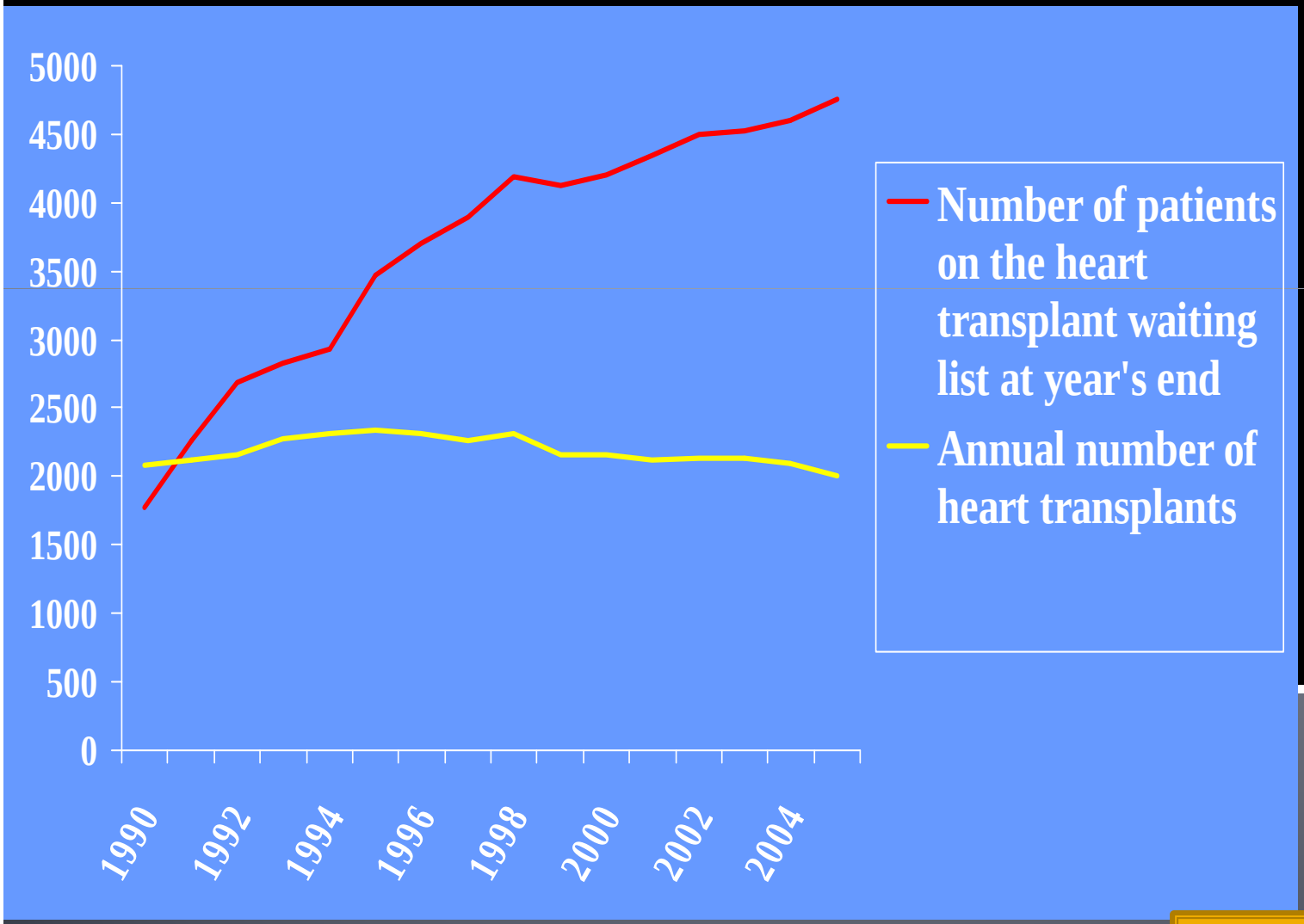
Projected Mortality for Advanced Heart Failure Exceeds Other Terminal Diseases



Data on file, Thoratec Corporation.

Rose EA, et al. Long-term mechanical left ventricular assistance for end-stage heart failure. *N Engl J Med.* 2001 Nov 15;345(20):1435-43.

End-stage Heart Failure
Limited Donor Organ Availability

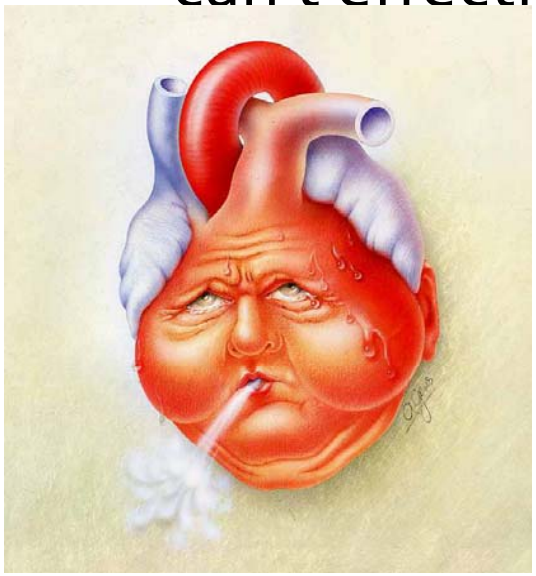


AHA, 2005

What is a LVAD?

- A left ventricular assist device (LVAD) is a battery-operated, mechanical pump-type device that's surgically implanted.

- It helps maintain the pumping ability of a heart that can't effectively work on its own.



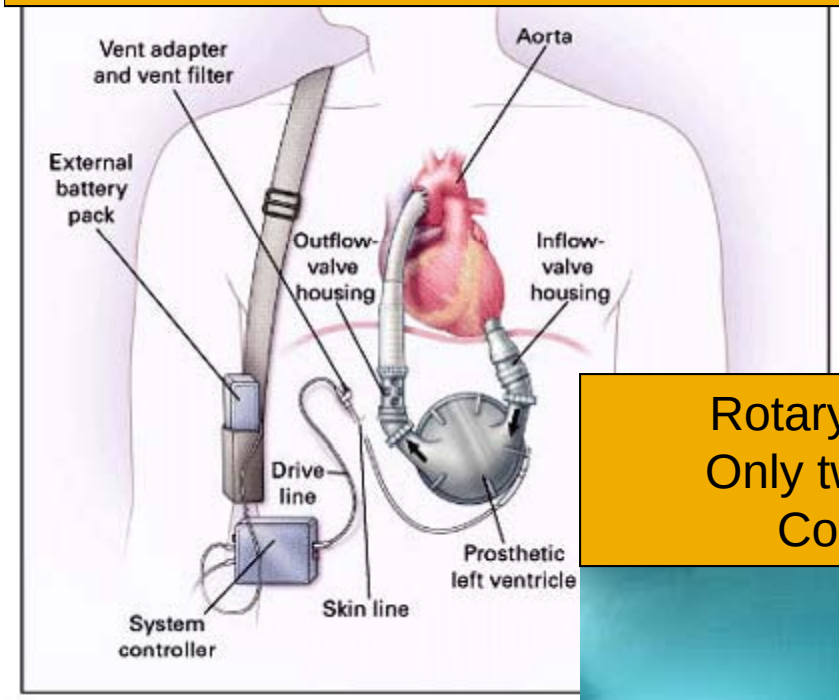
Ventricular Assist Devices (VADs) In the Treatment of ESCD

Overview

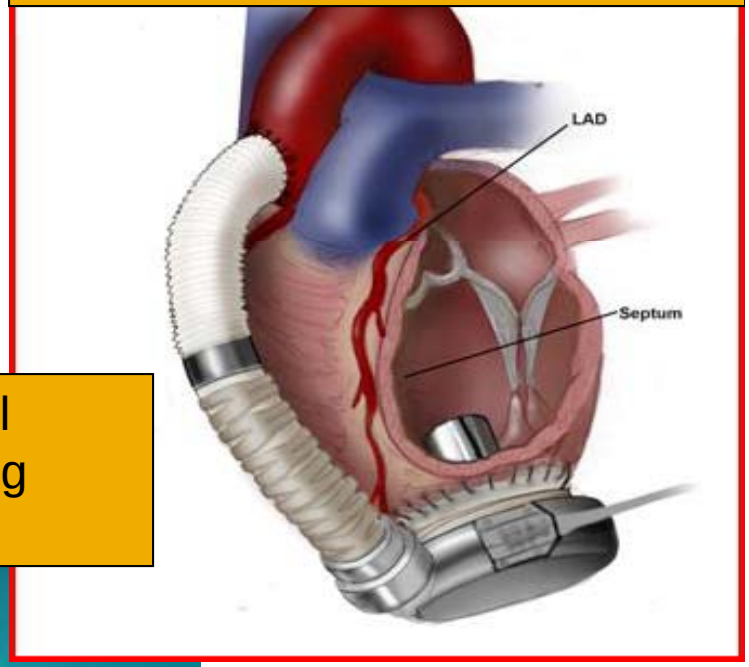
- Augment or replace native heart function
- Native heart remains "intact"
- Indications: refractory left heart failure
  - Bridge to transplant
  - Salvage
  - Destination therapy (DT)

The Functional Categories of VADS (Generation)

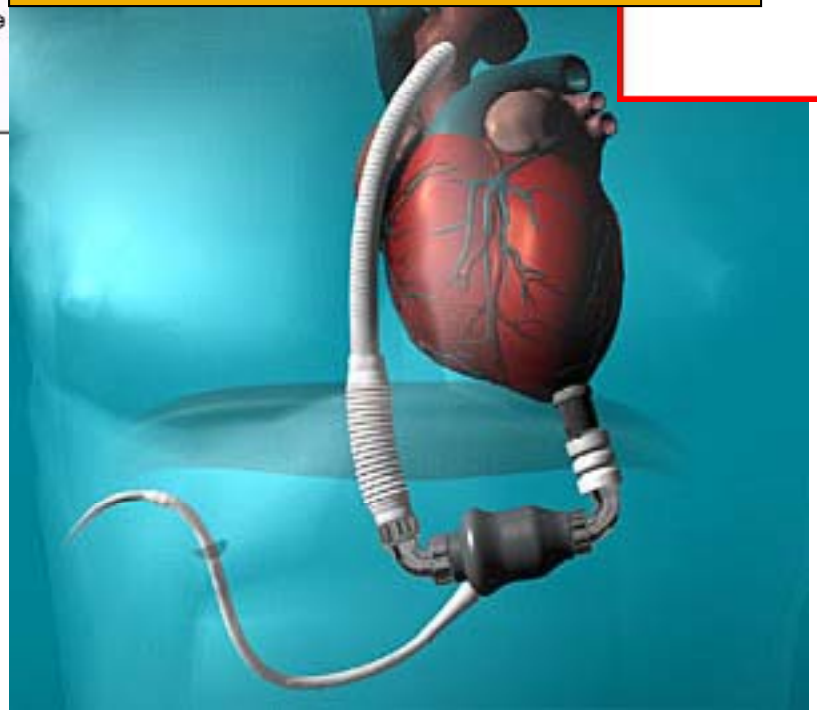
Volume in > Volume Out
Many touching and moving parts
Pulsatile



Spinning Levitated Magnet
No touching parts
Continuous Flow



Rotary like a Whirlpool
Only two parts touching
Continuous Flow



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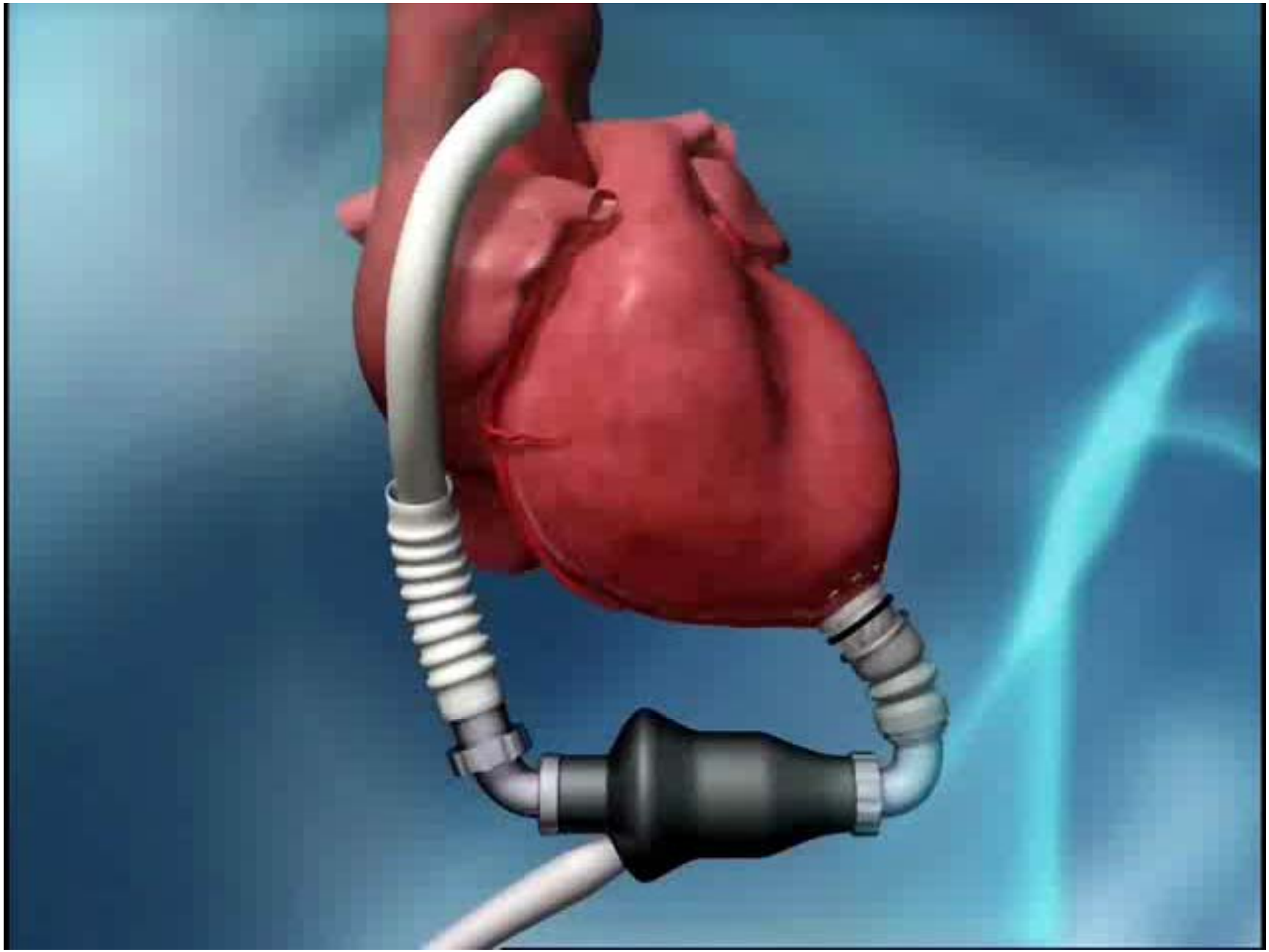

System Controller

Battery

Hand Pump

Patient Management

1. Airway and Breathing First!
2. Auscultate and listen to see if the device is working, don't go by pulses or consciousness
3. Any alarms going off? Assess and fix
4. Look at colored tag on the patient and refer to EMS Guide – Be Careful with the scissors!
5. Patients skin color, temperature, cap. Refill, MAP, cardiac rhythm
6. Establish IV access
7. Always take the patients travel kit and significant other if possible. They will be an invaluable resource for you.
8. Consult and transport to VAD Center on the colored tag and Medical Alert bracelet

Community Preparedness
EMS Awareness

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HeartMate II®

1. Can I do external CPR?
Only if absolutely necessary

2. If not, is there a "hand pump" or external device to use?
No.

3. If the device slows down (low flow state), what alarms will go off?
A red heart alarm light indicator and steady audio alarm will sound if less than 2.6 lpm.

4. How can I speed up the rate of the device?
Check for hypovolemia or right heart failure and treat

5. Do I need to heparinize the patient if it slows down?
Usually no, but you will need to check with implanting center

6. Can the patient be defibrillated while connected to the device?
Yes

7. If the patient can be defibrillated, is there anything I have to disconnect before defibrillating?
No.

8. Does the patient have a pulse with this device?
May have weak pulse or lack of palpable pulse.

9. What are acceptable vital sign parameters?
MAP 70-90 mm Hg with a narrow pulse pressure

10. Can this patient be externally paced?
Yes.

Adapted from Sweet, L. and Walls, Jr., A. Mechanical Circulatory Devices in Transport in ASTNA: Patient Transport Principles and Practice, 4th ed. Mosby, 2010 in press.

FAQs

- May not be able to obtain cuff pressure (axial flow pump)
- Pump connected to electric line exiting patient's abdominal area and is attached to computer which runs the pump.
- Pump does not affect EKG
- All ACLS drugs may be given.
- No hand pump is available.
- A set of batteries last approximately 3 hours
- Any emergency mode of transportation is ok. These patients are permitted to fly.
- Be sure to bring ALL of the patient's equipment with them.

TROUBLE SHOOTING: HeartMate II®

When the Pump Has Stopped

- Check the connections between the controller and the pump and the power source
- Fix any loose connection (s) to restart the pump.
- If the pump does not restart and the patient is connected to batteries replace the current batteries with a new, fully-charged pair *(see changing batteries section no next page)*
- If pump does not restart, change controllers *(see changing controllers section on next page)*

Alarms: Emergency Procedures

Yellow or Red Battery Alarm: Need to Change Batteries. *See changing batteries section on next page.*

Red Heart Flashing Alarm: This may indicate a Low Flow Hazard. Check patient–the flow may be too low. If patient is hypovolemic, give volume. If patient is in right heart failure–treat per protocol. If the pump has stopped check connections, batteries and controllers as instructed in the section above.

This guide does not supersede manufacturer instructions. Copy with permission only. March 2009

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Resources

- www.MYLVAD.com
  - EMS module
  - Field guides
- www.thoratec.com