

Management of Heart Failure: Role of the Advanced Heart Failure Clinic

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Disclosures

- PI: Cardiomems post-approval study (St. Jude)
- Consultant:
 - Novartis
 - Abbott
- Director: Compassionate Care Hospice

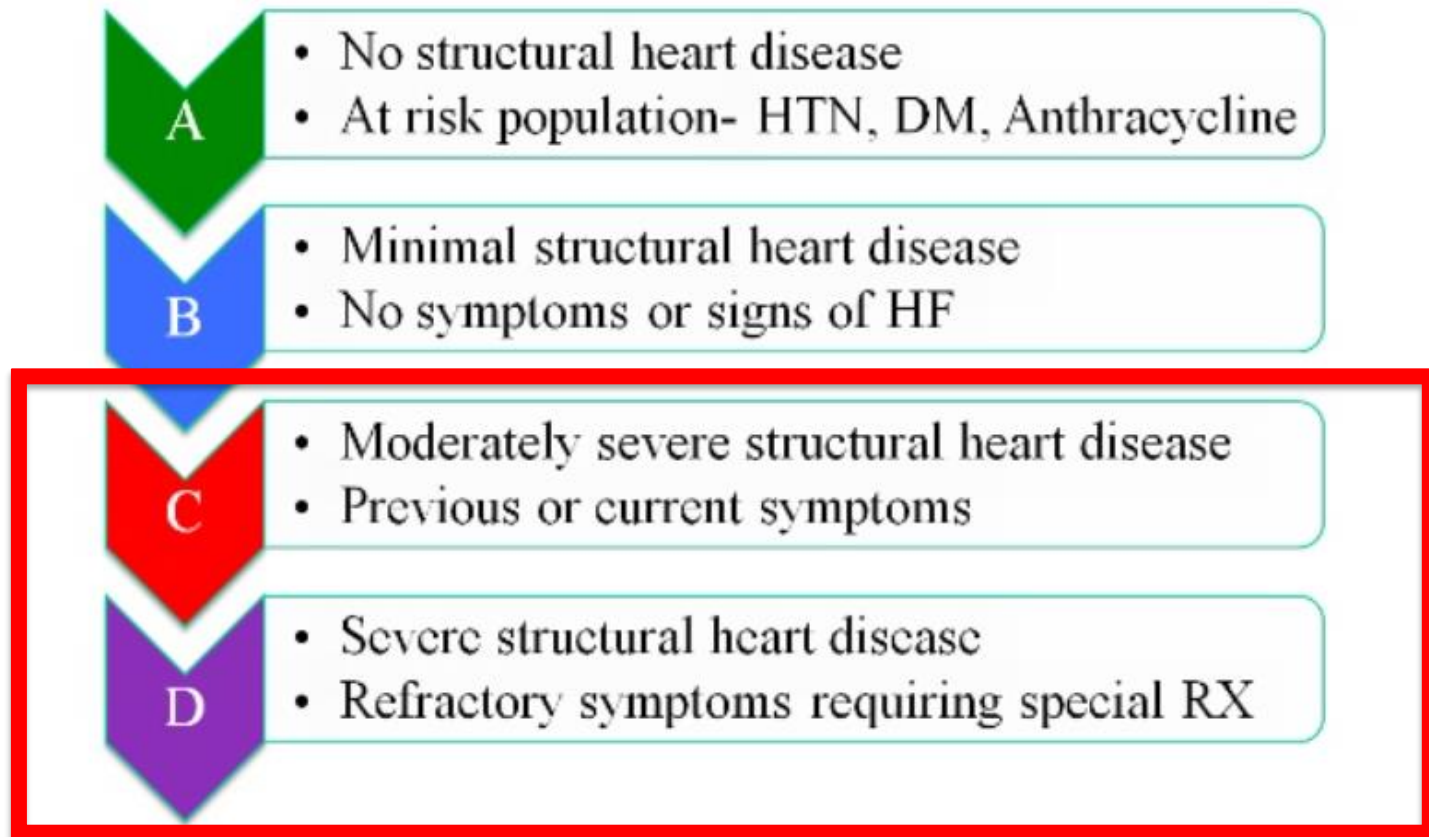
Objectives

1. Define heart failure, review epidemiology and outcomes associated with diagnosis
2. Describe the role of a heart failure clinic and associated advanced heart failure program
3. Identify available therapies for patients with advanced heart failure

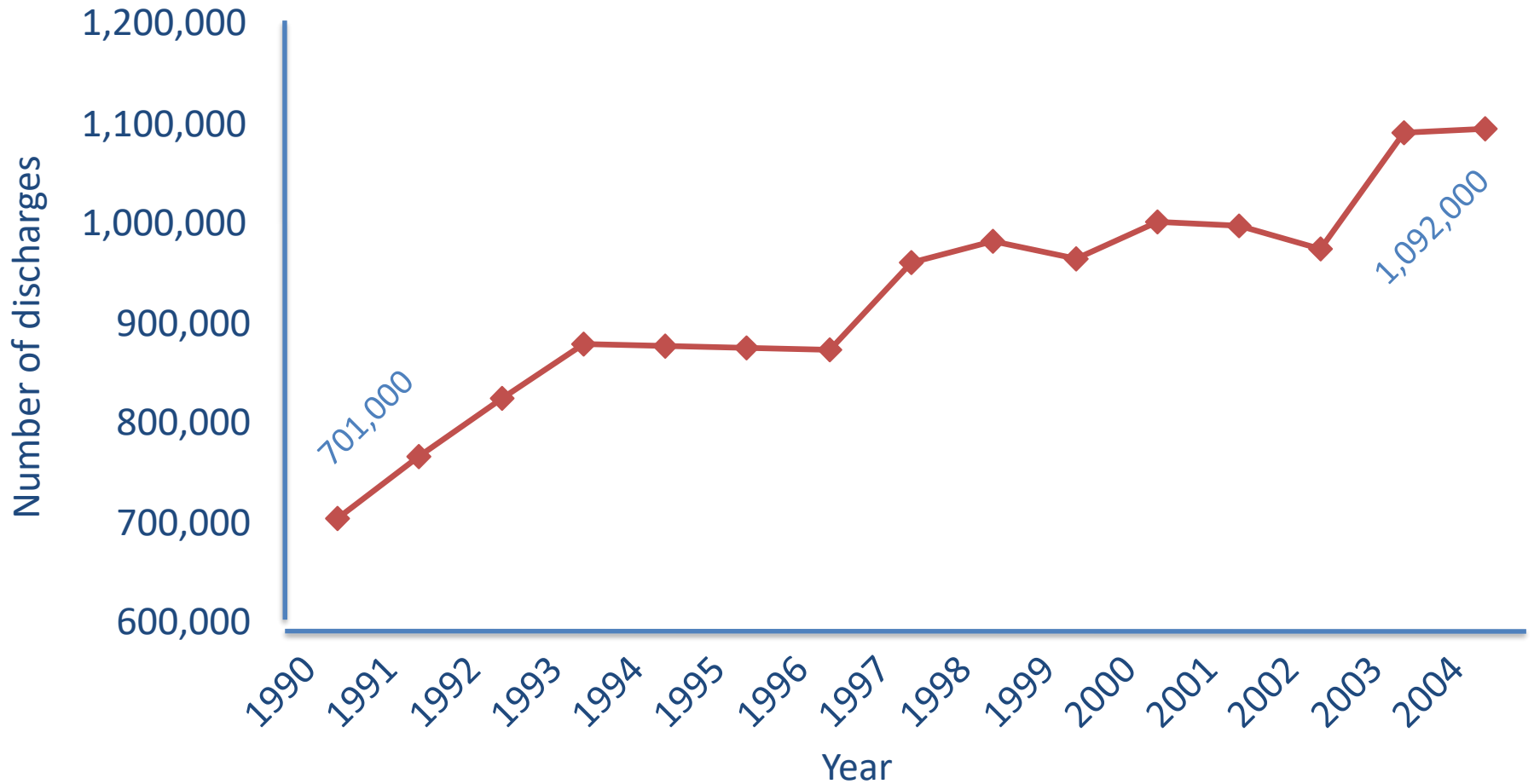
Heart Failure: Definition

- Heart failure is a *clinical syndrome* caused by various cardiac pathologies
- It is characterized by specific symptoms of *impaired cardiac output, venous congestion, and fluid retention*
- It results from any structural or functional disorder that impairs the ability of the ventricle to *fill with or eject blood*
- *Can be due to HFrEF, HFpEF, infiltrative cardiomyopathy or other cardiac conditions*

Stages of Heart Failure



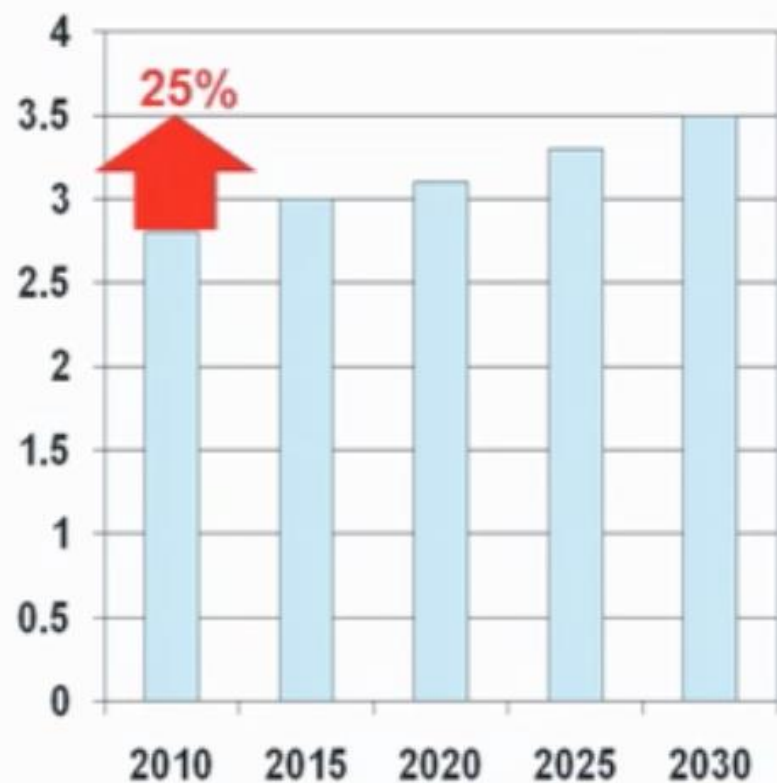
Hospital Discharges for Heart Failure



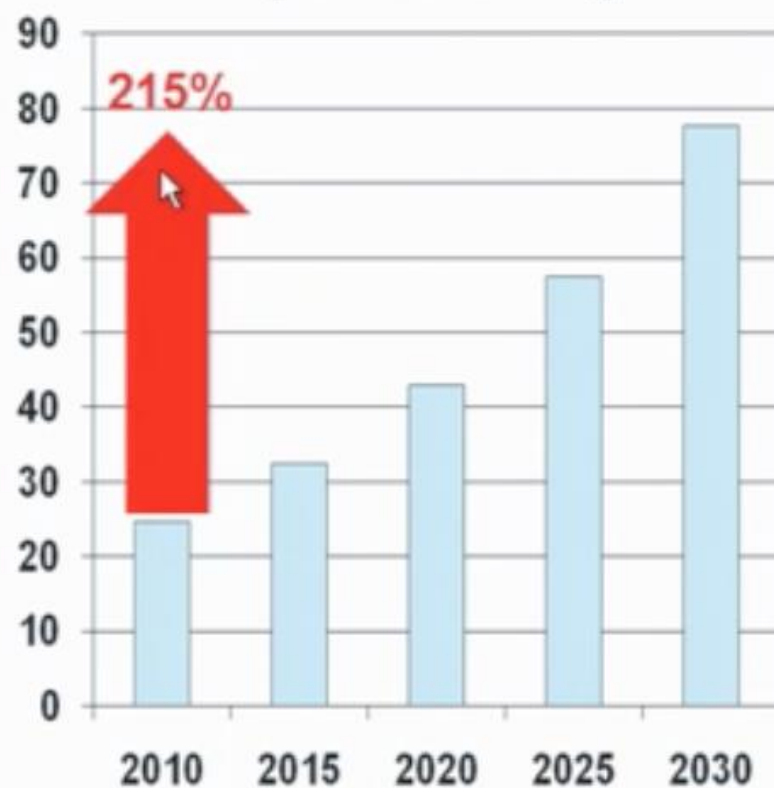
Advanced Data; National Hospital Discharge Survey 1990-2004;
Available at: <http://www.cdc.gov/nchs/about/major/hdasd/listpubs.htm>. Accessed: June 27, 2007.

Projected US Heart Failure Prevalence and Direct Cost

Projected US Prevalence of Heart Failure (%)

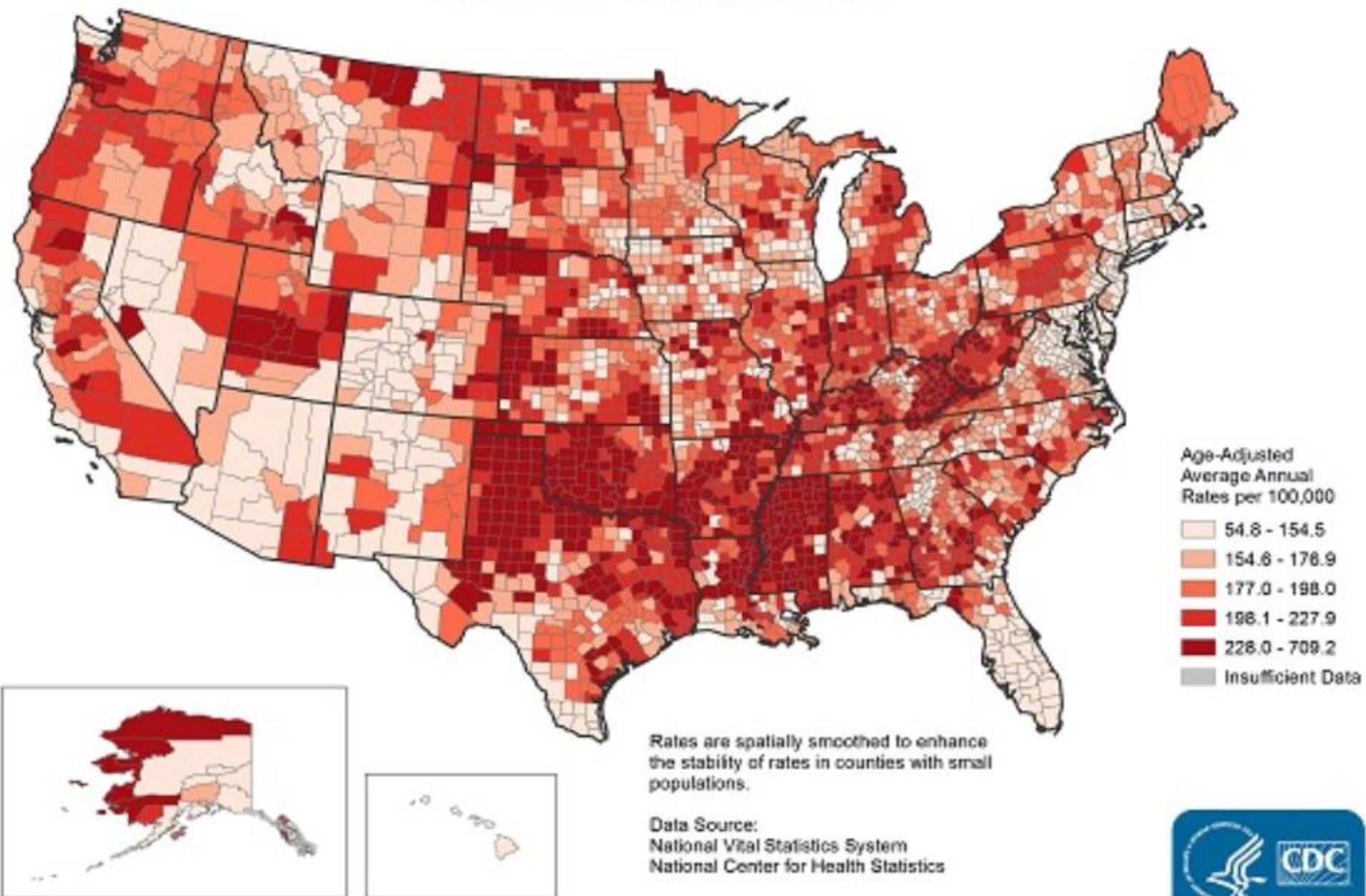


Projected US Direct Costs for Heart Failure (billions 2008\$)

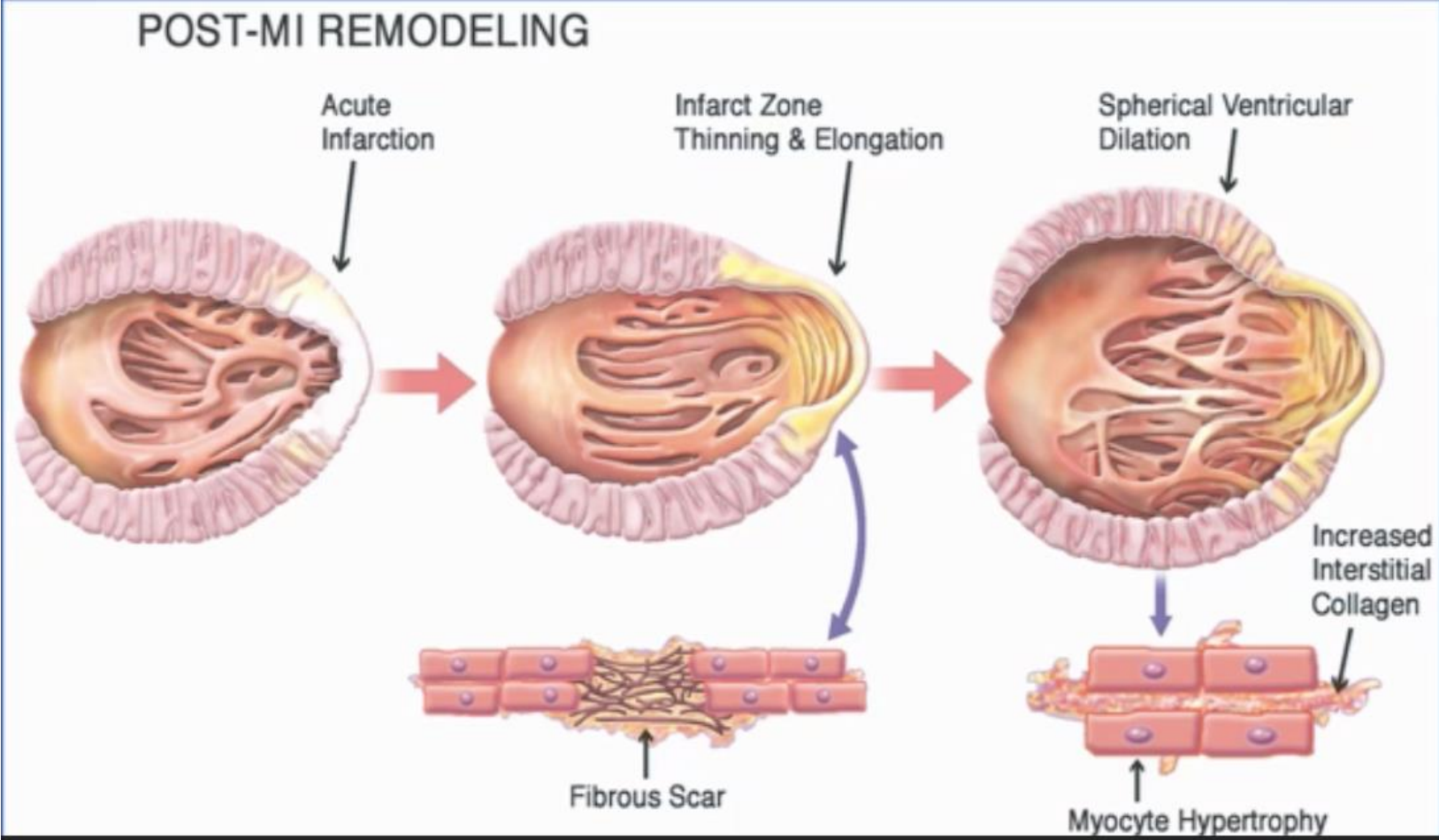


Adapted from Heidenreich PA et al. *Circulation*. 2011;123:933-944
AHA Statement: Forecasting the future of CV disease in US

Heart Failure Death Rates, 2011-2013 Adults, Ages 35+, by County



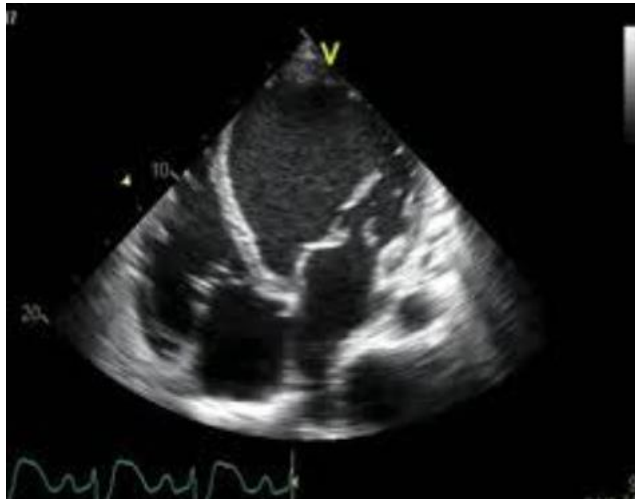
Left ventricular remodeling post MI



Role of the Heart Failure Clinic

1. Assist patients with heart failure symptoms to arrive at the correct diagnosis

All Heart Failure is Not the Same



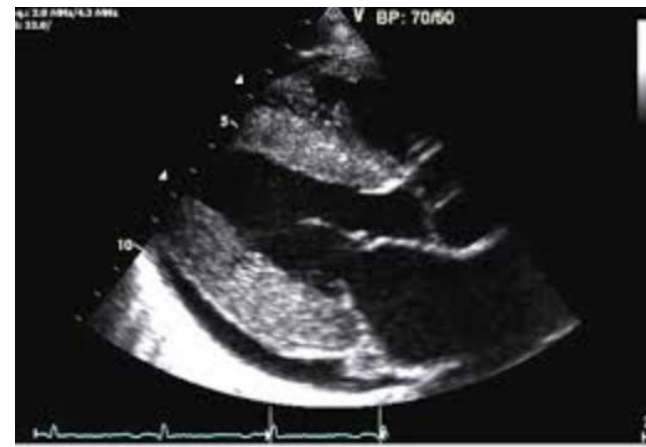
Dilated Cardiomyopathy



Restrictive Cardiomyopathy



Hypertrophic Cardiomyopathy

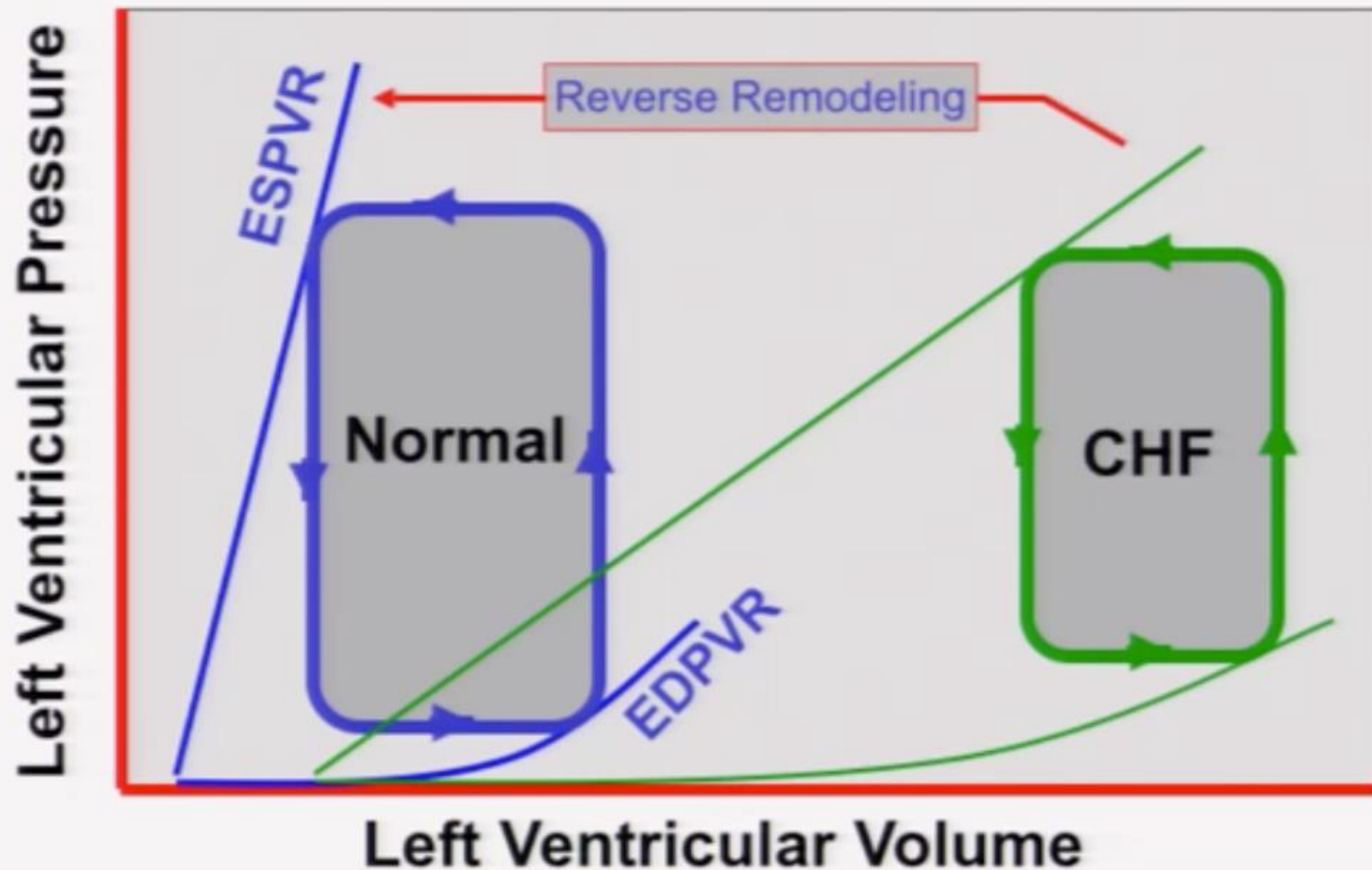


Amyloid Cardiomyopathy

Role of the Heart Failure Clinic

1. Assist patients with heart failure symptoms to arrive at the correct diagnosis
2. **Treat patients with heart failure, titrating evidence based therapies**

Goal of Therapies: Reverse Remodeling

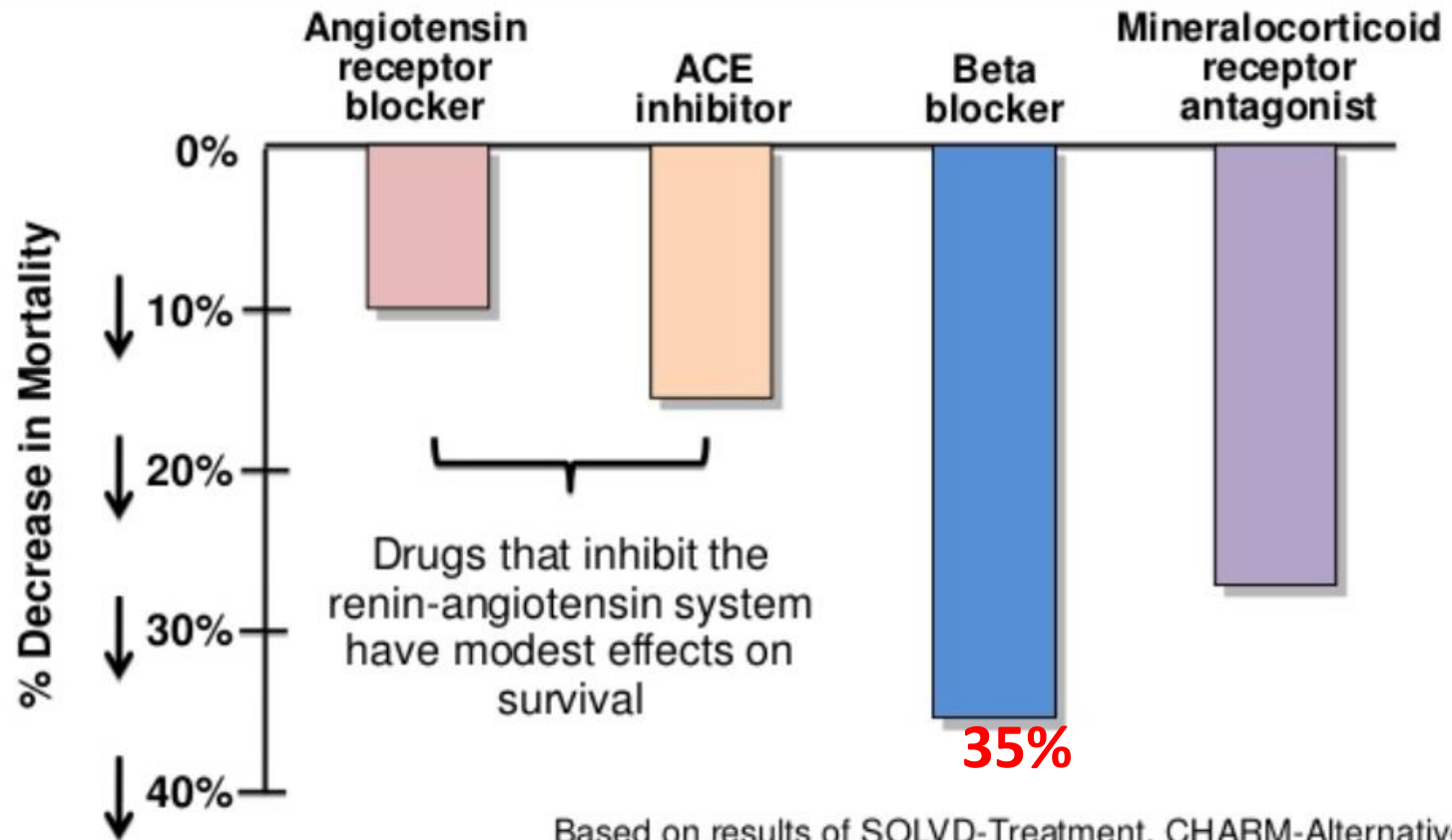


Drugs for Long-term Therapy for Heart Failure with Reduced LVEF

Clinical Trial Benefit

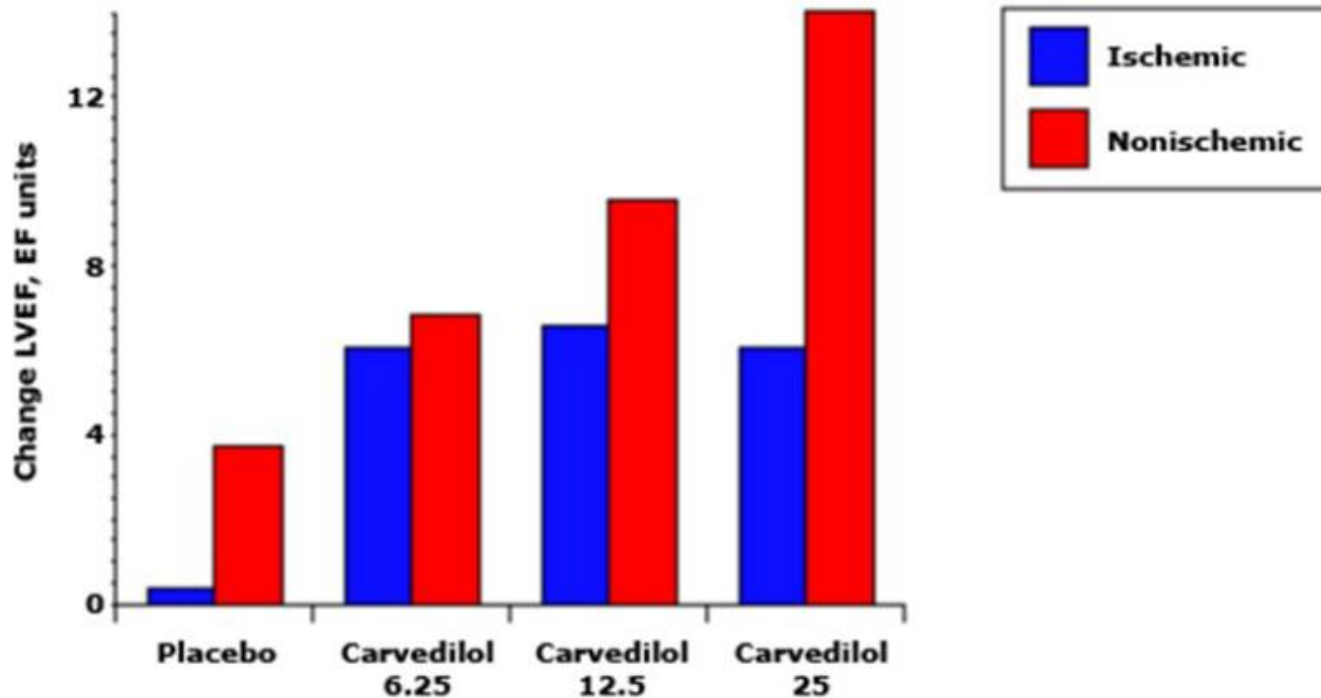
- ✓ ACE inhibitors or
Angiotensin receptor blockers
- ✓ Beta-blockers
- ✓ Aldosterone blockers
- ✓ Nitrate/Hydralazine
- ✓ Digoxin*

Life Saving Therapy



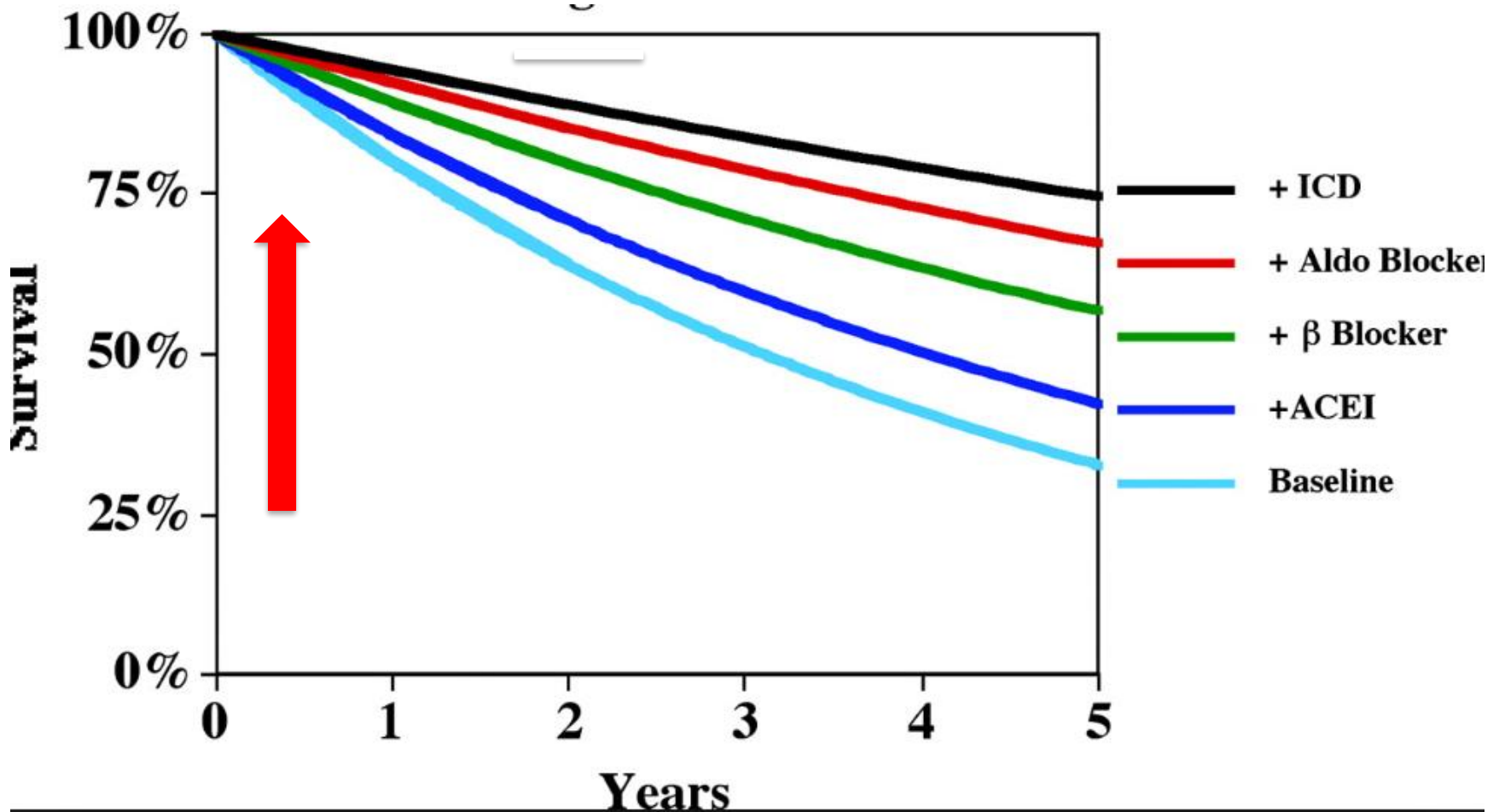
Based on results of SOLVD-Treatment, CHARM-Alternative, COPERNICUS, MERIT-HF, CIBIS II, RALES and EMPHASIS-HF

Improvement of Systolic Function is Related to Beta Blocker Dose



Bristow. Circulation, 1996.

Heart Failure Cocktail: Effect of Adding Therapies



Device Therapy

ICD therapy is recommended for primary prevention of SCD in selected patients with HF/EF at least 40 d post-MI with LVEF $\leq 35\%$ and NYHA class II or III symptoms on chronic GDMT, who are expected to live >1 y*

CRT is indicated for patients who have LVEF $\leq 35\%$, sinus rhythm, and LBBB with a QRS ≥ 150 ms, and NYHA class II, III, or ambulatory IV symptoms on GDMT

ICD therapy is recommended for primary prevention of SCD in selected patients with HF/EF at least 40 d post-MI with LVEF $\leq 30\%$ and NYHA class I symptoms while receiving GDMT, who are expected to live >1 y*

CRT can be useful for patients who have LVEF $\leq 35\%$, sinus rhythm, a non-LBBB pattern with a QRS ≥ 150 ms, and NYHA class III/ambulatory class IV symptoms on GDMT

CRT can be useful for patients who have LVEF $\leq 35\%$, sinus rhythm, LBBB with a QRS 120 to 149 ms, and NYHA class II, III, or ambulatory IV symptoms on GDMT

CRT can be useful in patients with AF and LVEF $\leq 35\%$ on GDMT if a) the patient requires ventricular pacing or otherwise meets CRT criteria and b) AV nodal ablation or rate control allows near 100% ventricular pacing with CRT

CRT can be useful for patients on GDMT who have LVEF $\leq 35\%$ and are undergoing new or replacement device implantation with anticipated ventricular pacing ($>40\%$)

An ICD is of uncertain benefit to prolong meaningful survival in patients with a high risk of nonsudden death such as frequent hospitalizations, frailty, or severe comorbidities*

CRT may be considered for patients who have LVEF $\leq 35\%$, sinus rhythm, a non-LBBB pattern with QRS 120 to 149 ms, and NYHA class III/ambulatory class IV on GDMT

CRT may be considered for patients who have LVEF $\leq 35\%$, sinus rhythm, a non-LBBB pattern with a QRS ≥ 150 ms, and NYHA class II symptoms on GDMT

CRT may be considered for patients who have LVEF $\leq 30\%$, ischemic etiology of HF, sinus rhythm, LBBB with QRS ≥ 150 ms, and NYHA class I symptoms on GDMT

CRT is not recommended for patients with NYHA class I or II symptoms and a non-LBBB pattern with QRS <150 ms

CRT is not indicated for patients whose comorbidities and/or frailty limit survival to <1 y

I	A
I	A (NYHA class III/IV)
	B (NYHA class II)
I	B
IIa	A
IIa	B
IIa	B
IIa	C
IIb	B
IIb	B
IIb	B
IIb	C
III: No Benefit	B
III: No Benefit	C

New Therapies?

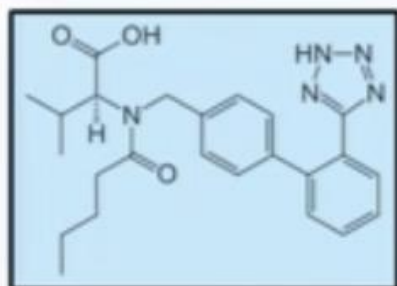
LCZ696: Angiotensin Receptor Neprilysin Inhibition



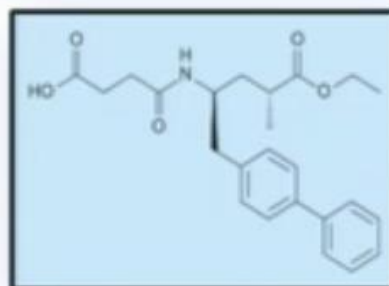
Entresto™
(sacubitril/valsartan) tablets

24/26mg • 49/51mg • 97/103mg

Angiotensin
receptor blocker



Inhibition of
neprilysin



Neprilysin Inhibition Potentiates Actions of Endogenous Vasoactive Peptides That Counter Maladaptive Mechanisms in Heart Failure

Endogenous vasoactive peptides

(natriuretic peptides, adrenomedullin, bradykinin, substance P, calcitonin gene-related peptide)



Neurohormonal activation



Vascular tone



Cardiac fibrosis, hypertrophy



Sodium retention



Neprilysin



Neprilysin inhibition

Inactive metabolites

PARADIGM-HF: Effect of LCZ696 vs Enalapril on Primary Endpoint and Its Components

	LCZ696 (n=4187)	Enalapril (n=4212)	Hazard Ratio (95% CI)	P Value
Primary endpoint	914 (21.8%)	1117 (26.5%)	0.80 (0.73-0.87)	0.0000002
Cardiovascular death	558 (13.3%)	693 (16.5%)	0.80 (0.71-0.89)	0.00004
Hospitalization for heart failure	537 (12.8%)	658 (15.6%)	0.79 (0.71- 0.89)	0.00004

PARADIGM-HF: Adverse Events

	LCZ696 (n=4187)	Enalapril (n=4212)	P Value
Prospectively identified adverse events			
Symptomatic hypotension	588	388	< 0.001
Serum potassium > 6.0 mmol/l	181	236	0.007
Serum creatinine \geq 2.5 mg/dl	139	188	0.007
Cough	474	601	< 0.001
Discontinuation for adverse event	449	516	0.02
Discontinuation for hypotension	36	29	NS
Discontinuation for hyperkalemia	11	15	NS
Discontinuation for renal impairment	29	59	0.001
Angioedema (adjudicated)			
Medications, no hospitalization	16	9	NS
Hospitalized; no airway compromise	3	1	NS
Airway compromise	0	0	----

Drugs for Long-term Therapy for Heart Failure with Reduced LVEF

Clinical Trial Benefit

- ✓ ACE inhibitors or Angiotensin receptor blockers
- ✓ Beta-blockers
- ✓ Aldosterone blockers
- ✓ Nitrate/Hydralazine
- ✓ Digoxin

**Sacubitril/Valsartan
(ENTRESTO)**



Heart Failure Self Care



Learning to **live** with Heart Failure



Heart Failure with Reduced Ejection Fraction (HFrEF or "systolic" heart failure)

This occurs when the heart is weak and enlarged and is unable to pump as much blood as it should. The EF is 50% or less.



Foods to Avoid



Weigh Yourself Daily!
Stay on top of any major changes in your weight.

Nutrition Facts

Serving Size 1 cup (228 g)	
Servings per Container about 2	
Amount per Serving	
Calories 250	Calories from Fat 110
% Daily Value	
Total Fat 12g	18%
Saturated Fat 3g	15%
Trans Fat 0g	
Cholesterol 30 mg	
Sodium 470 mg	20%
Total Carbohydrate 31g	10%
Dietary Fiber 0g	0%
Sugars 5g	
Proteins 5g	
Vitamin A	4%
Vitamin C	2%
Calcium	20%
Iron	4%

* Percent Daily Values are based on a 2000 calorie diet. Your daily values may be higher or lower depending on your calorie needs.

Step 1. Look at the Serving Size

- The information on the label for sodium is for one serving
- 1 serving = 1 cup

Step 2. Find Amount of Sodium

- Look at the sodium per serving
- 1 serving = 470 mg

Step 3. Calculate the Total Amount of Sodium

- If you eat more or less than the listed serving size, you will get more or less sodium
- How much sodium in 2 cups?
2 cups = 2 servings
2 x 470 mg per serving = 940 mg sodium total



Medication Class

Live Longer

Feel Better

Stay Out of Hospital

ACE Inhibitor



ARB



Beta Blocker



Diuretic



Aldosterone Blocker



Hydralazine & Isosorbide



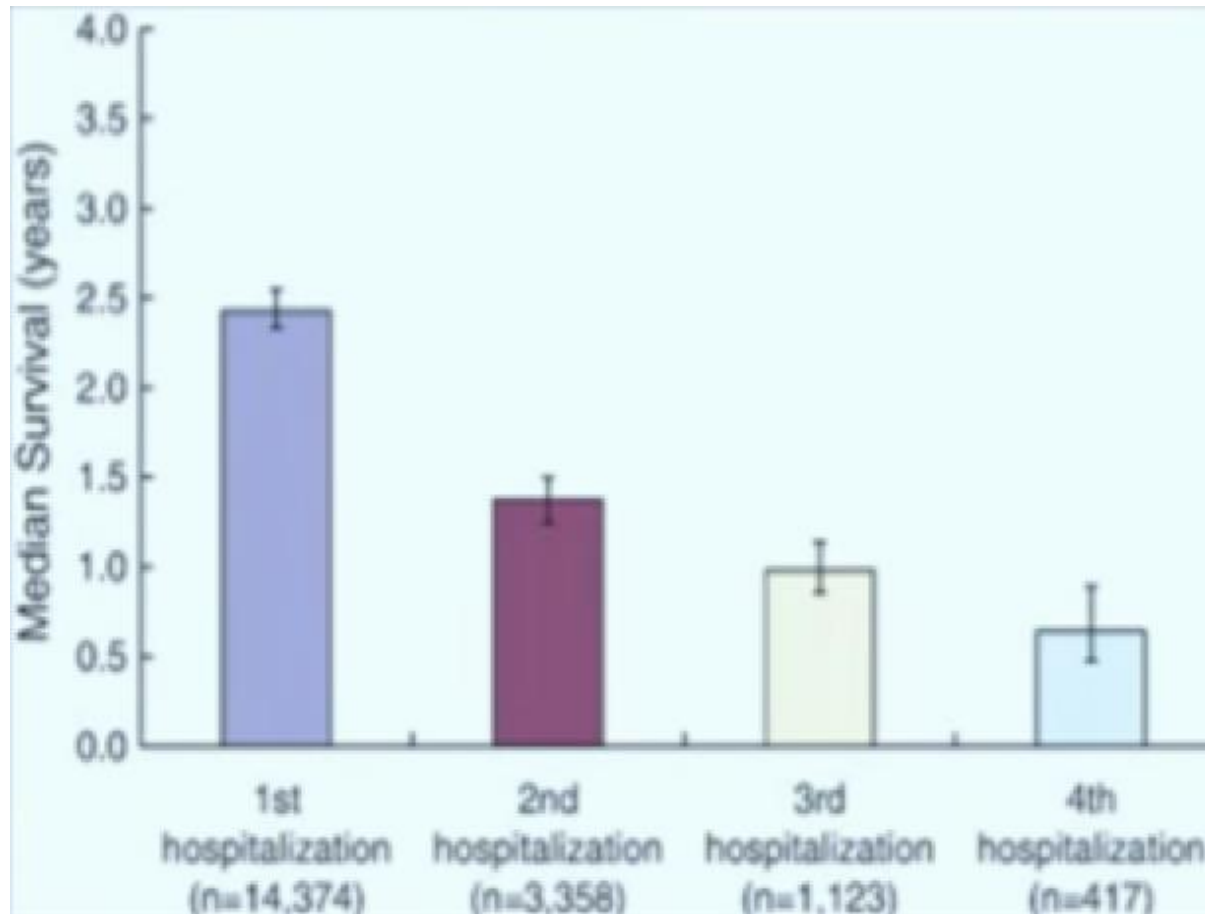
Digoxin



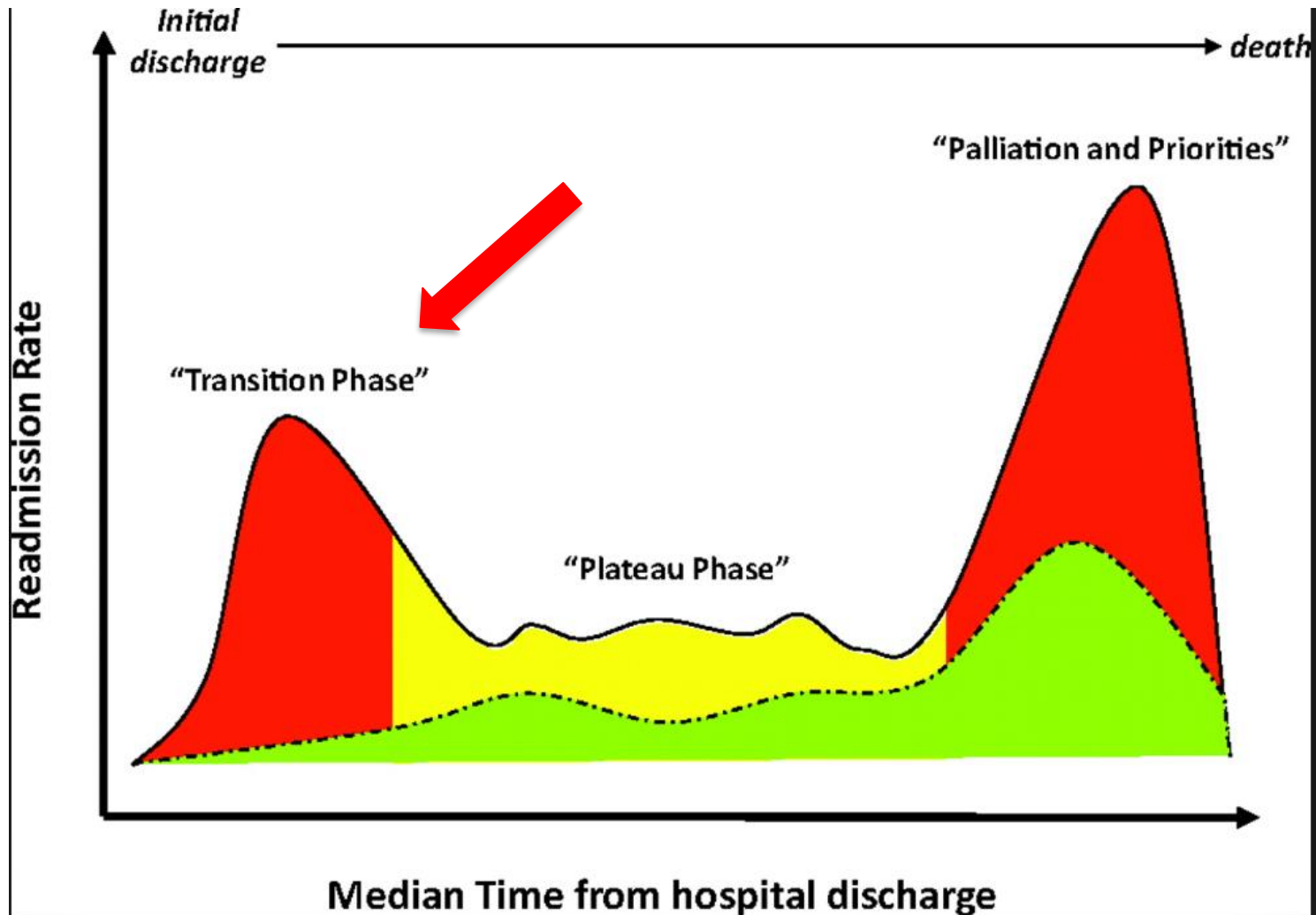
Role of the Heart Failure Clinic

1. Assist patients with heart failure symptoms to arrive at the correct diagnosis
2. Treat patients with heart failure, titrating evidence based therapies
3. **Act as an acute care clinic, managing patients with decompensated heart failure to avoid hospitalization**

Heart Failure Hospitalization is Ominous



High risk patients for readmission



Diuretic Resistance

- Inadequate dose
- Poor absorption, consider torsemide
- Reinforce salt restriction
- Add thiazide
- Add MRA
- Stop NSAIDS
- Consider low output heart failure

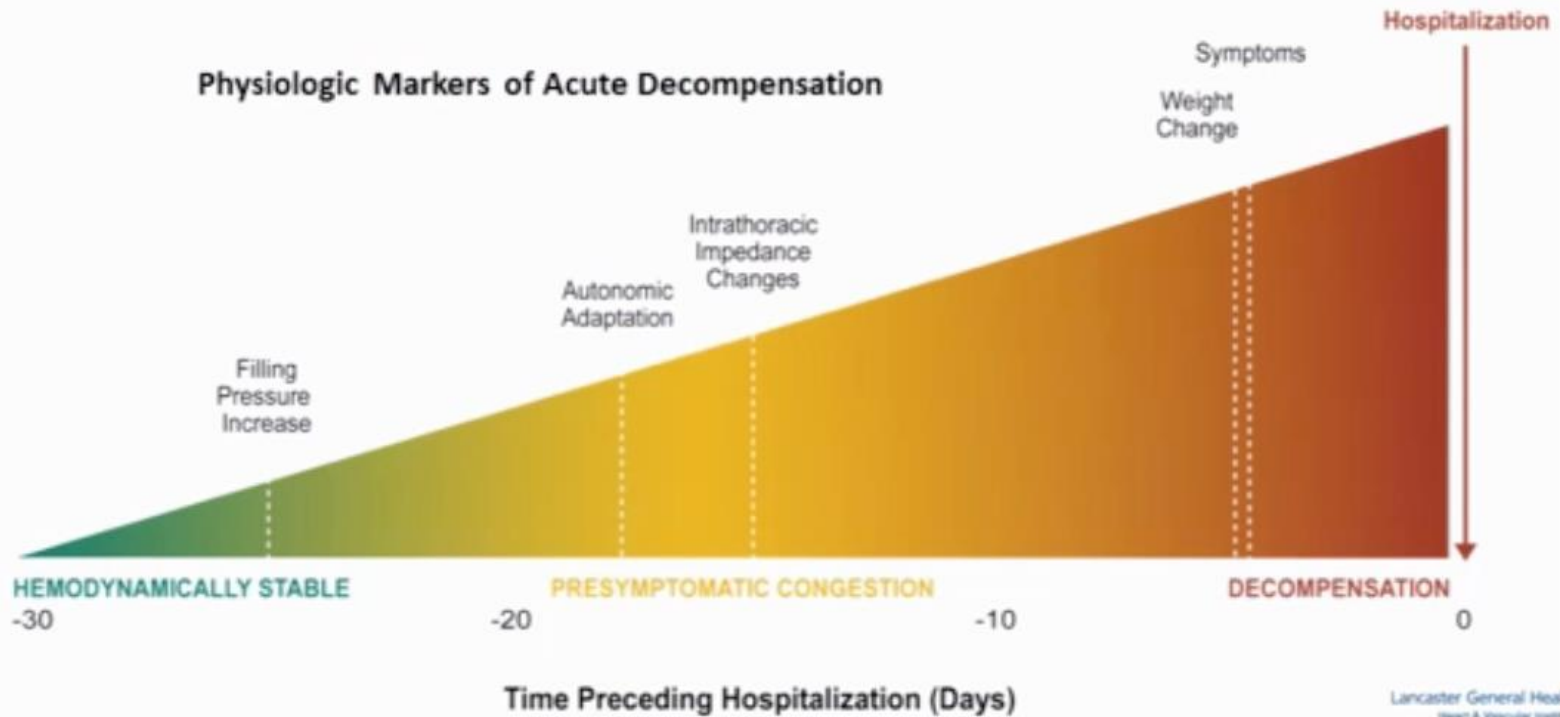


IV Diuretic in Clinic



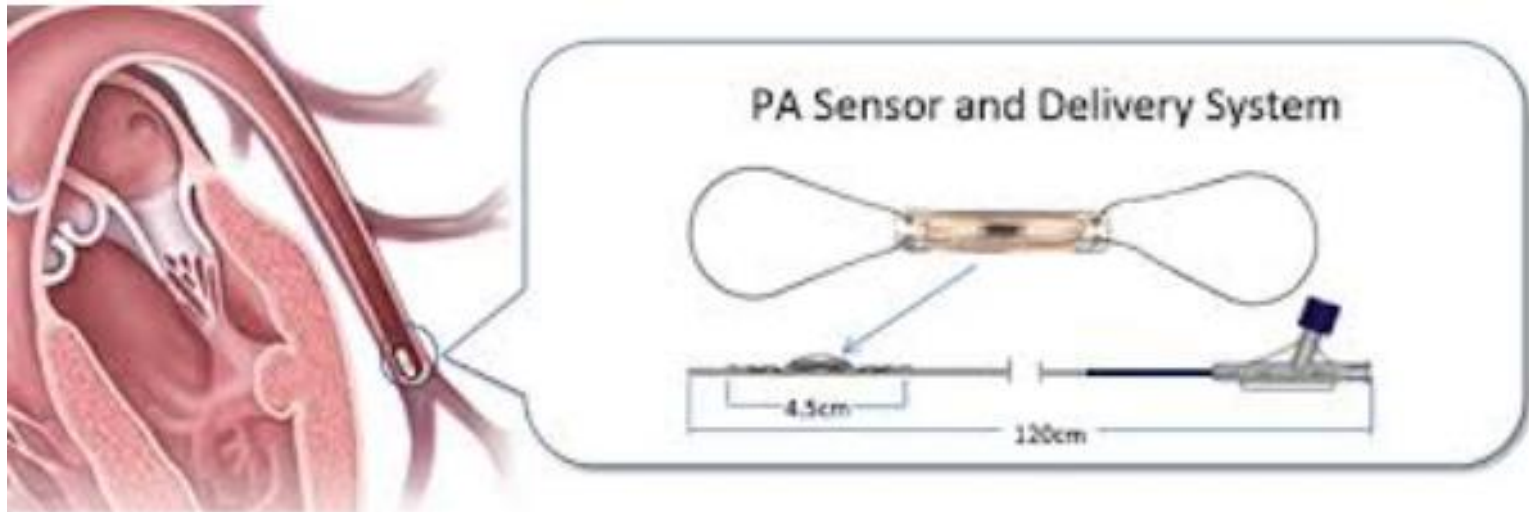
HF Hospitalization Starts Weeks Before Admission!

Time Course of Decompensation



* Graph adapted from Adamson PBL, et al. Curr Heart Fail Reports. 2009.

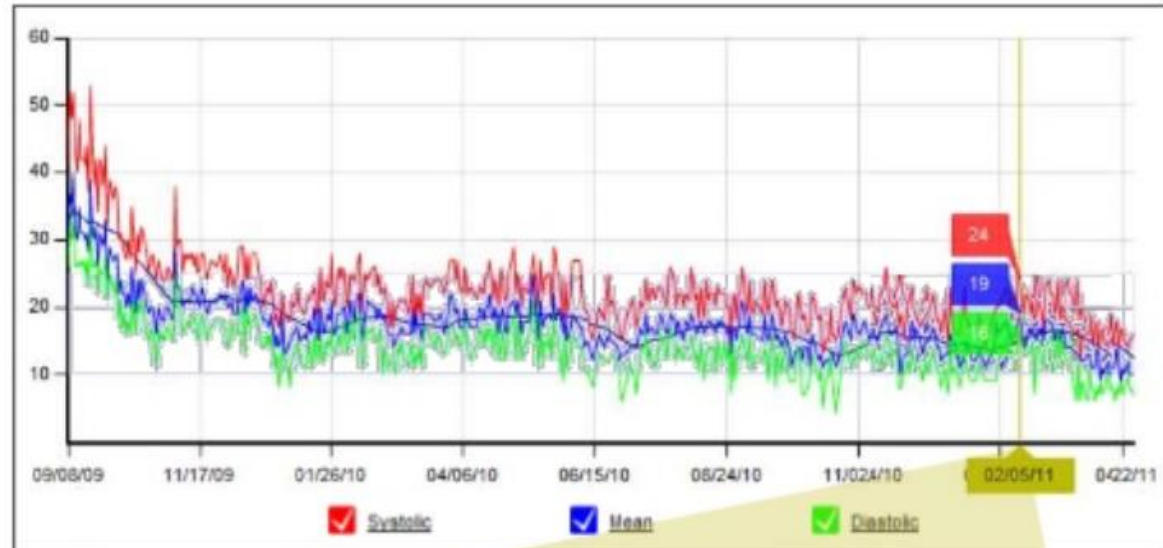
Wireless Pulmonary Hemodynamic Monitoring



Patient Management Database

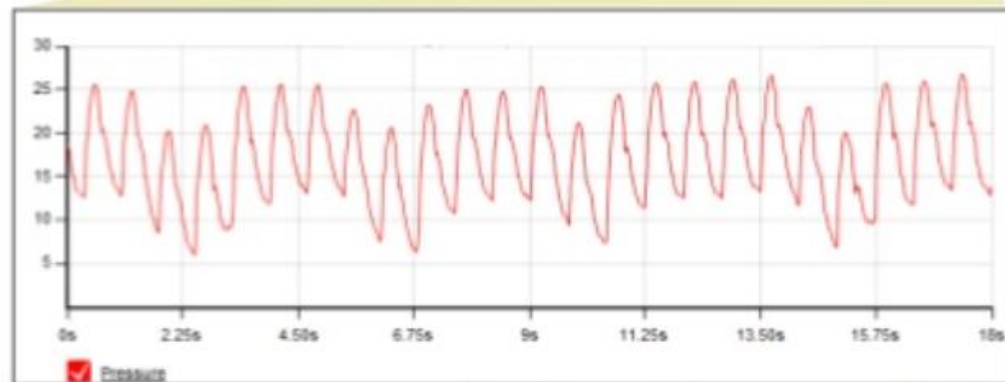
Trend Data

- Easy-to-read
- Physician alerts
- Home transmission
- Secure, encrypted web-based access



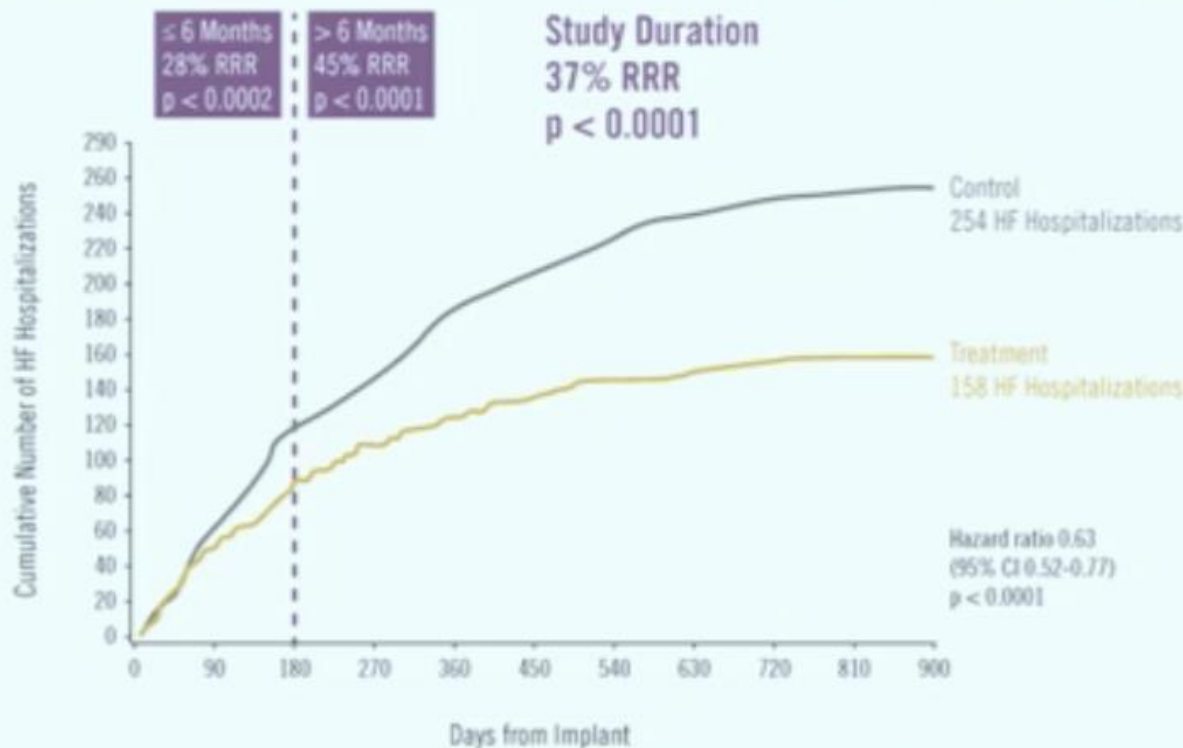
Discrete Data

Reading	
Systolic:	24
Mean:	19
Diastolic:	16
Heart Rate:	81



cal
er

➔ **W** Wireless pulmonary artery haemodynamic monitoring in chronic heart failure: a randomised controlled trial

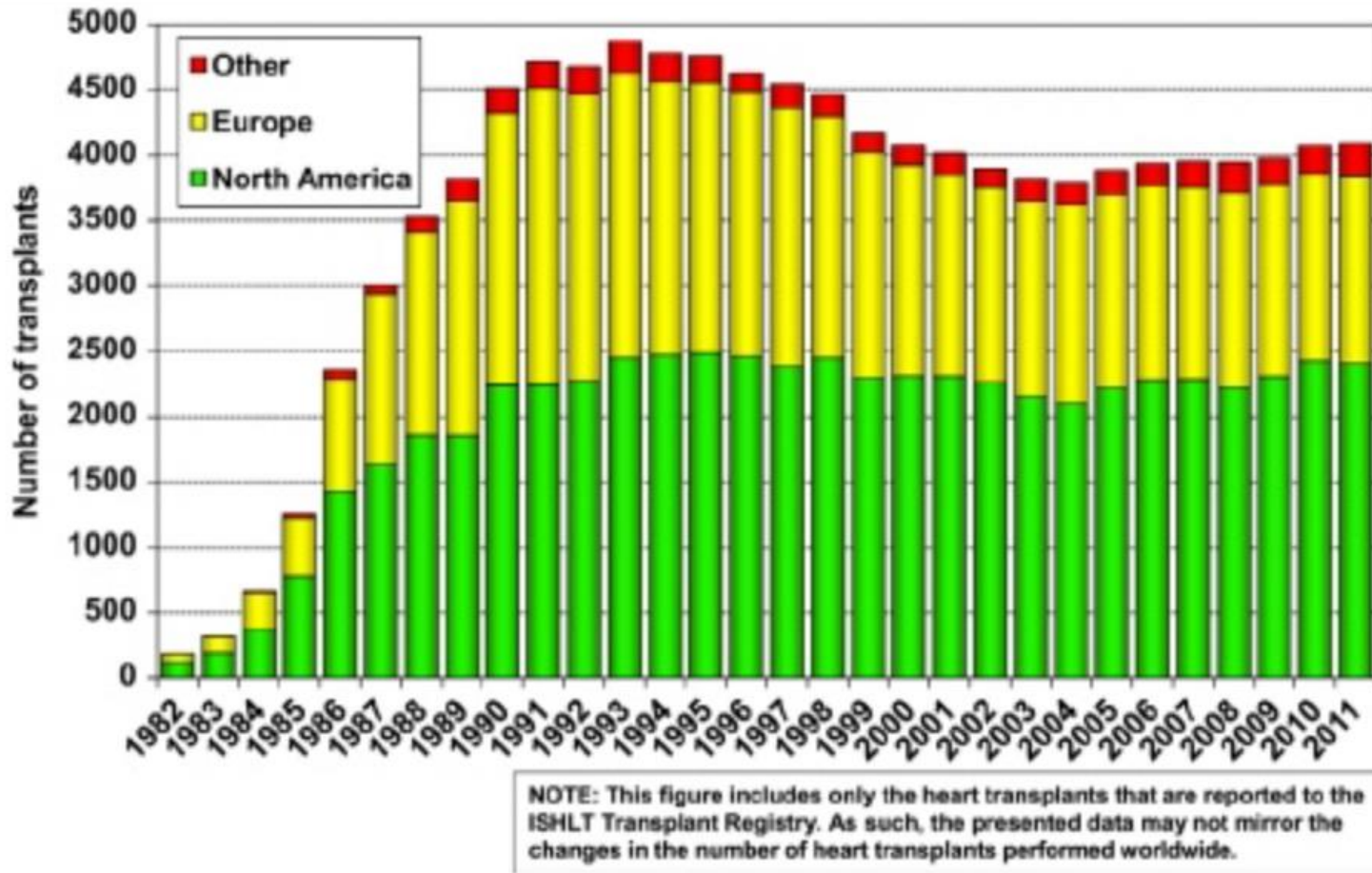


	HR for HF Hsp at 6 Mo	P Value
HFrEF	0.76	0.007
HFpEF	0.48	<0.0001

Role of the Heart Failure Clinic

1. Assist patients with heart failure symptoms to arrive at the correct diagnosis
2. Treat patients with heart failure, titrating evidence based therapies
3. Act as an acute care clinic, managing patients with decompensated heart failure to avoid hospitalization
4. **Manage patients with end-stage heart failure: advance therapies (transplant or LVAD) or palliative (inotropes)**

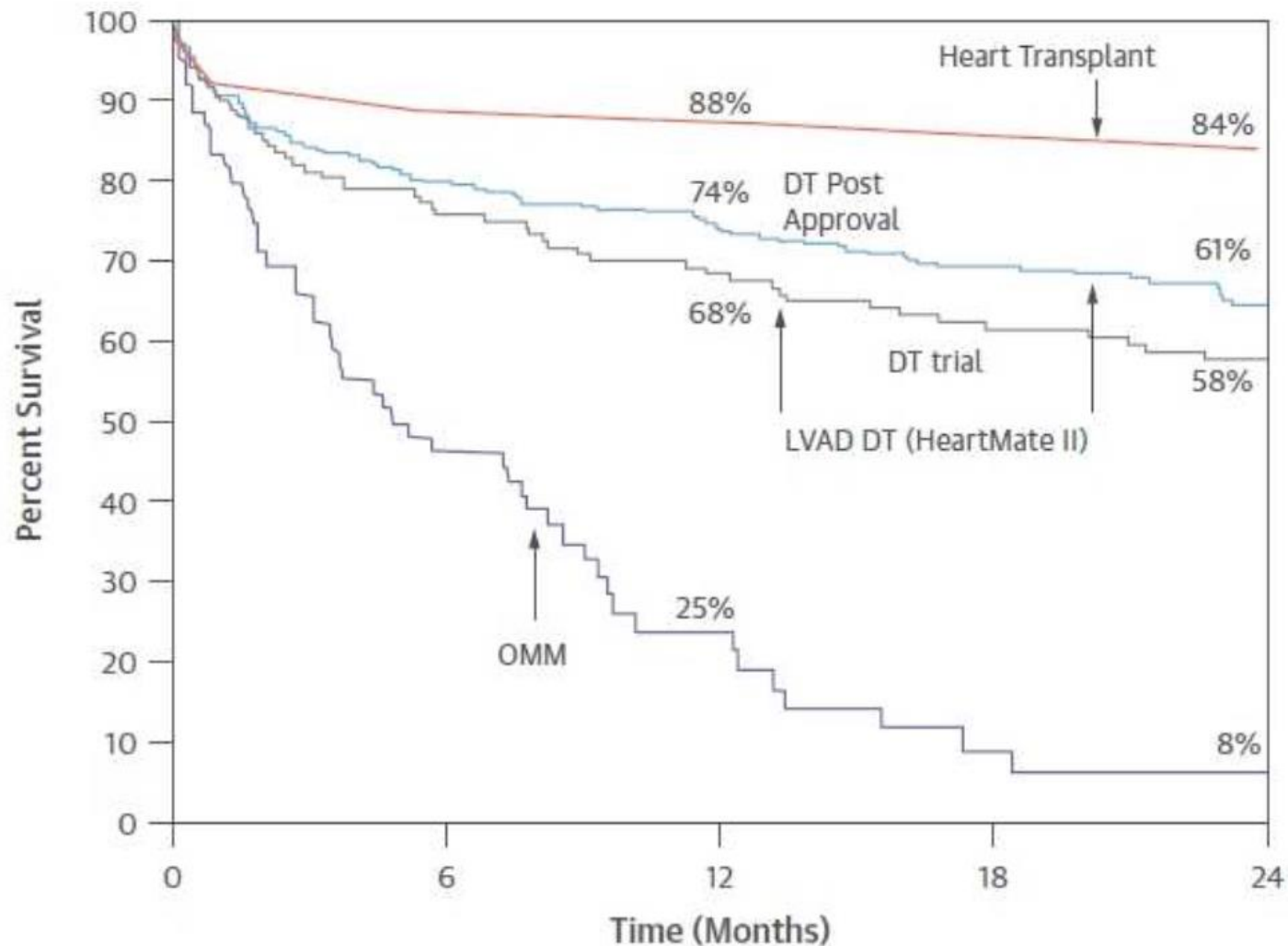
Transplant Is Not a Viable Option for Many Patients



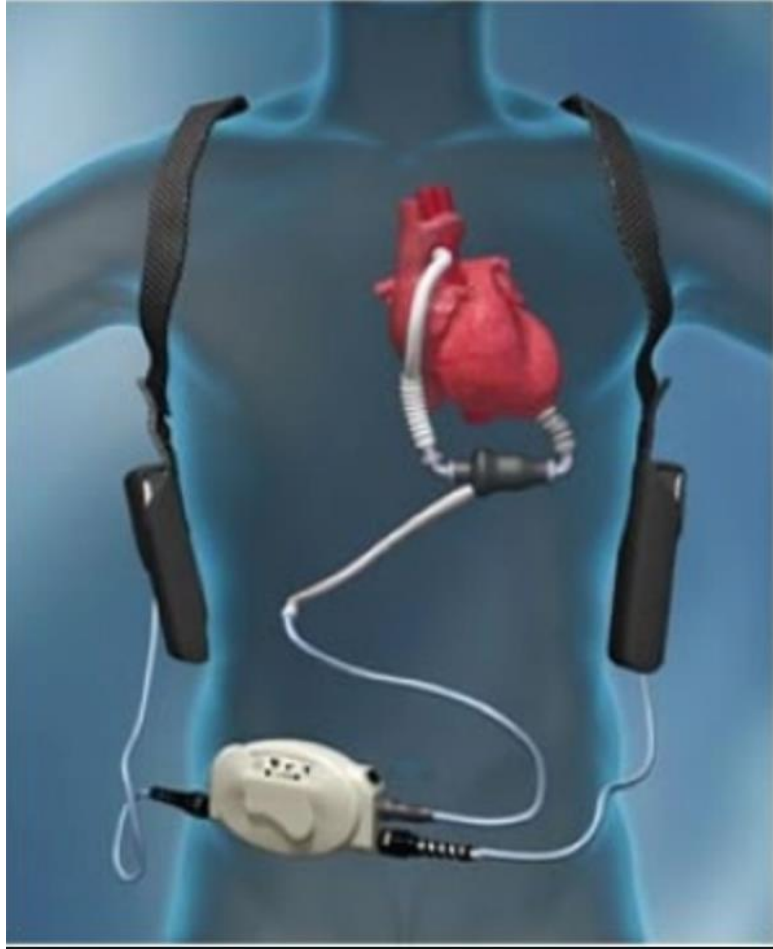
Home Inotropic Therapy



Improved Outcomes in Stage D with Advanced Therapies for Heart Failure

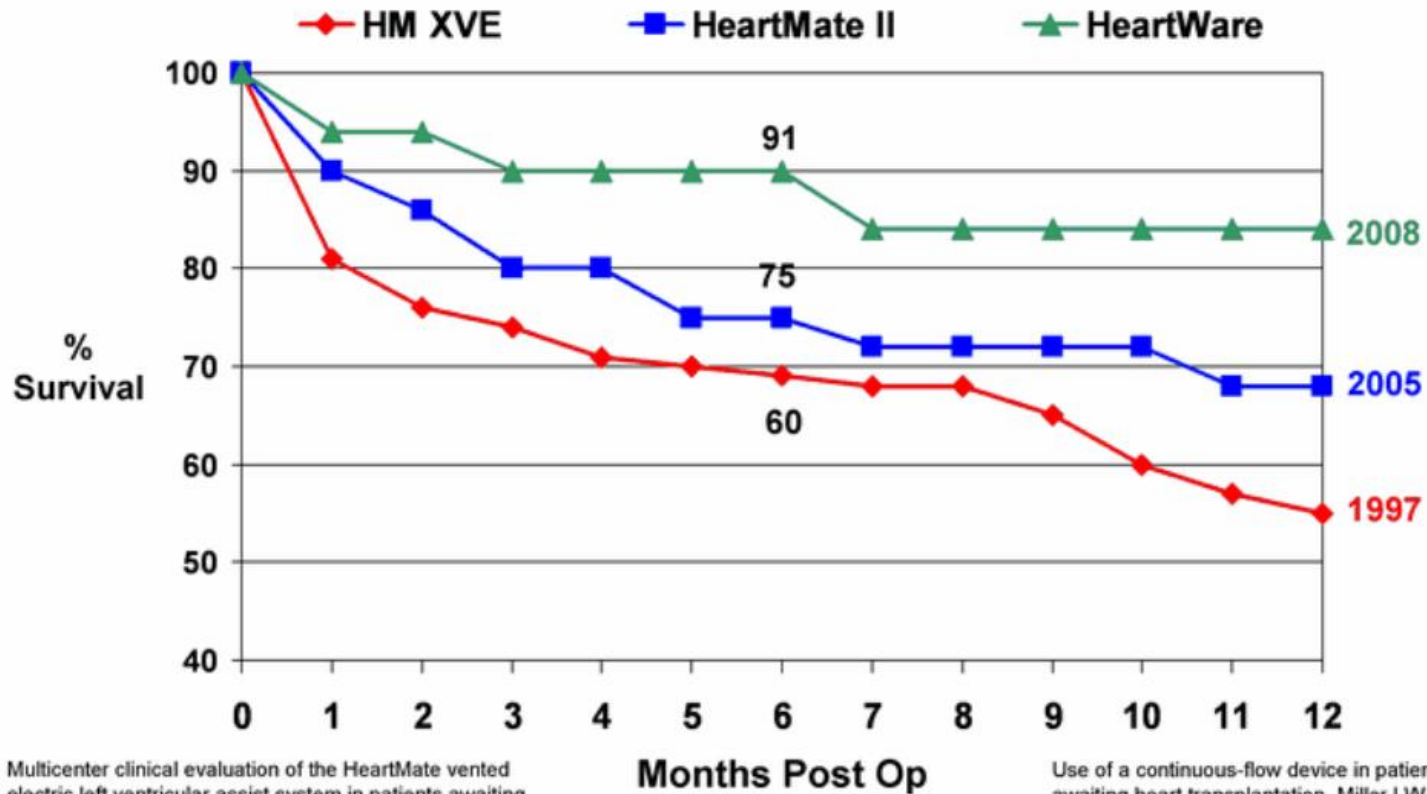


Left Ventricular Assist Device





Improving Outcomes with LVAD

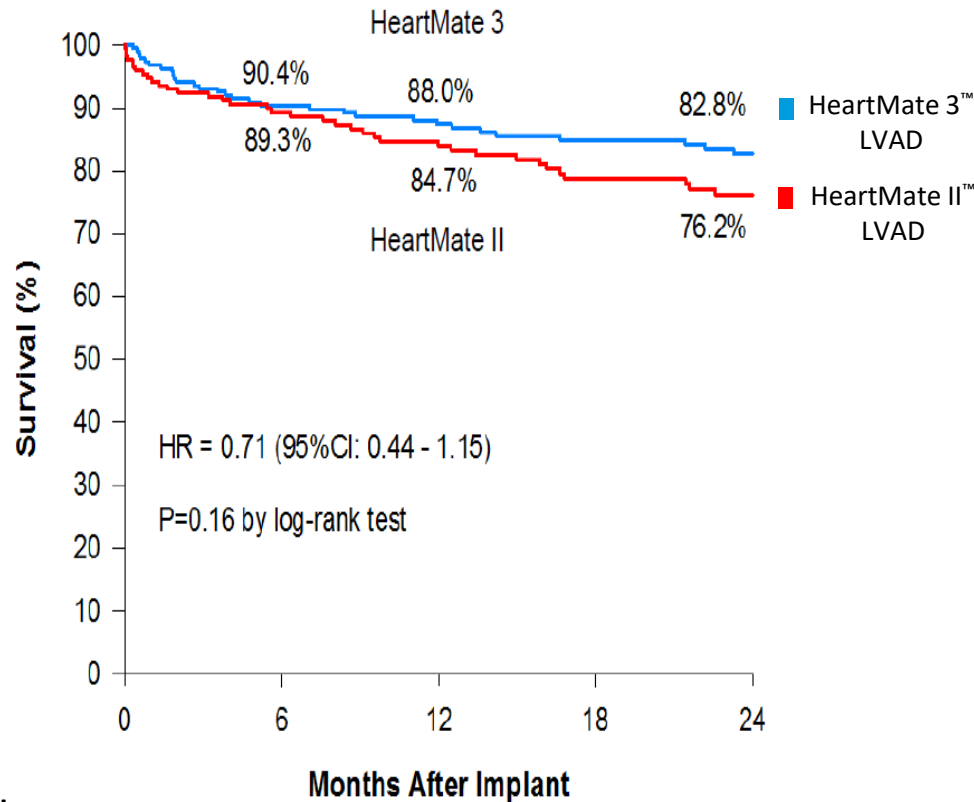


Multicenter clinical evaluation of the HeartMate vented electric left ventricular assist system in patients awaiting heart transplantation. Frazier OH, Rose EA, Oz MC et al. J Thor Cardiovasc Surg 2001:122

Use of a continuous-flow device in patients awaiting heart transplantation. Miller LW, Pagani FD, Russell SD et al. N Engl J Med. 2007 Aug 30.

Survival at 2 years in the LT cohort

Kaplan-Meier estimates of all-cause survival



No. at Risk:

	0	6	12	18	24
HeartMate 3 LVAD	189	165	146	127	117
HeartMate II LVAD	172	141	121	98	86

*82% 2-year survival for heart transplant patients between 2009 and 2015.²

References: 1. Mehra MR, Goldstein DJ, Uriel N, et al. Two-Year Outcomes with a Magnetically Levitated Cardiac Pump in Heart Failure. *N Engl J Med.* 2018;378(15):1386-1395. 2. Lund LF, Khush KK, Cherikh WS, et al. The Registry of the International Society for Heart and Lung Transplantation: Thirty-fourth Adult Heart Transplantation Report—2017; Focus theme: allograft ischemic time. *J Heart Lung Transplant.* 2017;36:1037-1046.

83%
SURVIVAL¹

HeartMate 3™ LVAD survival is comparable to transplant survival at 2 years^{2*}

Adverse Events

HeartMate II Destination Therapy Trial

	CF LVAD (n=133) [211 pt-years]	PF LVAD (n=59) [41 pt-years]	Risk Ratio [95% Confidence Interval]	p-value
	Events/pt yr	Events/pt yr		
Pump Replacements	0.06	0.51		<0.001
Stroke	0.13	0.22		0.21
Ischemic	0.06	0.10		0.38
Hemorrhagic	0.07	0.12		0.33
Device-related infection	0.48	0.90		0.01
Local non-device infection	0.76	1.33		0.02
Sepsis	0.39	1.11		<0.001
Bleeding				
Bleeding requiring PRBC	1.66	2.45		0.06
Bleeding requiring surgery	0.24	0.29		0.57
Other Neurological	0.17	0.29		0.14
Right Heart Failure				
Extended Inotropes	0.14	0.46		<0.001
RVAD	0.02	0.07		0.12
Cardiac Arrhythmias	0.69	1.31		0.006
Respiratory Failure	0.11	0.80		<0.001
Renal Failure	0.10	0.34		<0.001
Hepatic Dysfunction	0.01	0.00		
Device Thrombosis	0.02	0.00		
Re-hospitalizations	2.64	4.25		0.02

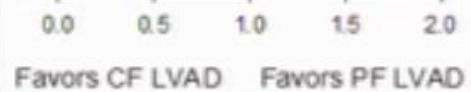
STROKE

INFECTION

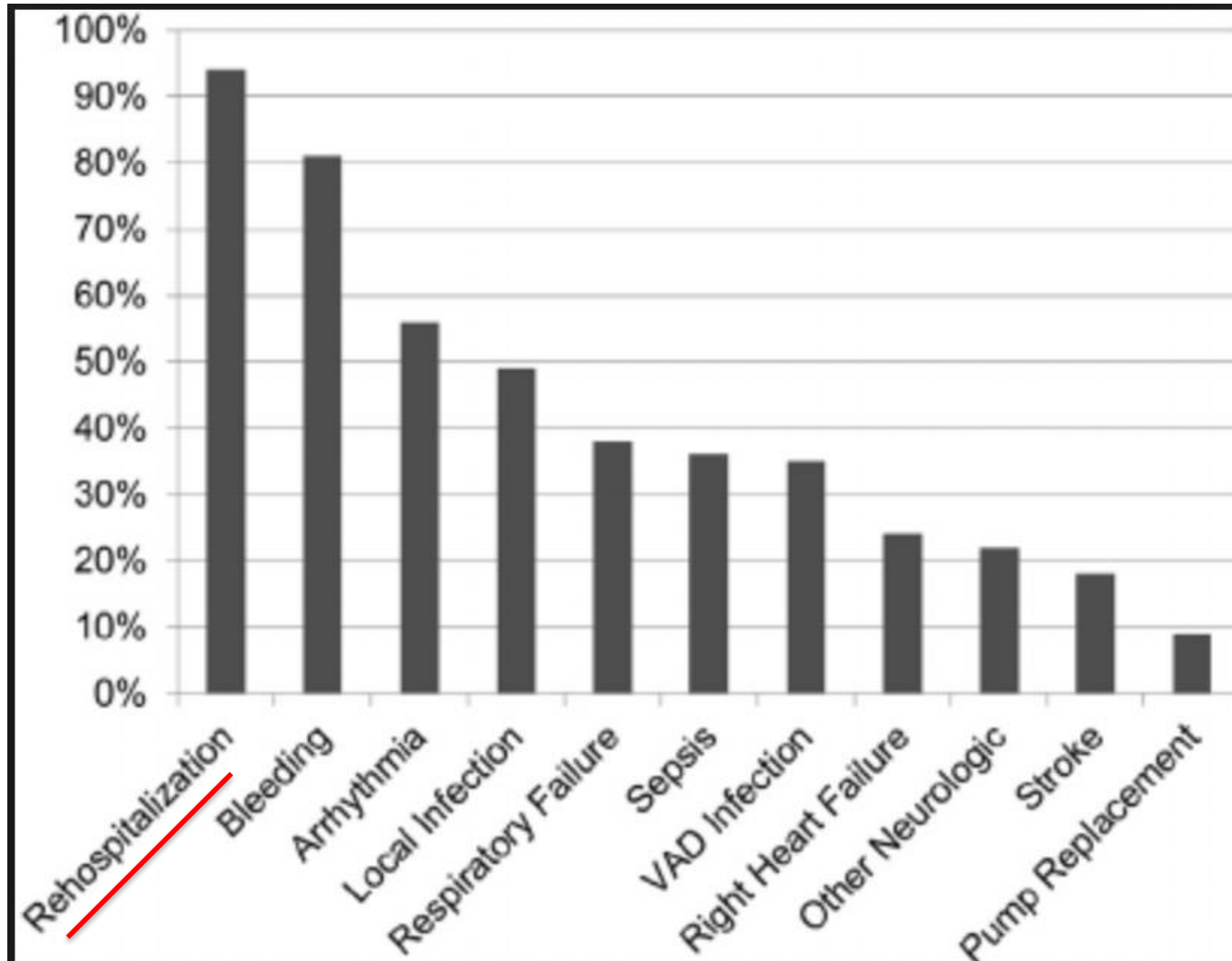
BLEEDING

RIGHT HEART FAILURE

PUMP THROMBOSIS



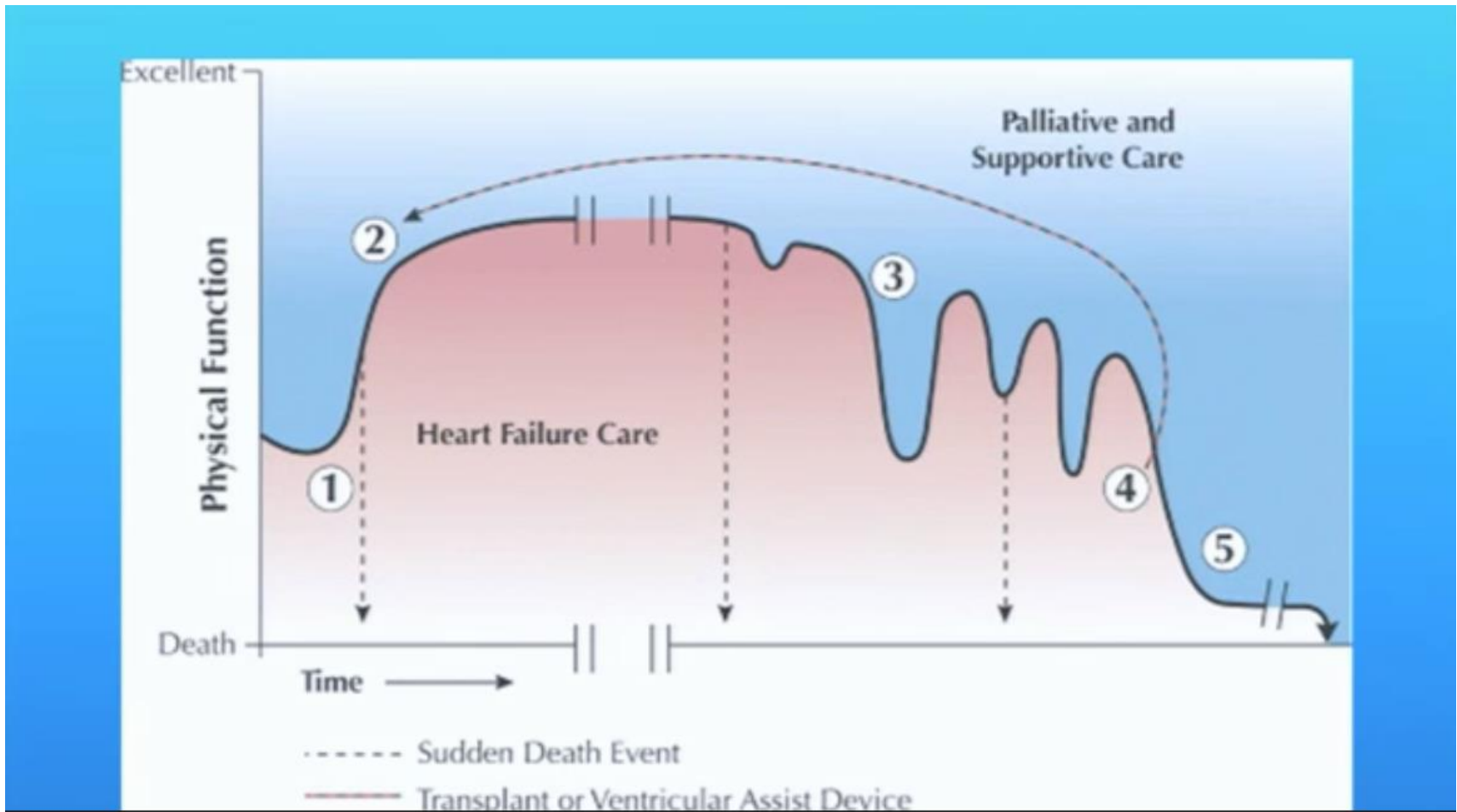
VAD Complications



Improved Quality of Life



Palliative Care: Not just for Stage D



Question #1

A 56 y/o man with ischemic cardiomyopathy comes into clinic. He has been hospitalized four times this year for heart failure. He is extremely fatigued and had to stop twice on the way into clinic. His BP is 82/60 and he is not able to tolerate any medicines for heart failure. You should,

- A. Start him on very low dose metoprolol
- B. Increase his diuretics
- C. Refer him to heart failure clinic for advanced therapies

Question #2

You see a 59 y/o man in clinic with new onset heart failure, LVEF 20%. His BP is 97/60 and HR is 72. You are nervous about starting medications because of his low blood pressure but then you remember that if you start him on a beta blocker you could potentially reduce his mortality by:

- A. 5%
- B. 10%
- C. 35%

Question #3

You see a 74 y/o M in clinic with end stage heart failure. He asks about the “new heart pump”. You tell him that left ventricular assist devices (LVAD) have been shown to:

- A. Reduce heart failure mortality
- B. Improve quality of life
- C. Both

Additional Resources

PAR Heart Failure Clinic!
706-475-1700



www.hfsa.org/heart-failure-guidelines

www.hfsa.org/accahahfsa-guideline-management-heart-failure-update/

Thank you

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