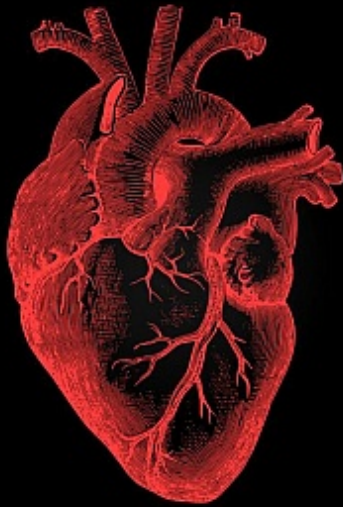


Keeping HF Patients out of the Hospital: What, Why, and How?



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Disclosures

No Pertinent Disclosures

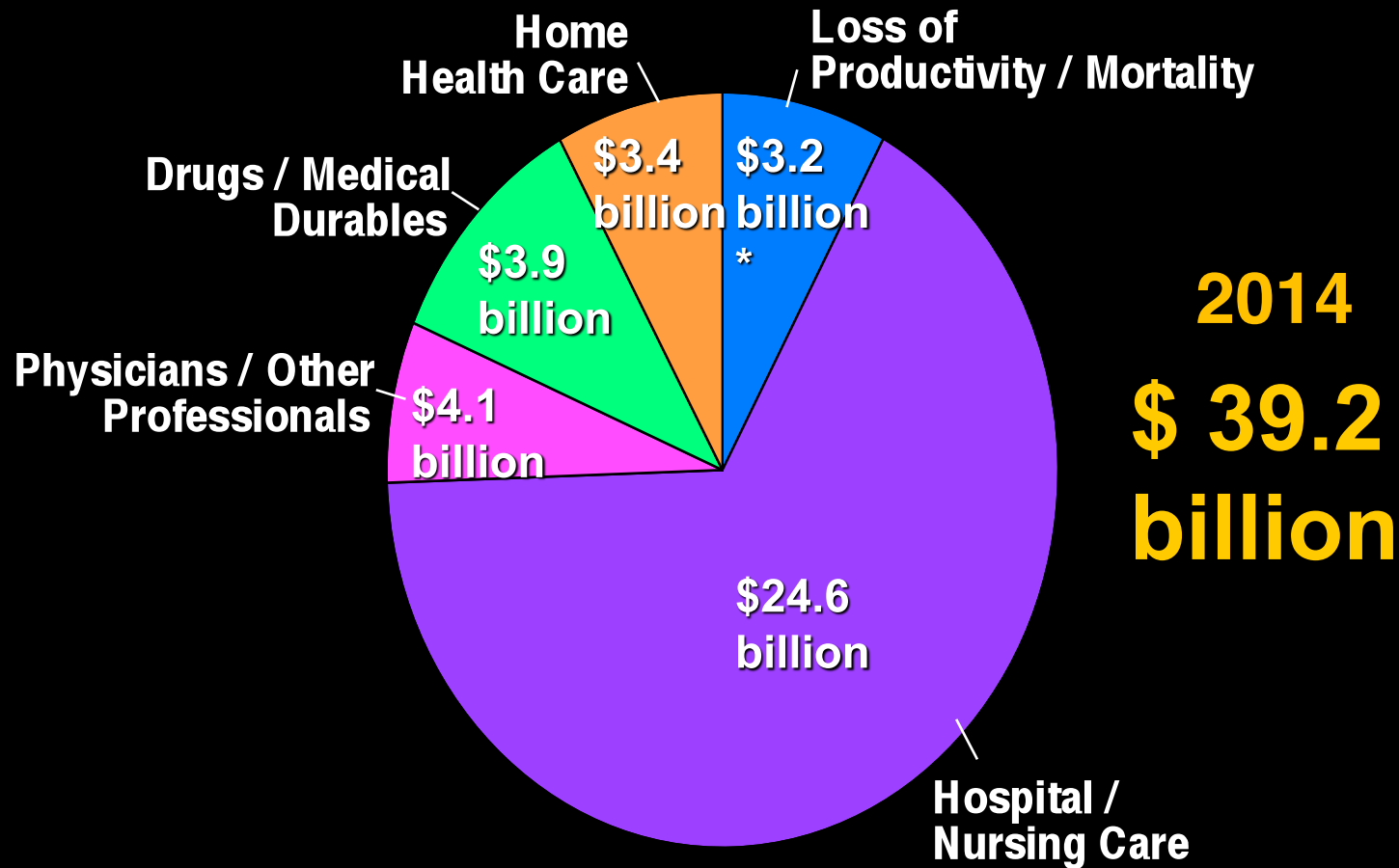
Discussing All of Heart Failure in 30 minutes.....



Heart Failure is a Major and Growing Public Health Problem

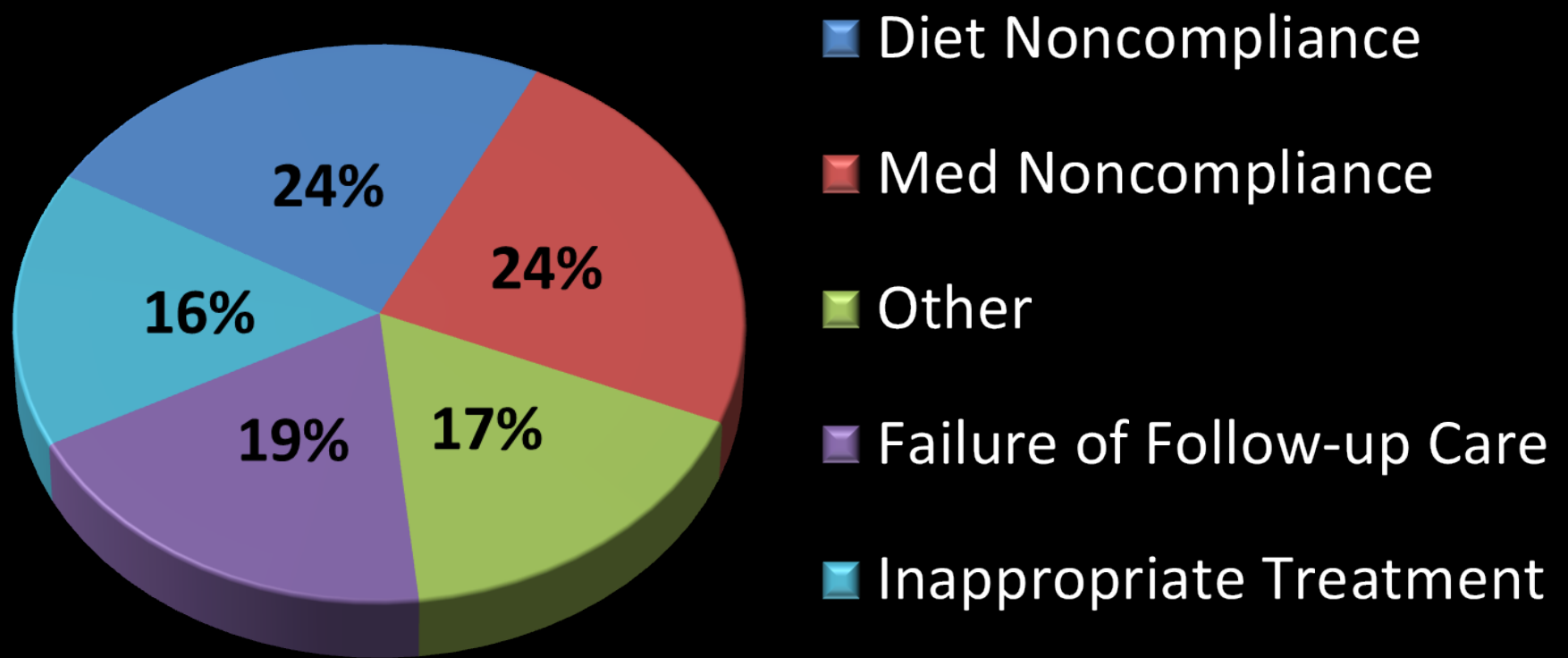
- **6.2 million people with HF in the US**
- **> 1,000,000 new cases / year**
- **> 40,000 deaths / year**
- **Leading cause for ambulatory visits in the Medicare population**
- **More dollars are spent for the diagnosis and treatment of HF than any other diagnosis by Medicare (2014 cost = 39.2 billion)**

The High Cost of Heart Failure



1993 estimated cost = \$17.8 billion

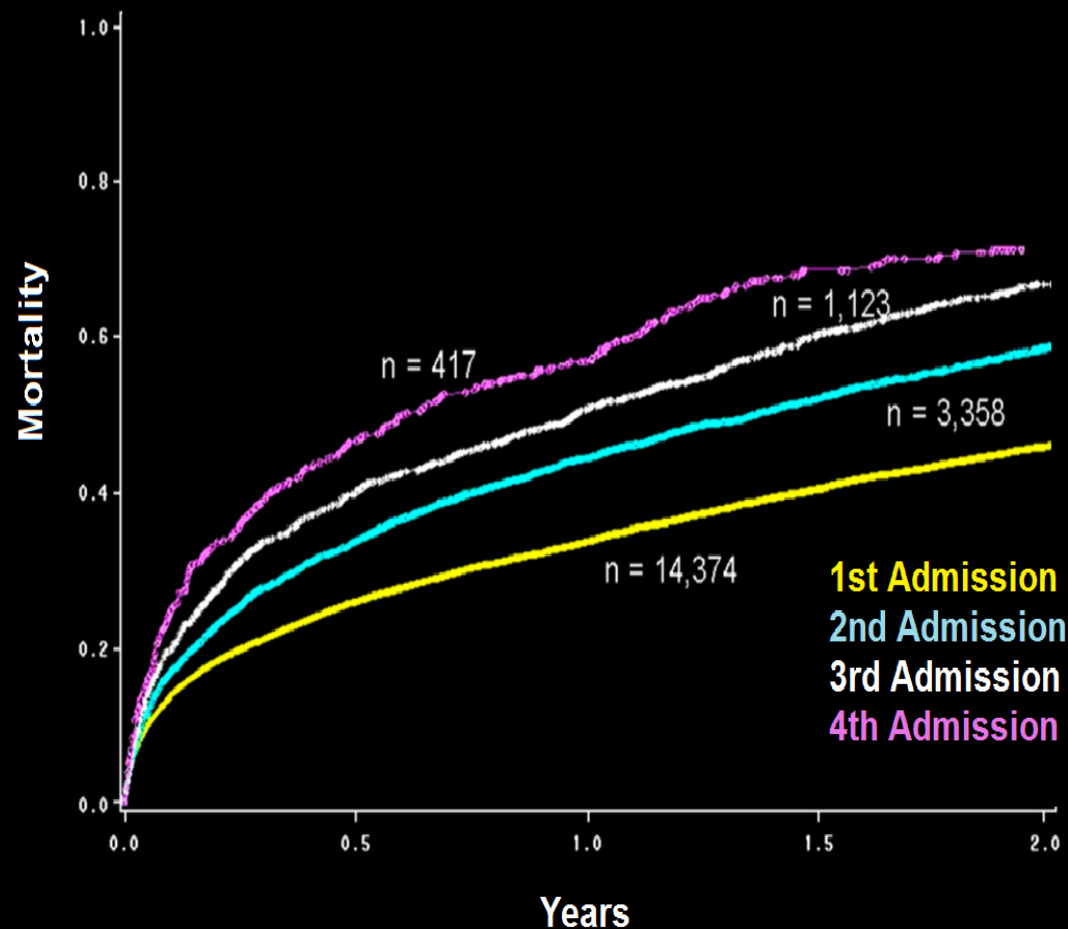
Preventable Reasons For HF Readmission



N = 179 readmissions

Increasing Mortality With Each Readmission

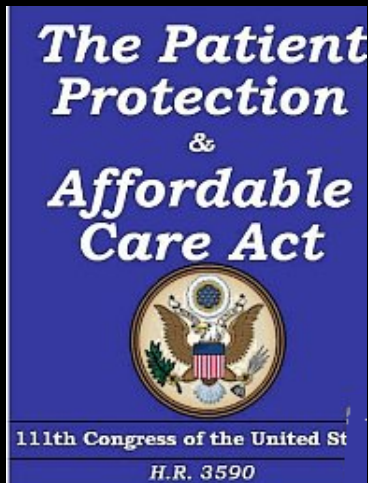
All Cause Mortality After Each Subsequent Hospitalization



- 25% 30-d all-cause readmission rate amongst Medicare patients
- MEDPAC estimates that 13% of 30-d hospital readmissions are preventable¹
- CHF was the most common reason for preventable hospitalization in 2006 (estimated \$8.4 billion)²

Readmissions linked to Reimbursement

Hospital Readmissions Reduction Program

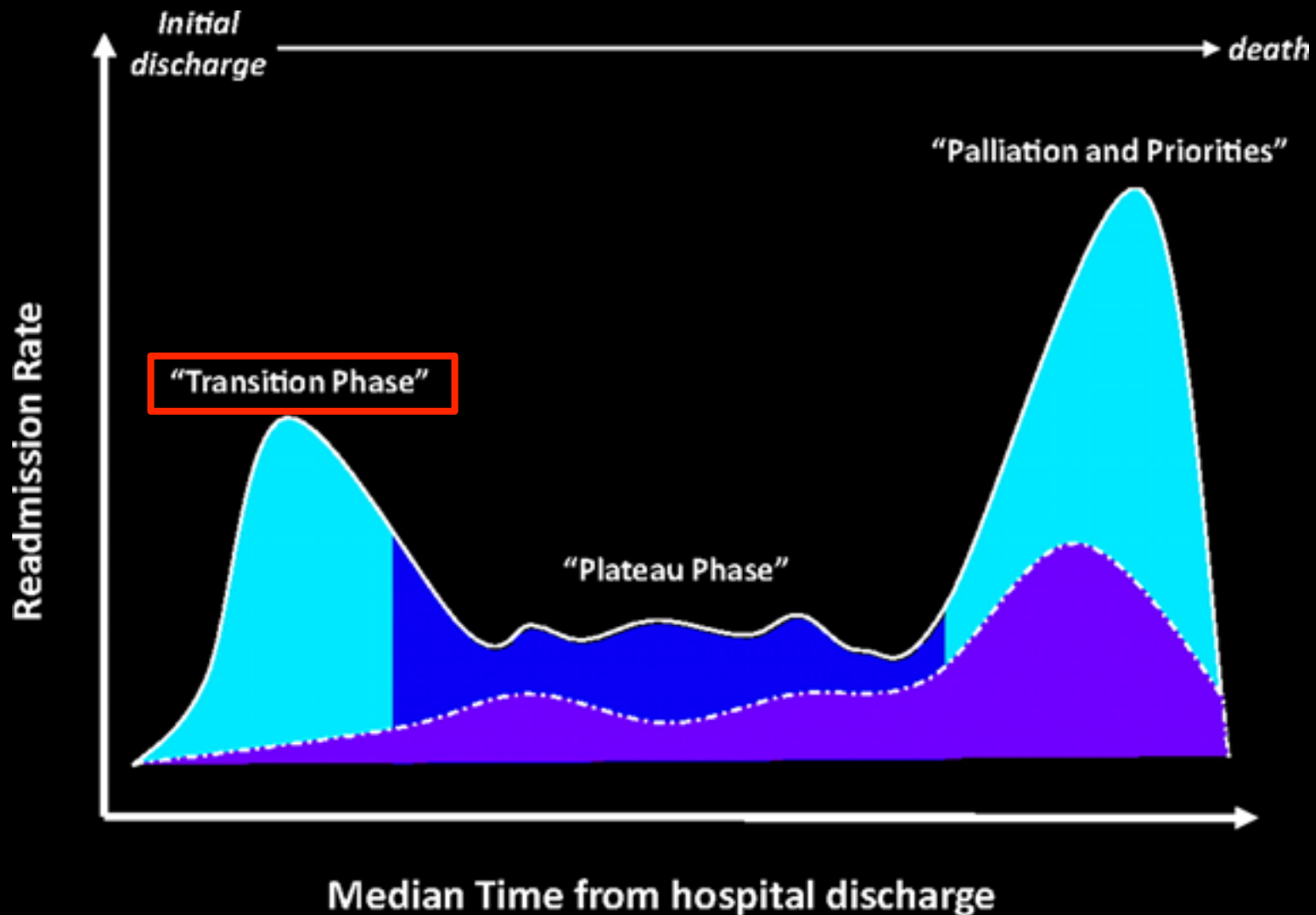


2012: ACA required reduction of payments to the hospitals with excess readmissions. Payment reduction capped at 3% in 2015



2016: 21st Century Cures Act considered patient background when calculating payment reductions (penalties adjusted based on proportion of pts dually eligible for Medicare/Medicaid).

How Do We Keep HF Patients Out?



Interventions Proven to Reduce 30 Day Rehospitalization Rates

- Extensive discharge teaching¹
- DC medication programs²
- **Early follow-up after discharge³**
- Home visits by RN/physicians⁴
- Telephone follow-up⁵
- Home Telecare Monitoring⁶

¹ VanSuch M. Qual Saf Health Care 2006;15:414-417.

² Lappe JM. Ann Intern Med. 2004;141:446-453.

³ Hernandez AF. JAMA 2010;303:1716-22..

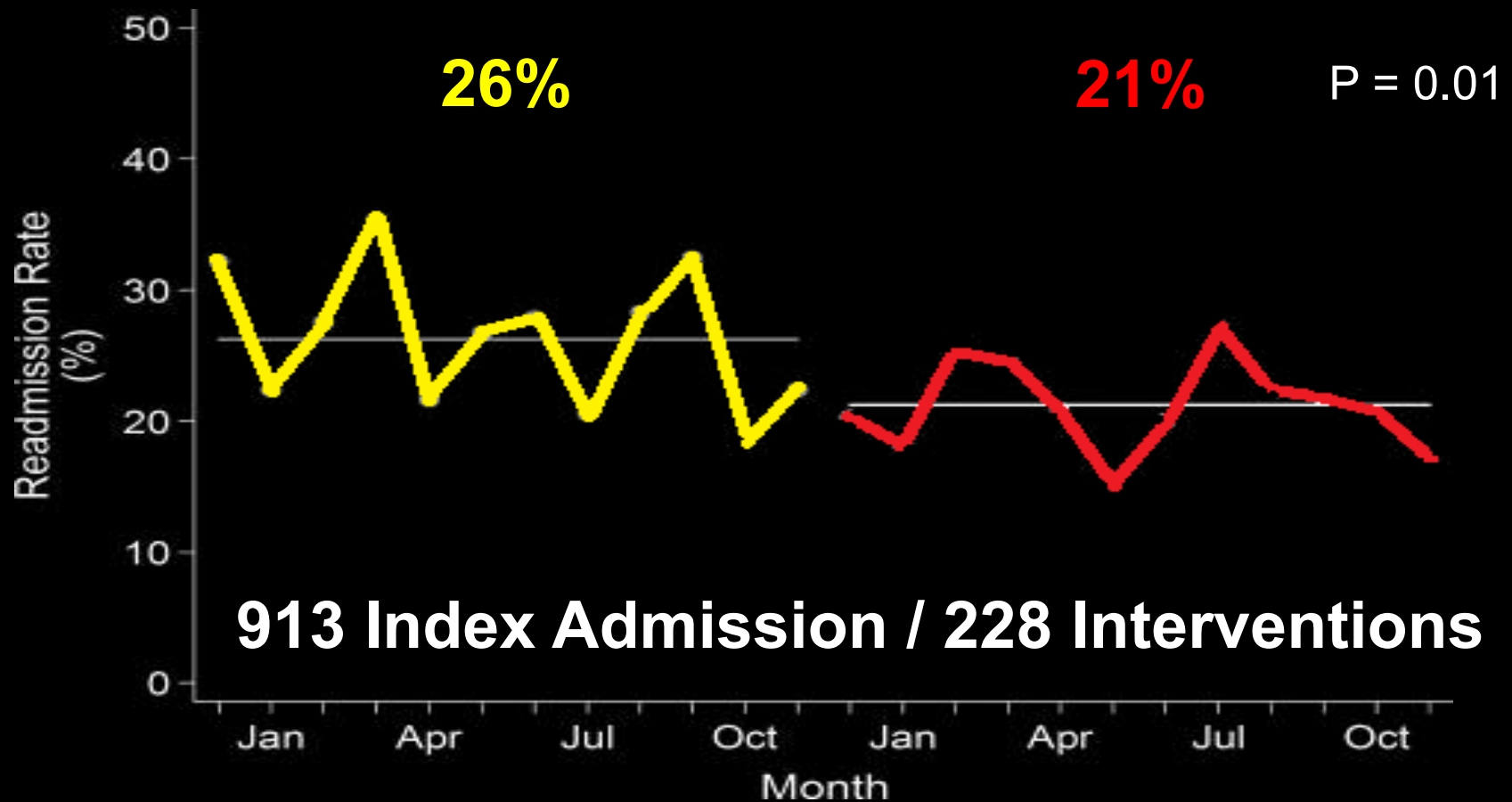
⁴ Kasper EK. JACC 2002;6:471-480.

⁵ Ferrante D. JACC 2010;56:372-8.

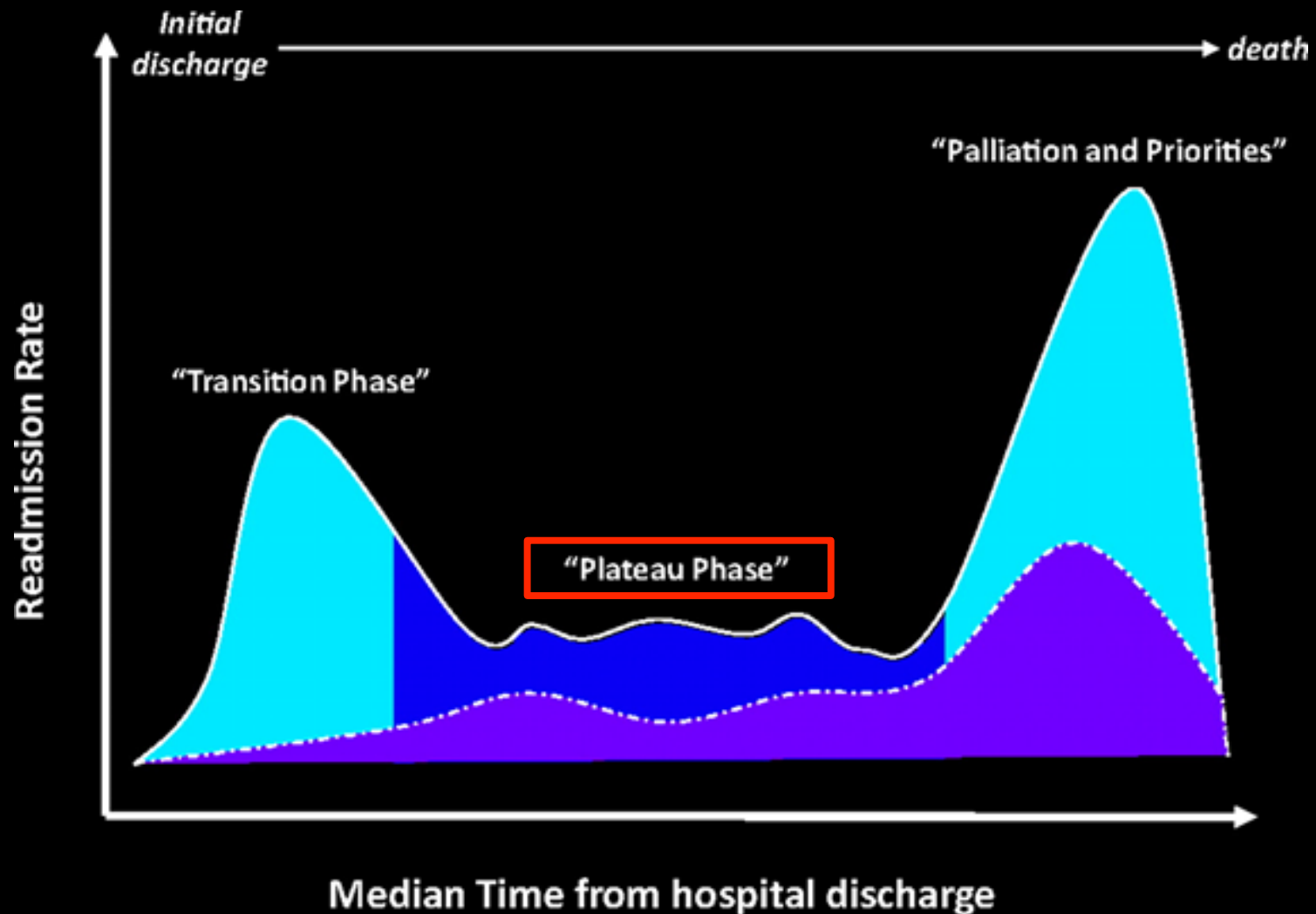
⁶ Jerant AF. Med Care 2001;39:1234-45.

Interventions for all?

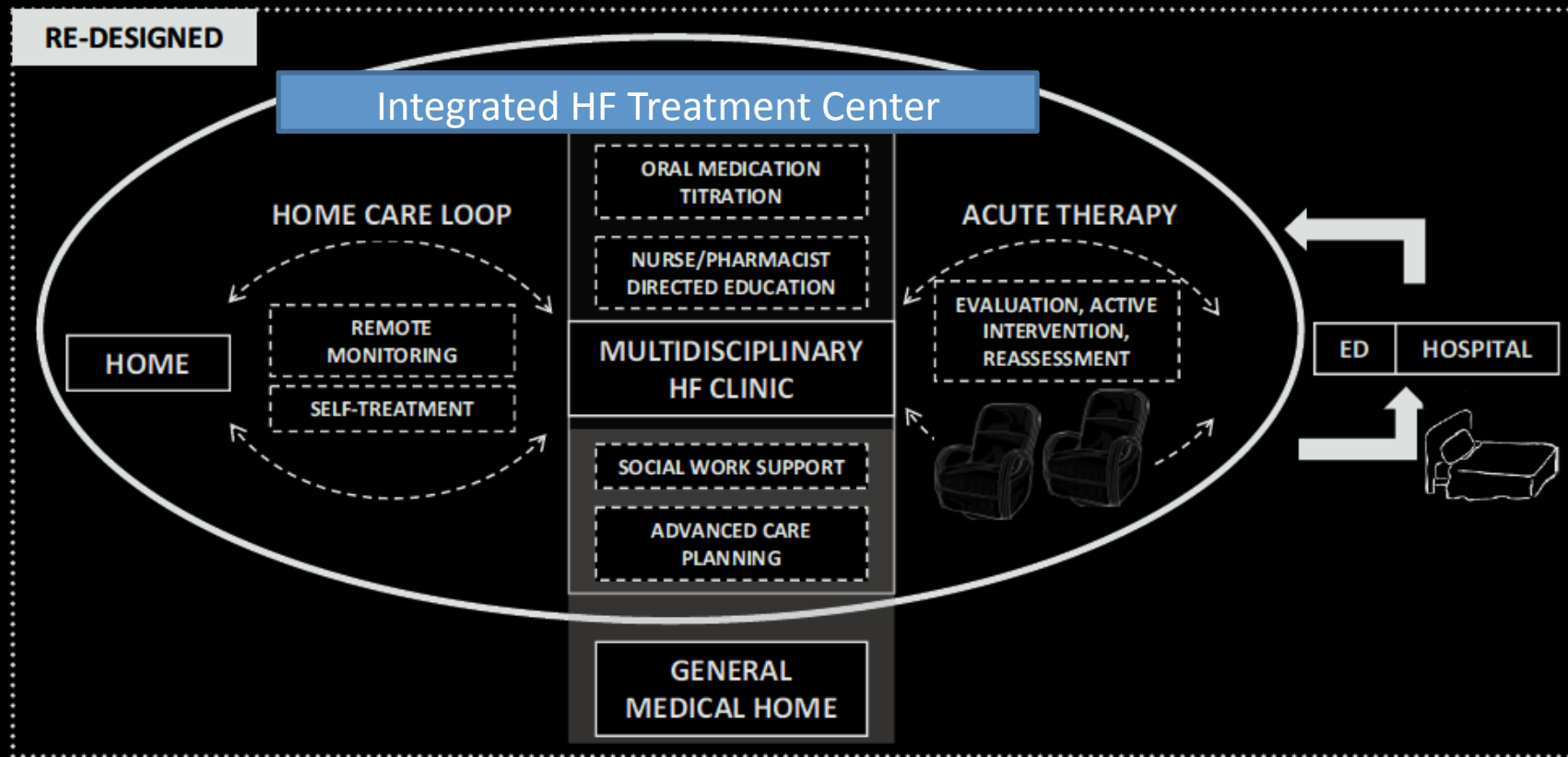
Intervention: Medium Medical & Low/Med Social Risk



How Do We Keep HF Patients Out?



Disease Management Programs Reduce Readmission



Chronic HF Management: Standardizing Care

- Step 1: Assess HF etiology and prognosis
- Step 2: Optimize behavioral, medical and device therapy
- Step 3: Consider referral for advanced management and therapies

Step 1: Assess HF Diagnosis

- **Assess cardiac structure and function**
- Determine etiology of HF
- Assess clinical severity

Assess Cardiac Structure and Function

Systolic (low EF)

- Well studied
- Definite therapeutic recommendations

60% of Patients

Diastolic (normal EF)

- Poorly studied
- General therapeutic recommendations

40% of Patients

Step 1: Assess HF diagnosis and current clinical status

- Assess cardiac structure and function
- Determine etiology of HF
- Assess clinical severity

Etiology of Systolic Heart Failure

- CAD (Ischemic)
- Hypertension
- Idiopathic
- Endocrine (Thyroid, Carcinoid, Pheo)
- Valvular
- Toxin: EtOH, Cocaine, Chemotherapy
- Arrhythmia
- Rheumatologic: SLE, Sarcoid, Giant Cell
- Genetic / Familial
- Infectious: HIV, Hepatitis, Chagas
- Peripartum
- Congenital

Etiology of Systolic Heart Failure

- CAD (Ischemic)
- Hypertension
- Idiopathic
- **Endocrine** (Thyroid, Carcinoid, Pheo)
- **Valvular**
- Toxin: EtOH, Cocaine, Chemotherapy
- Arrhythmia / **Tachycardia induced**
- Rheumatologic: SLE, **Sarcoid, Giant Cell**
- Genetic / Familial
- Infectious: HIV, Hepatitis, **Chagas**
- Peripartum
- Congenital

Step 1: Assess HF diagnosis and current clinical status

- Assess cardiac structure and function (systolic or diastolic dysfunction)
- Determine etiology of HF
- **Assess clinical severity:**
 - **Functional**
 - **Hemodynamic**
 - **Prognostic**

NYHA: Functional Assessment

- Class I:** No symptoms with ordinary activity
- Class II:** Slight limitation of physical activity. Comfortable at rest, but ordinary physical activity results in fatigue, palpitation, dyspnea, or angina
- Class III:** Marked limitation of physical activity. Comfortable at rest, but less than ordinary physical activity results in fatigue, palpitation, dyspnea, or anginal pain
- Class IV:** Unable to carry out any physical activity without discomfort. Symptoms of cardiac insufficiency may be present even at rest

Noninvasive Hemodynamic Assessment

Dry (Filling Pressures)

		No	Yes
Warm (CO)	Yes	Profile A	
	No		

Noninvasive Hemodynamic Assessment

Wet (Filling Pressures)

		No	Yes
Warm (CO)	Yes	Profile A	Profile B ↑↑ Volume
	No		

JVP/JVD
Orthopnea/PND
Hepatomegaly
Edema (legs or abd)
Bendopnea

Noninvasive Hemodynamic Assessment

Wet (Filling Pressures)

		No	Yes
Cool (CO)	Yes	Profile A	Profile B ↑↑ Volume
	No		Profile C ↓↓ CO ↑↑ Volume

Narrow Pulse Pressure
Cool extremities
Sleepy/obtunded
Hypotension
Azotemia

Orthopnea/PND
JVD
Hepatomegaly
Edema
Bendopnea

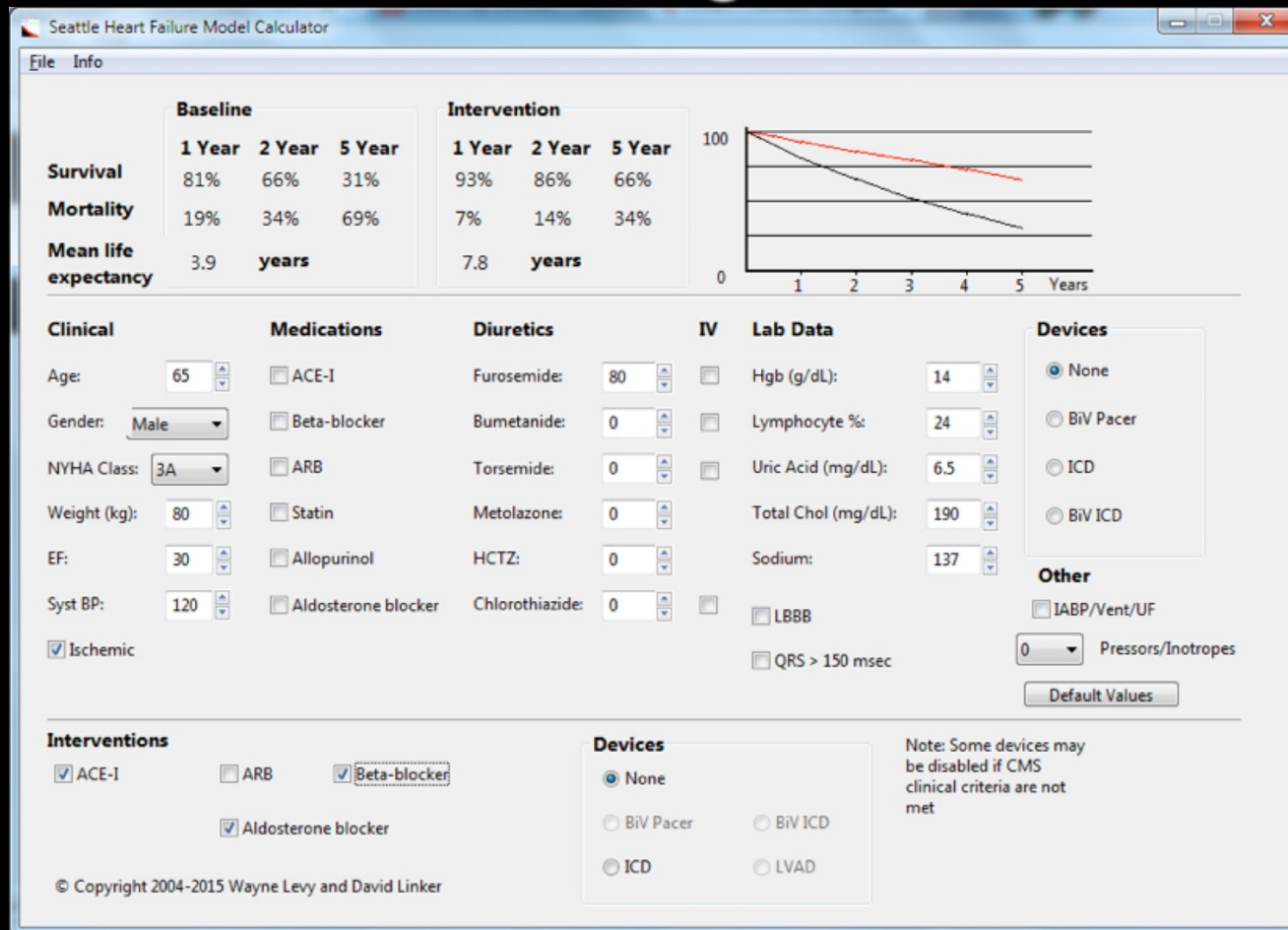
Noninvasive Hemodynamic Assessment

Dry (Filling Pressures)

		No	Yes
Cool (CO)	Yes	Profile A	Profile B ↑↑ Volume
	No	Profile L ↓↓∞	Profile C ↓↓CO ↑↑ Volume

Narrow Pulse Pressure
Cool extremities
Sleepy/obtunded
Hypotension
Azotemia

Seattle HF Score: Prognostic Assessment



<http://depts.washington.edu/shfm/>

80% of patients with a SHF survival < 1 year do not perceive HF as EOL

Chronic HF Management: Standardizing Care

- Step 1: Assess HF diagnosis and current clinical status
- Step 2: Optimize behavioral, medical and device therapy
- Step 3: Consider referral for advanced management and therapies

Step 2: Optimize therapies

- Behavioral therapy
- Medical therapy
- Device therapy

Salt and Fluid Compliance

Nutrition Facts	
Serving Size 28 g	
Amount Per Serving	
Calories 94	Calories from Fat 77
Total Fat 9g	
Saturated Fat 3g	
Trans Fat 0g	
Cholesterol 24mg	
Sodium 347mg	
Total Carbohydrate	
Dietary Fiber 0g	
Sugars 0g	



No Added Salt vs. Low Salt

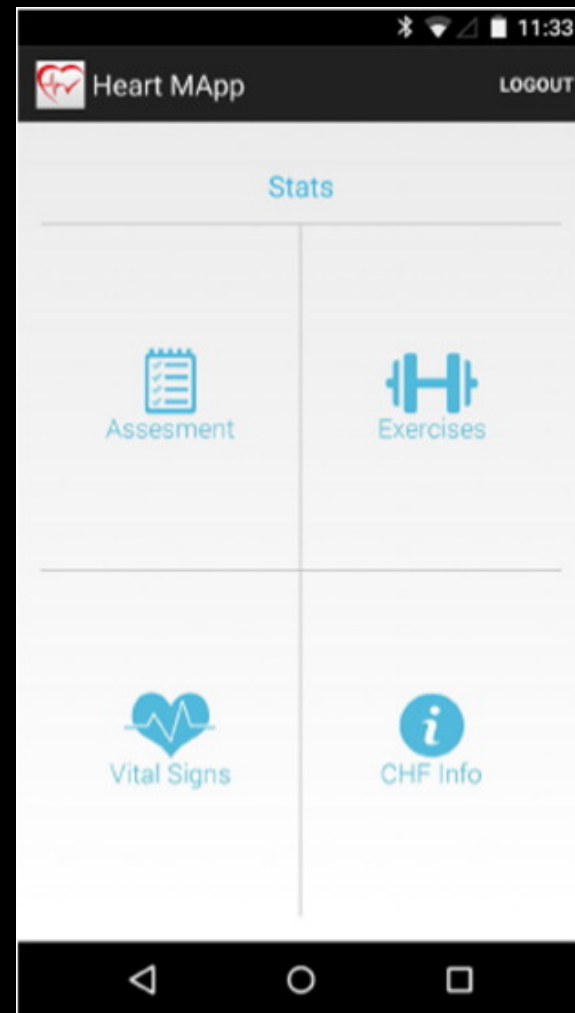
Fruit, Soup = Fluid
Ice > Water
Lemon Drops / Frozen Grapes

Cheap / Reliable

Empower Self Management

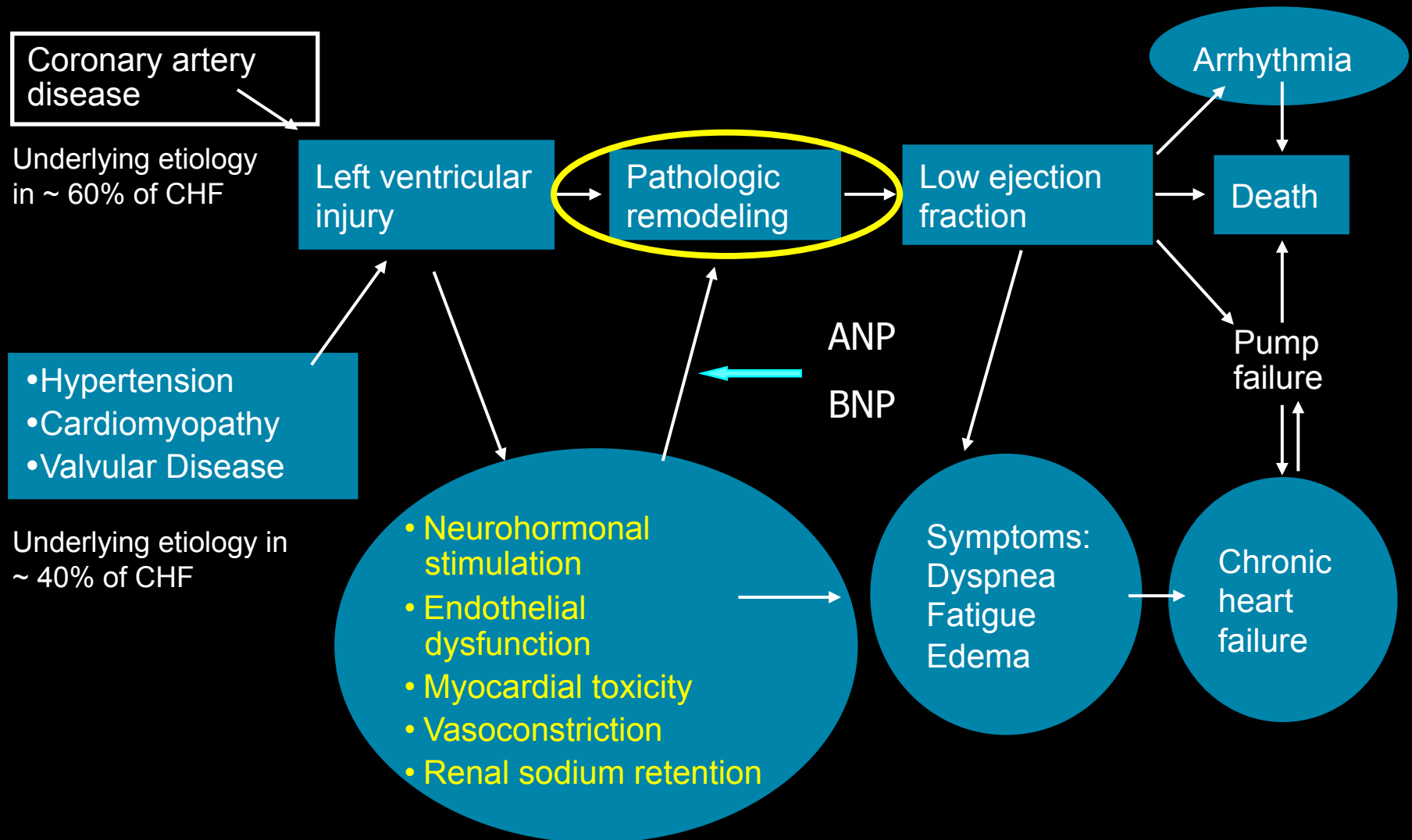


HFSA Storyline



Heart Mapp (USF)

Pathological Progression of CV Disease



Optimization of Medical Therapy

Systolic HF (EF < 40%)

- ★ – ACE-I/ARB (IA)
- ★ – Beta Blockers (IA)
- ★ – Aldosterone antagonists (IB)
- ★ – Hydralazine/Isosorbide dinitrate (IA)

★ Proven
mortality benefit
for EF < 40%

- Diuretics (IC)
- Digoxin (IA/IB)
- Exercise testing and training (1B/C)

Strength of Recommendation:

IA: Recommended IIB: May be considered
IIA: Responsible III: NOT recommended

Strength of Evidence:

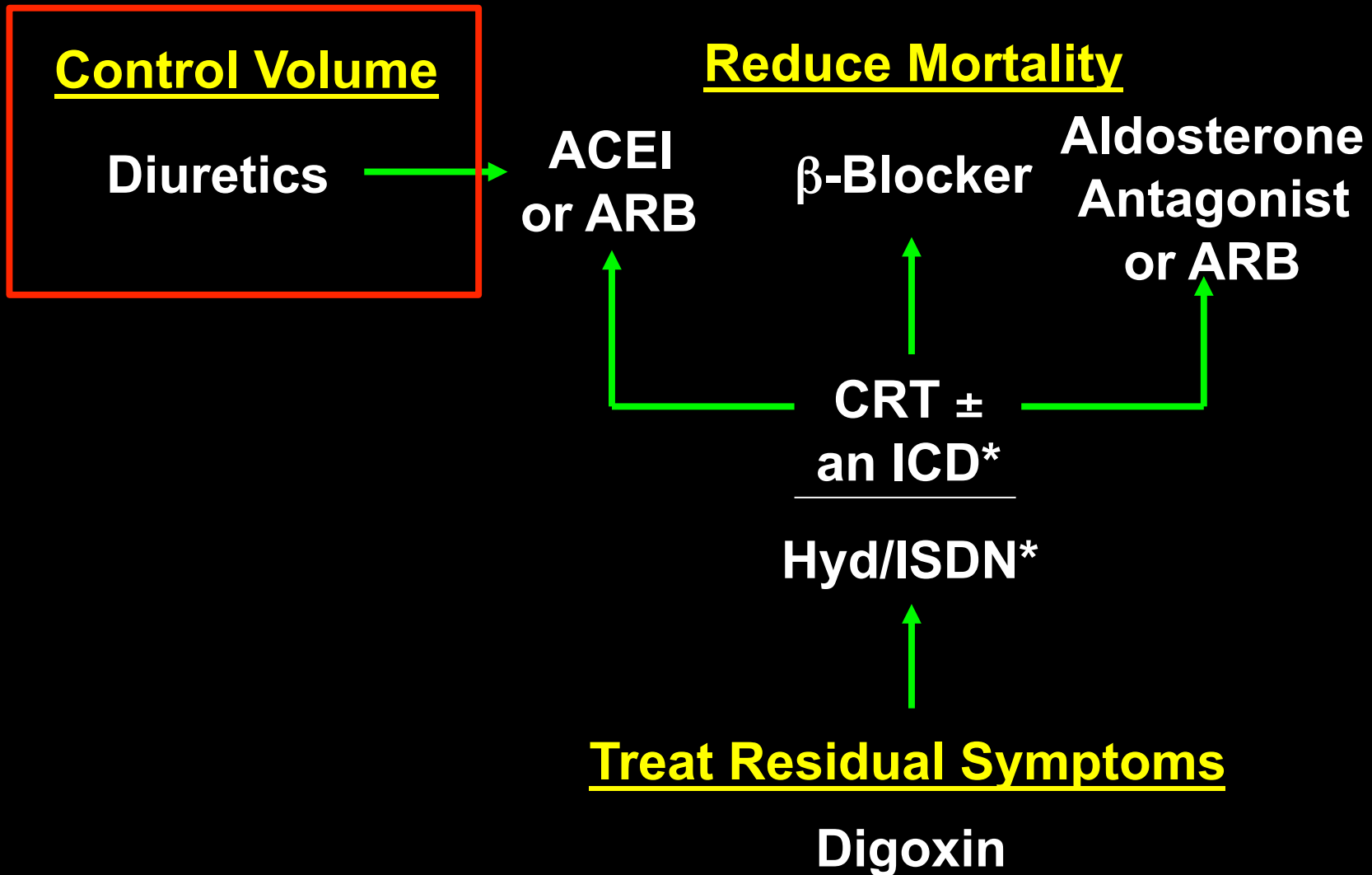
A: Multiple RCT / meta analyses
B: Single RCT / no-randomized studies
C: Expert opinions

Cumulative Impact of Heart Failure Therapies on Long Term Outcomes

	<u>Relative-Risk</u>	<u>2 Year Mortality</u>
None	--	35%
ACE Inhibitor	↓ 23%	27%
Aldosterone Antag	↓ 30%	19%
Beta-Blocker	↓ 35%	12%
CRT / ICD	↓ 36%	8%

Cumulative risk reduction if all four therapies are used: 77%
Absolute risk reduction: 27%, NNT = 4

Optimization of Medical Therapy





Diuretics

Clinical Pearls

- Use minimal dose needed to maintain euvolemia
- Bumex > torsemide > lasix
- Metolazone 30 min prior to loop - NOT DAILY
- Daily weights.
 - If weight increases by 3 lbs in 1 day or 5 lbs in 1 week, consider dose escalation AND reinforce behavioral therapy
- Don't worry about BP!

Optimization of Medical Therapy

Control Volume

Diuretics →

Reduce Mortality

ACEI
or ARB

β-Blocker

Aldosterone
Antagonist
or ARB

CRT ±
an ICD*

Hyd/ISDN*

Treat Residual Symptoms

Digoxin

ACE Inhibitors (ARBs)

Clinical Pearls

- OK to start if asymptomatic hypotension = “stable baseline”
- Start lowest dose and uptitrate slowly
- Order QHS to **stagger meds**
- Do not use if Cr ≥ 3 g/dL, bilateral RAS, K⁺ ≥ 5.5 mmol/L
- Check K⁺ within 2 wks of dose increase

Beta Blockers

Clinical Pearls

- Carvedilol, metoprolol succinate, bisoprolol
- **START LOW AND GO SLOW**
- OK to decrease ACE-I to allow for more BP room to uptitrate beta blocker
- Do NOT start or uptitrate when there is significant volume overload or hypovolemia
- OK to start if asymptomatic hypotension = “stable baseline” / Stagger BP medications
- Do not use BB to treat HR in a ADHF

Aldosterone Antagonists

Clinical Pearls

- Most commonly underutilized OMT
- Creatinine should be < 2.5 in men or < 2.0 in women
- Potassium should be < 5.0
- Benefit: Decrease K supplements
- Check K / Cr in: 1w, 1mo for 3 mo, then Q3mo

Optimization of Medical Therapy

Control Volume

Diuretics

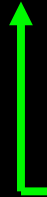


ACEI
or ARB

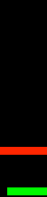
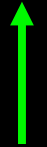
Reduce Mortality

β -Blocker

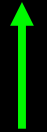
Aldosterone
Antagonist
or ARB



CRT \pm
an ICD*



Hyd/ISDN*

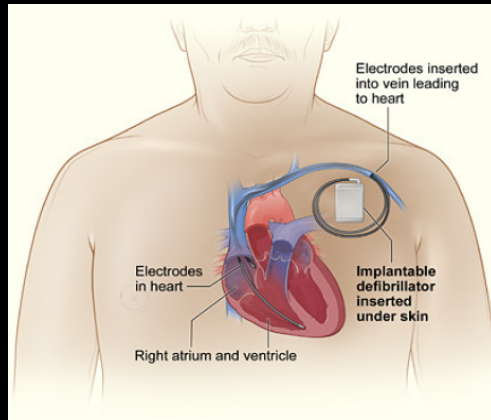


Treat Residual Symptoms

Digoxin

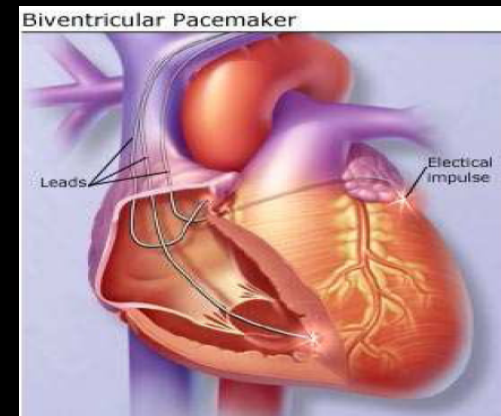
Consideration of Device Therapy

Internal Cardio-Defibrillator (ICD)



- LVEF \leq 35% (IA)
- Optimized Medical Therapy
- Class II/III with
 - Nonischemic cardiomyopathy
 - Ischemic cardiomyopathy but no MI in last 40 days
- LVEF 35-40%: if NSVT and ischemic, EPS

Cardiac Resynchronization Therapy (CRT) +/- ICD



- LVEF \leq 35%
- Optimized Medical Therapy
- Class III/IV with
 - QRS \geq 120 ms
 - NSR (IA) / Afib (IIB)
 - High dependence on V-pacing (IIC)

Optimization of Medical Therapy

Control Volume

Diuretics



ACEI
or ARB

Reduce Mortality

β -Blocker

Aldosterone
Antagonist

NEW THERAPIES???

CRT \pm
an ICD*

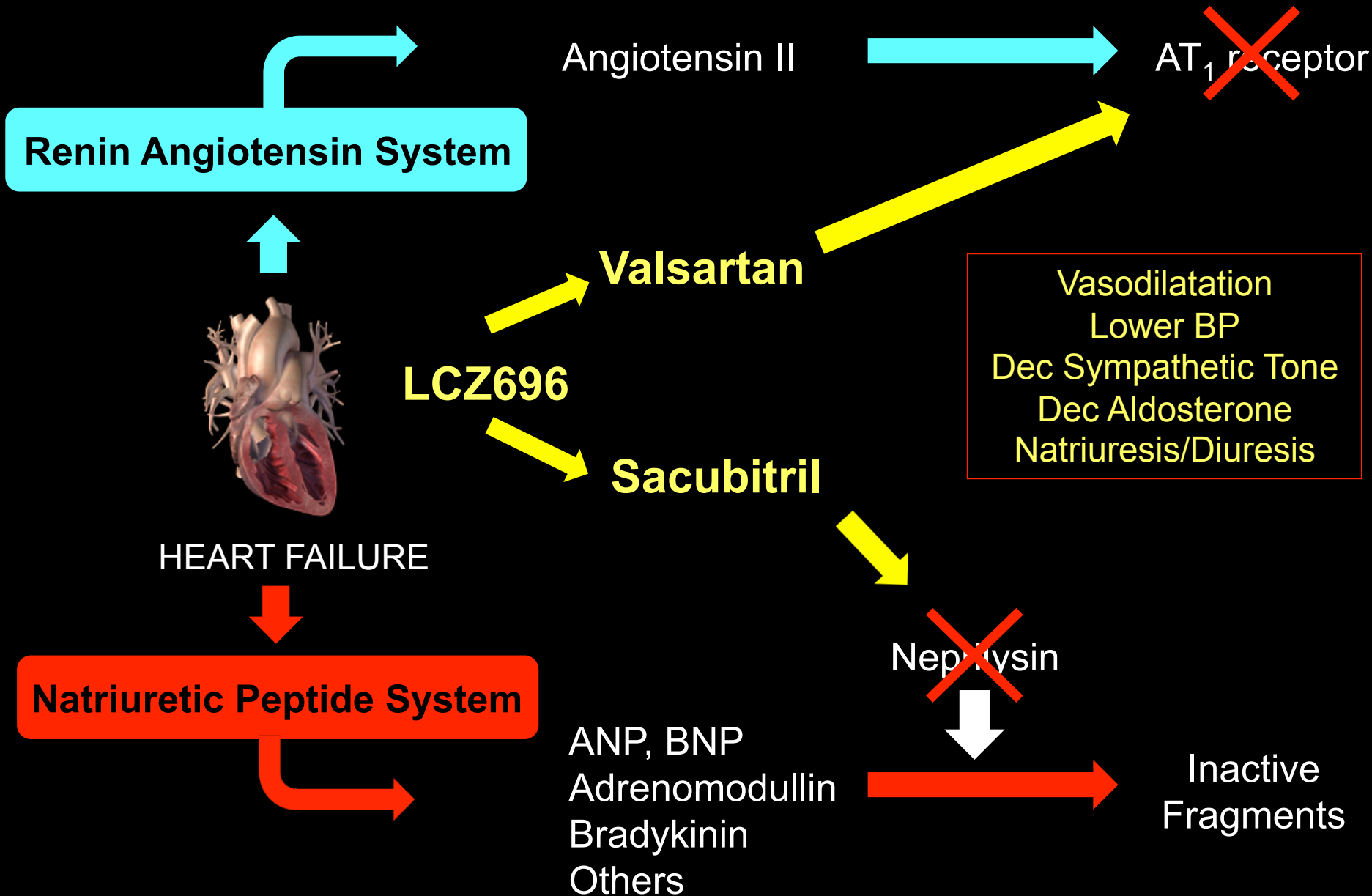
Hyd/ISDN*



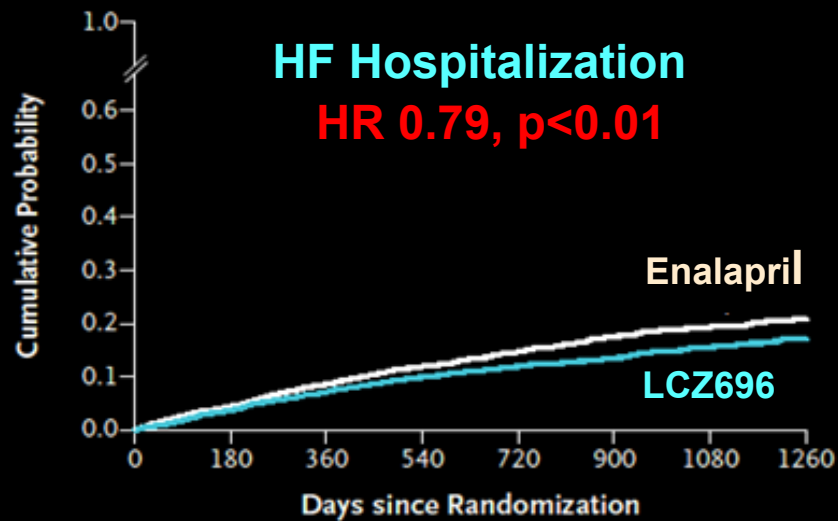
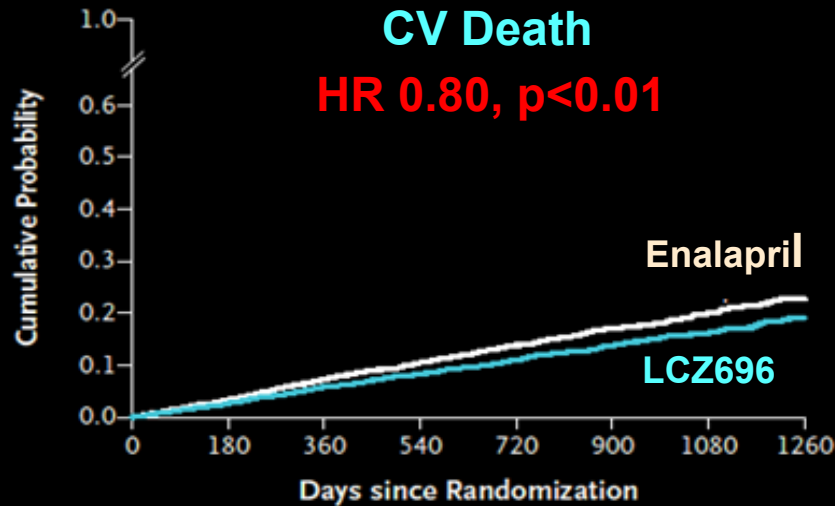
Treat Residual Symptoms

Digoxin

Entresto: ARB/NPI



Paradigm-HF



In comparison with the enalapril, LCZ696 patients had:

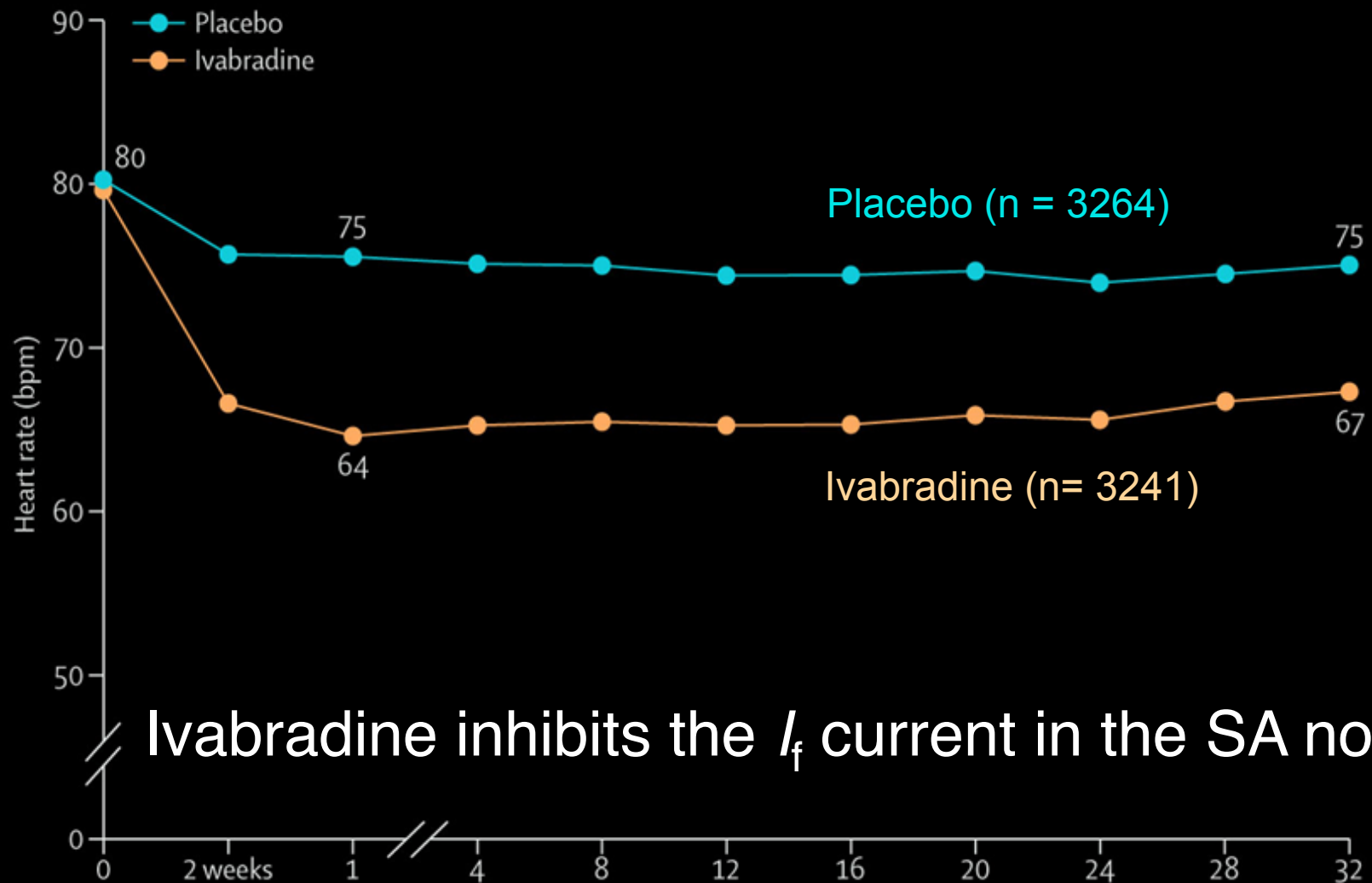
- Fewer ED visits for worsening HF (HR, **0.66**; $P < 0.01$)
- **23%** fewer hospitalizations for worsening HF ($P < 0.01$)
- Less likely to require ICU (**18%** risk reduction, $P < 0.01$), IV inotropes (**31%** risk reduction, $P < 0.01$), and LVAD/transplant (**22%** risk reduction, $P = 0.07$)

Entresto

Clinical Pearls

- Start Entresto AFTER OMT in stable OUTPATIENTS
- When switching from ACE-I allow washout period of 36 hrs
- **Patients previously taking ACE-I / ARB:**
 - Starting dose 49/51 mg BID
- **Patients not on ACE-I / ARB or previously taking low doses:**
 - Starting dose 24/26 mg BID
- Double ENTRESTO 2-4 wks to target dose (97/103 mg)
- **Consider COST vs. BENEFIT**

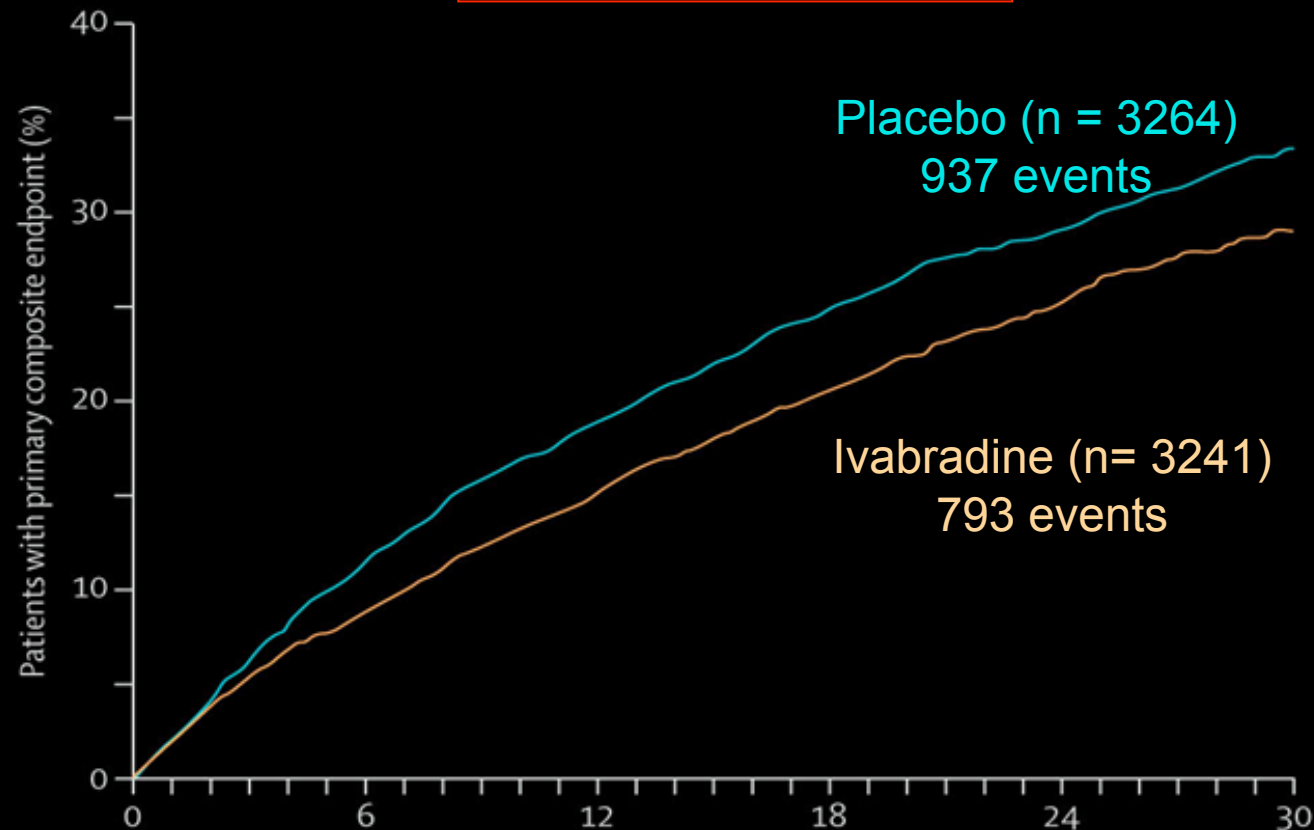
SHIFT: Median HR Reduction Over Time



Ivabradine inhibits the I_f current in the SA node

Ivabradine: CV Death or Hosp Admission for Worsening HF

RR 18%, $p < 0.01$



Optimization of Medical Therapy

Control Volume

Diuretics



ACEI
or ARB

Reduce Mortality

β -Blocker

Aldosterone
Antagonist

NEW THERAPIES:

Is it worth the Price?

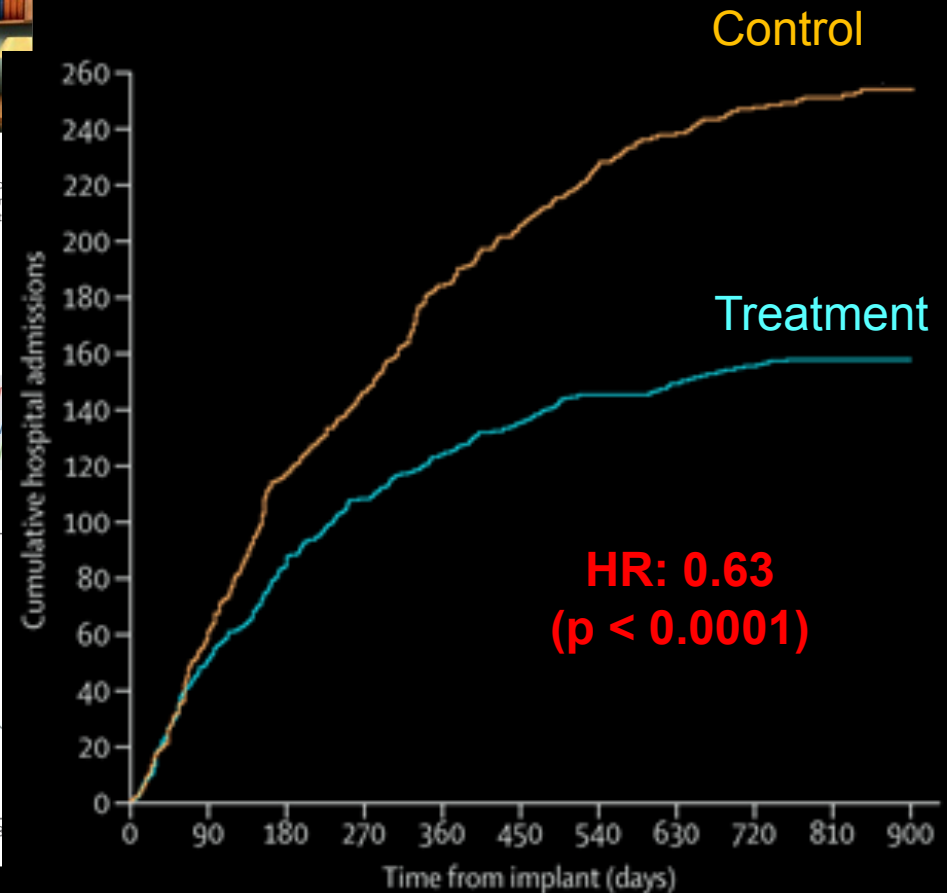
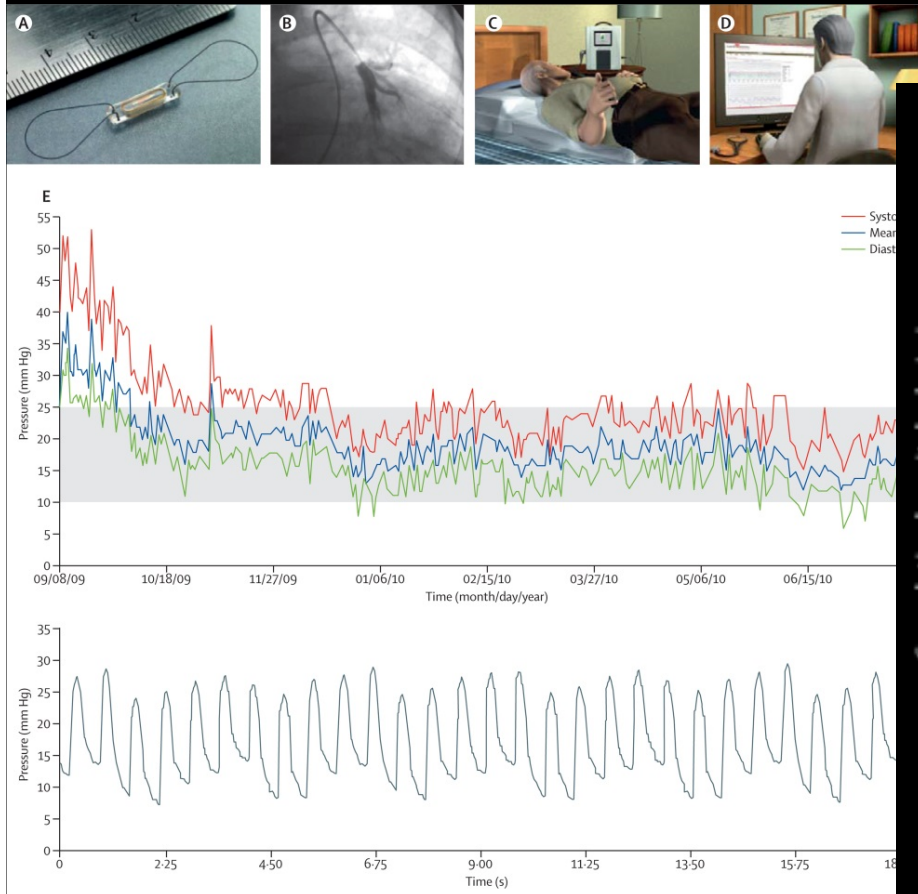
More meds?

Treat Residual Symptoms

Digoxin

Remote Monitoring: CardioMEMS

CHAMPION TRIAL

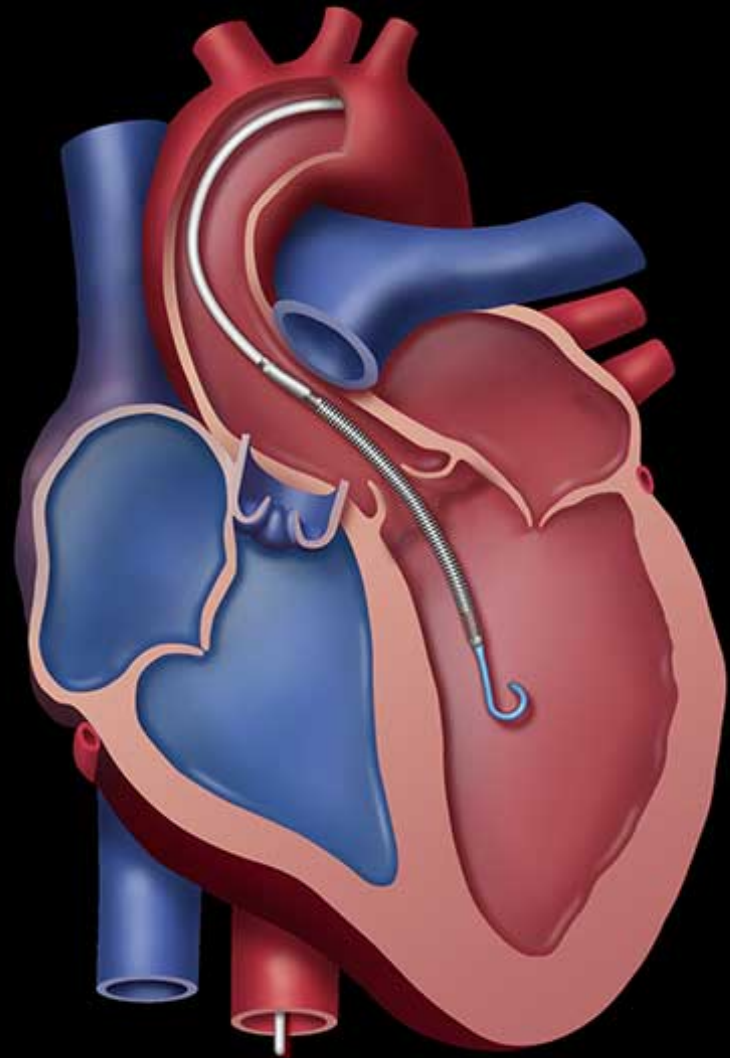


Reduce HF Admissions
But does it affect survival (GUIDE-HF)

Principles of Chronic HF Management

- Step 1: Assess HF diagnosis and current clinical status
- Step 2: Optimize behavioral, medical and device therapy
- Step 3: Consider referral for advanced management and therapies

Timing of Referral is Key to Survival



Who Should be Referred to an Advanced Heart Failure Program?

- CHF requiring 2 or more admissions in last year
- Inability to walk 1 block with shortness of breath
- Serum Cr > 1.5mg/dL, BUN >40 mg/dL
- Serum Na < 135 mmol/L
- Inability to uptitrate ACE inhibitor or B-blocker
- Diuretic dose >1.5mg/kg/d
- Requiring inotropic therapy
- Severe weight loss (cardiac cachexia)
- Malignant or recurrent ventricular arrhythmias
- Failure to respond to BiV pacing

A Beginning to the End???



Conclusions

- Heart Failure carries one of the highest social, medical and economic burdens among all disease states
- Approaches for reducing HF readmissions should be separated into three phases:
 - Transition of Care Phase: Close follow up
 - Plateau / Maintenance Phase: Standardization and Optimization of Meds
 - Advanced / Palliative Phase: Refer for advanced therapies early

Thank You



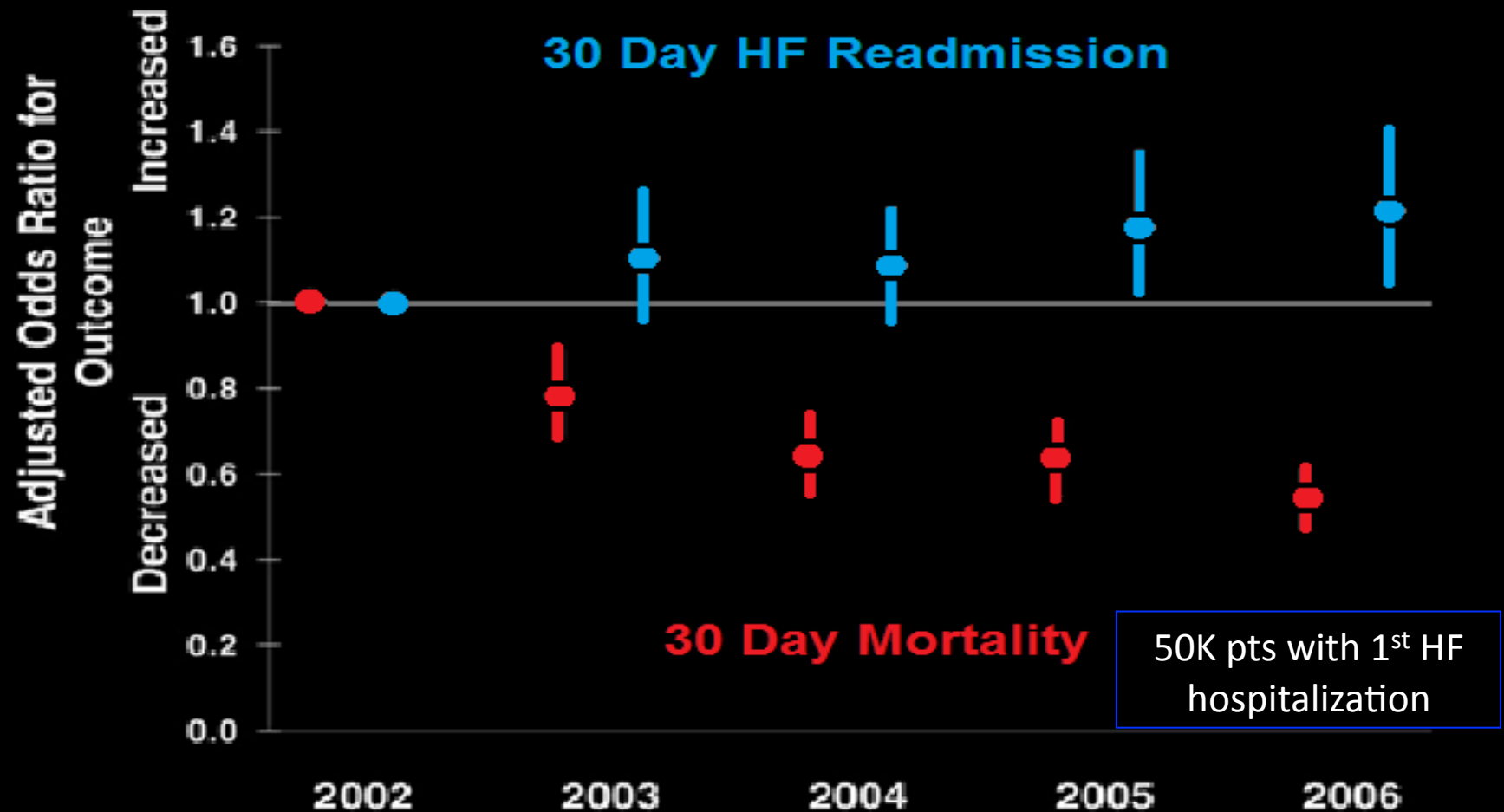
Parag Patel, MD
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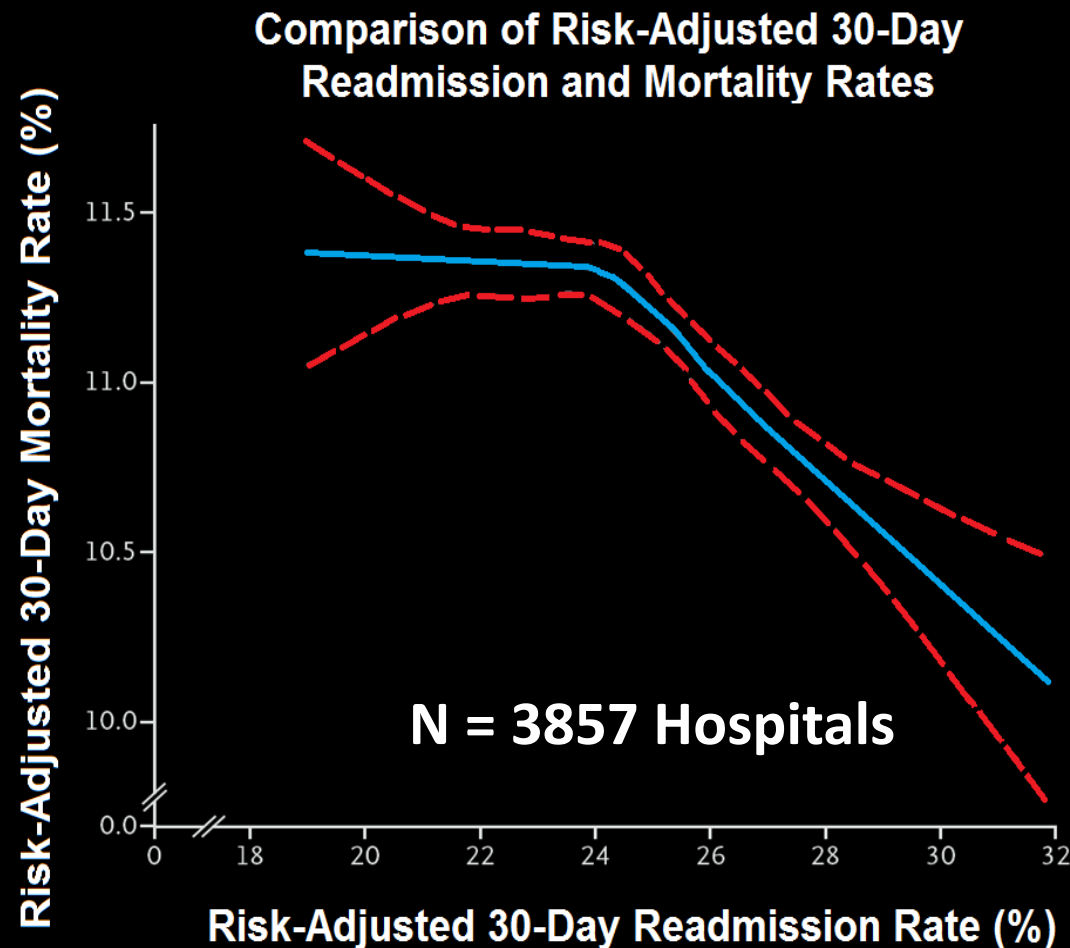
Discordance Between HF Readmission and Mortality

Adjusted OR Trends In Outcomes



2006: More comorbidities / More likely on EBT

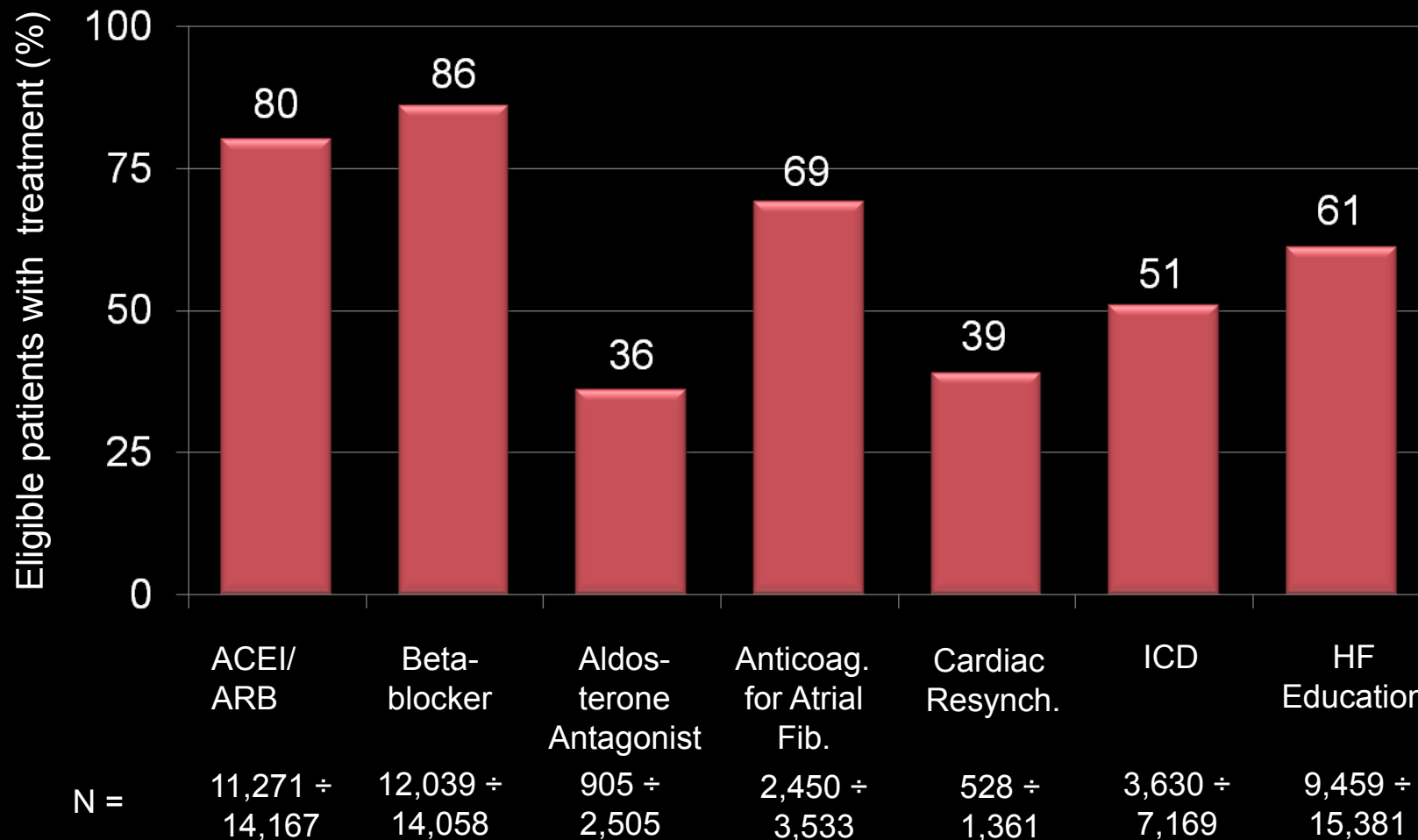
Discordance Between HF Readmission and Mortality



- Inverse association between adjusted readmission and death
- Are readmissions adversely affected by a competing risk of death?
- Maybe readmissions are a consequence of successful care

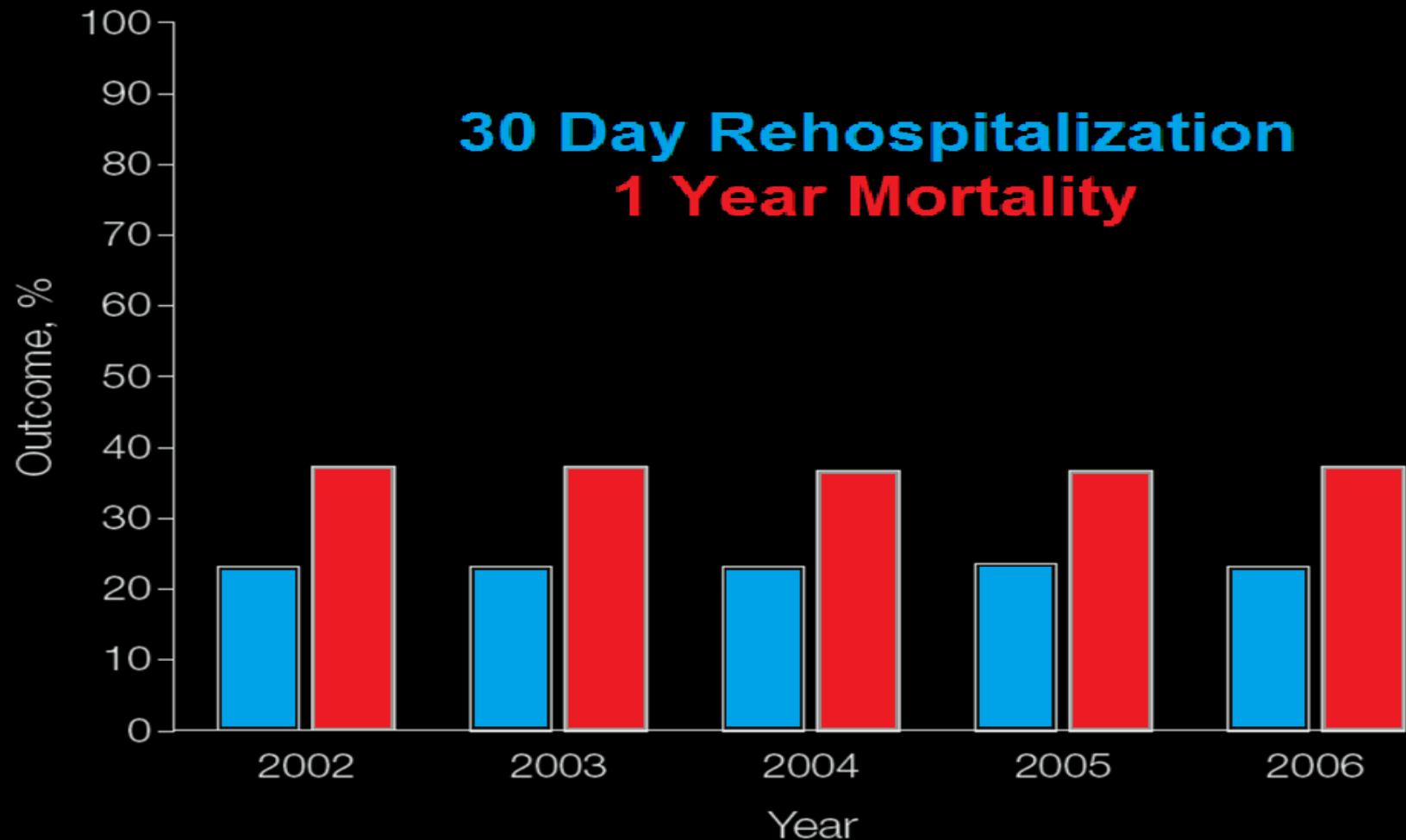
Quality of Outpatient HF Care: IMPROVE HF

Conformity with 7 Performance Measures at Baseline



Improvement in Quality Measure Does Not Translate to Improvement in Outcomes

Clinical Outcomes '02-'06



OPTIMIZE-HF: Evidenced Based Interventions Are Associated With Improved Outcomes

Risk-Adjusted Process-Outcome Links for HF Core Measures

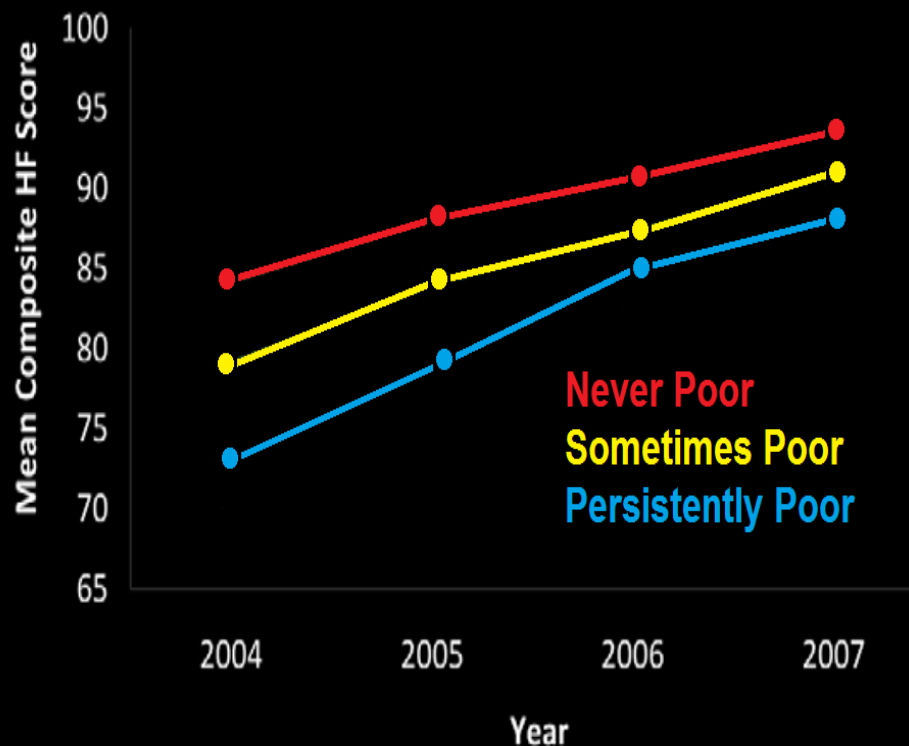
Performance Measure	Predictive of 90-d Mortality		Predictive of 90-d Mortality/ Rehosp	
	HR (95% CI)	P	OR (95% CI)	P
DC Instructions	0.9 (0.7-1.2)	.51	1.1 (0.8-1.3)	.46
Eval. Of LVSF	0.9 (0.7-1.3)	.59	1.1 (0.8-1.4)	.67
ACE-I / ARB (LVSD)	0.6 (0.4-1.1)	.08	0.5 (0.3-0.8)	.002
Smoking cessation	0.8 (0.4-1.4)	.13	0.7 (0.5-1.1)	.12
β-Blocker	0.5 (0.3-0.8)	.004	0.7 (0.5-1.0)	.02

Home Telemonitoring: Not for all

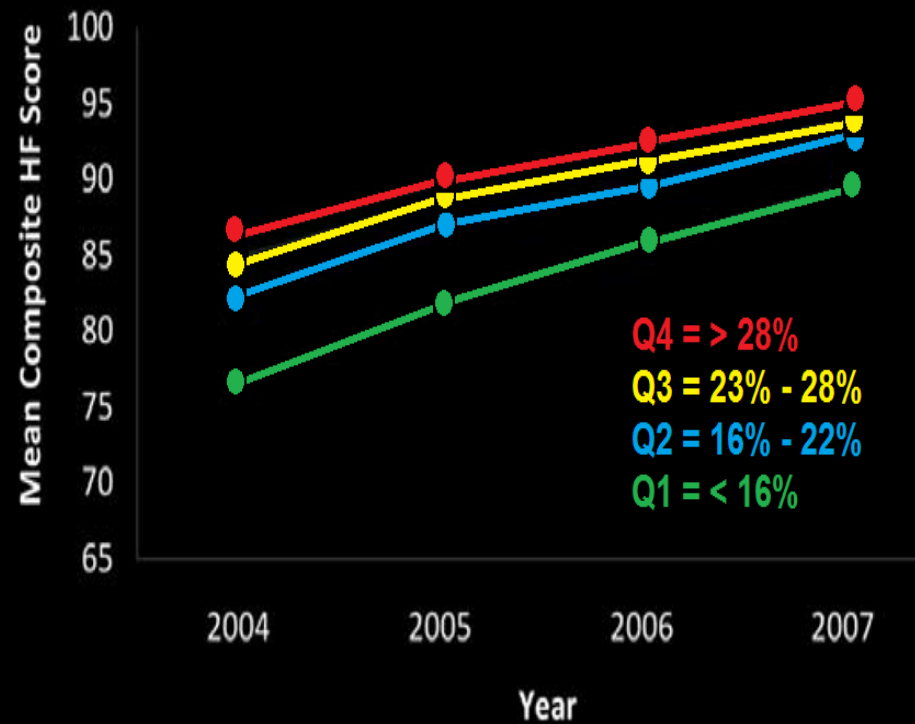
Clinical Endpoints			
	Telemonitoring (N = 826)	Usual Care (n = 827)	p
Death or Readmission	52.3%	51.5%	0.75
Death	11.1%	11.4%	0.88
HF Readmission	27.5%	27.0%	0.81
Hospital Days	7.2 ± 14.6	7.0 ± 14.9	0.27

Regional Variation in HF Score Associated with Socioeconomic Factors

HF Score By Chronicity of Poverty in County



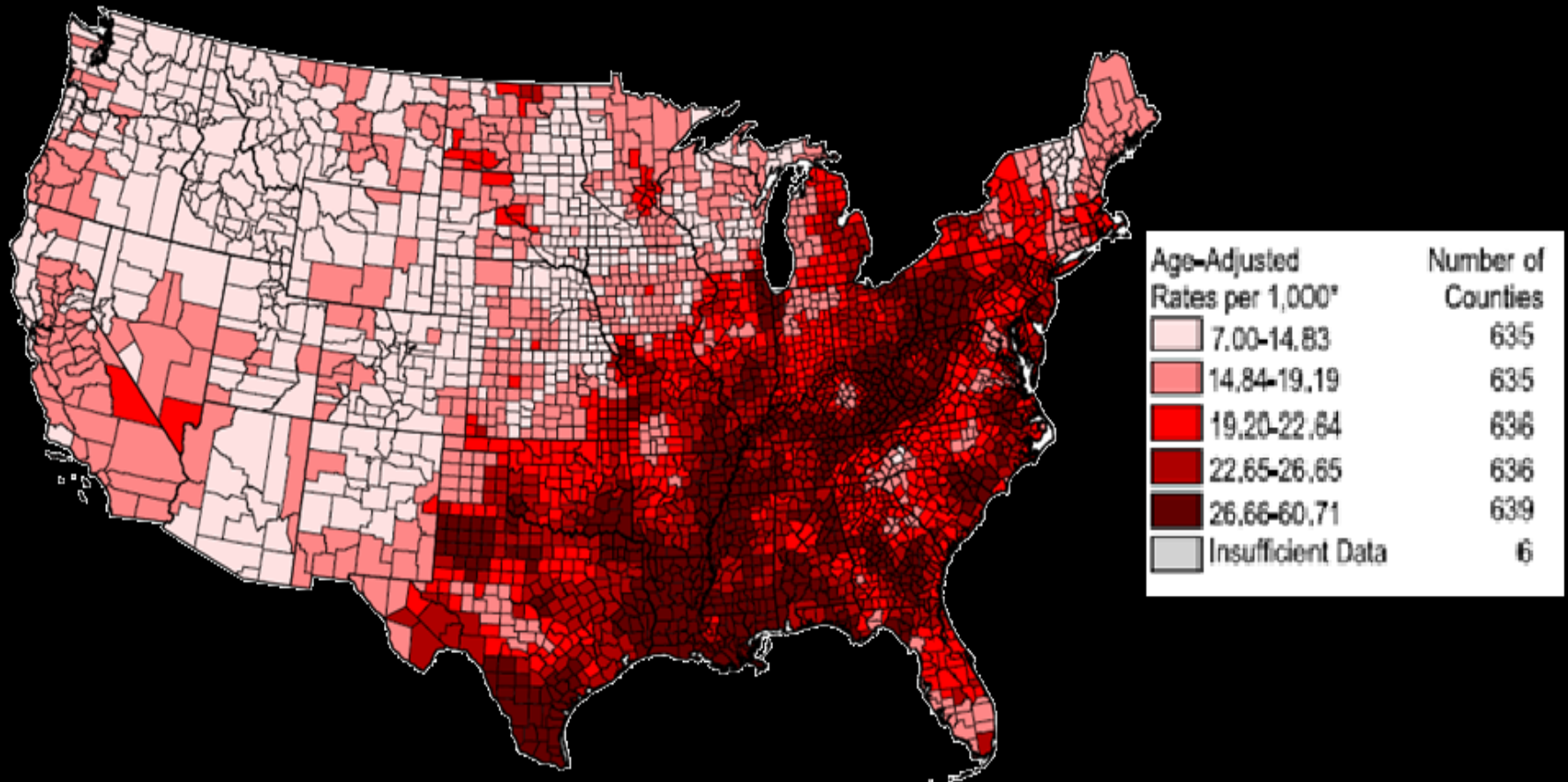
HF Score By Percent of College Graduates In County



N = 2,705 hospitals in the US National Longitudinal Study

Geographic Disparities in HF Readmission

Medicare HF Hospitalization Rates By County '00-'06



HF Quality is Public

Medicare.gov | Hospital Compare

The Official U.S. Government Site for Medicare

Hospital Compare
Home

About Hospital
Compare

About the data

Resources

Help

Home

Share

Find a hospital

A field with an asterisk (*) is required.

• **Location**

Example: 45802 or Lima, OH or Ohio

Hospital name (optional)

Search

