

***American College of Cardiology Foundation  
New York Cardiovascular Symposium***

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**Heart Failure 2007  
Addressing hospitalization?**

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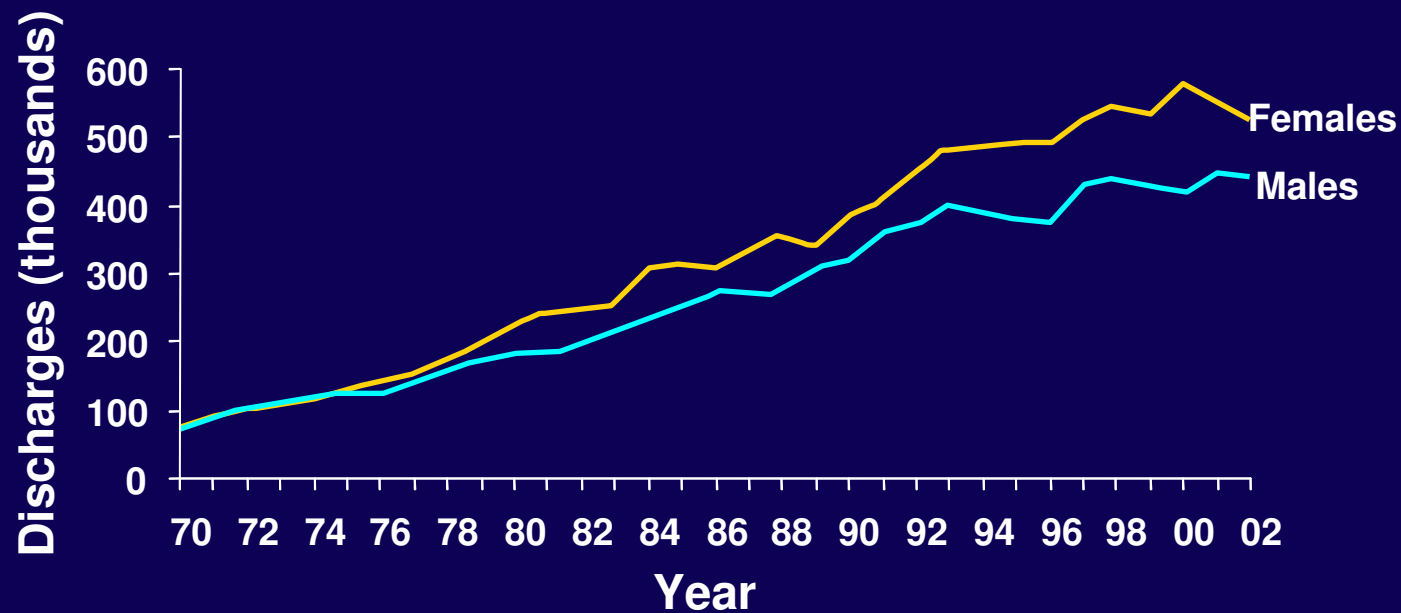
Baylor University Medical Center

Dallas, TX

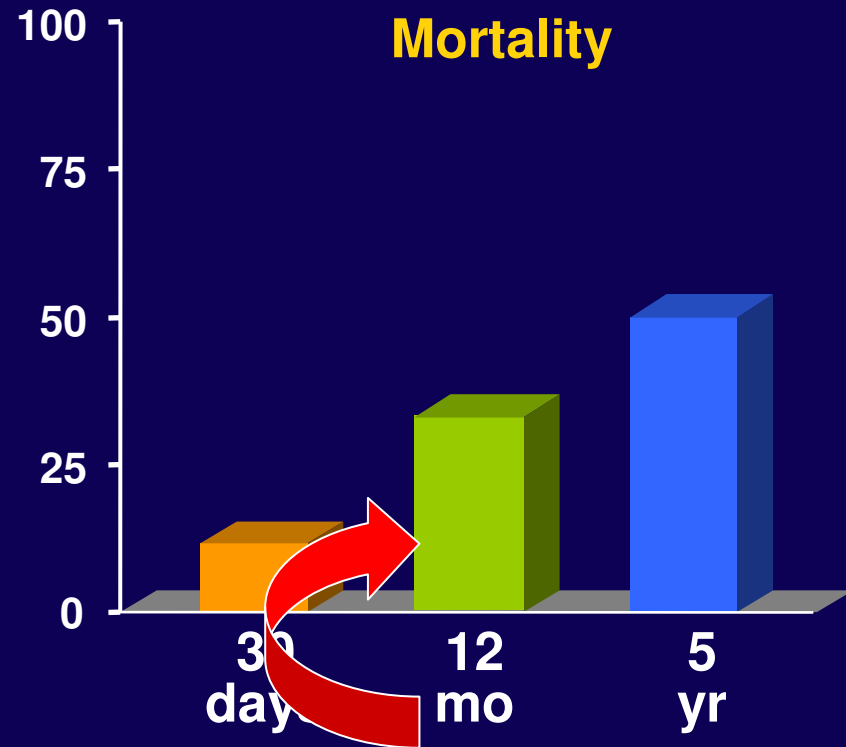
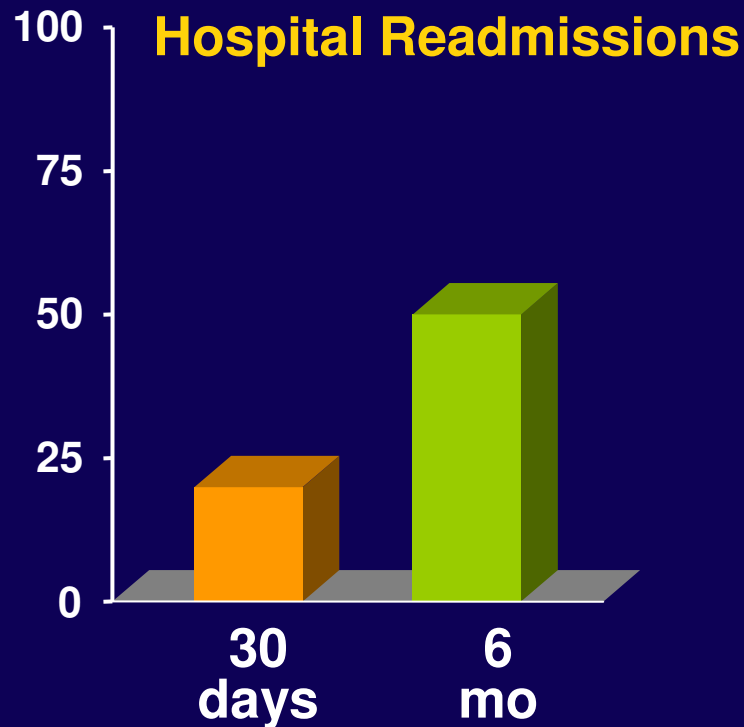
# The Problem of Heart Failure (HF)

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- Prevalence (2002): 4.9 million
- Incidence: 550,000
- Hospital discharges (2002): 970,000
- Understanding clinical characteristics is critical for developing effective therapies for these patients



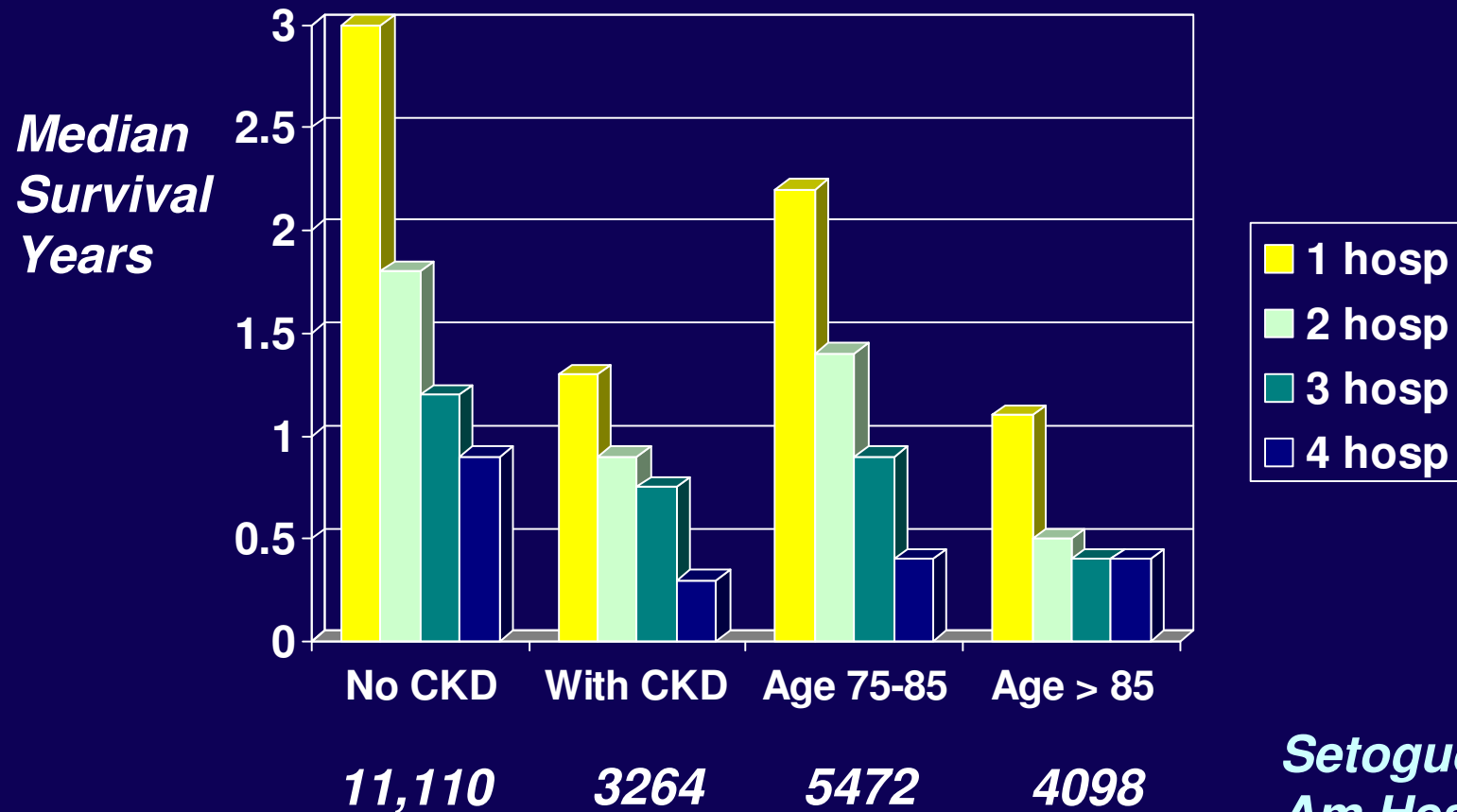
# Outcomes in Patients Hospitalized With HF



**Median hospital LOS: 6 days**

**Annual mortality rate-**  
**NYHA class III HF-**  
**12% [COPERNICUS DATA]**  
**NYHA class II HF-**  
**7% [SCD-HeFT DATA]**

# Survival After HF Hospitalizations



*Setoguchi et al  
Am Heart J 2007*

# National Trends in Outcomes Among Patients Hospitalized with HF

Year	N	Crude Mortality (%)		Adjusted Mortality (OR, 95% CI)	
		30-day	1-year	30-day	1-year
1992	483,560	11.0	32.5	NA	NA
1993	509,549	10.9	33.9	1.00 (referent)	1.00 (referent)
1994	509,245	10.6	31.7	0.99 (0.98-1.00)	0.91 (0.90-0.92)
1995	510,529	10.5	31.5	1.00 (0.98-1.01)	0.91 (0.90-0.92)
1996	505,661	10.3	31.4	0.99 (0.97-1.00)	0.91 (0.90-0.92)
1997	507,986	10.2	31.7	0.98 (0.97-0.99)	0.92 (0.92-0.93)
1998	436,257	10.2	31.8	0.99 (0.97-1.00)	0.93 (0.92-0.93)
1999	494,733	10.3	31.7	1.01 (1.00-1.02)	0.93 (0.92-0.94)

National sample of 3,957,520 Medicare beneficiaries  $\geq 65$  who were hospitalized with HF between 1992 and 1999

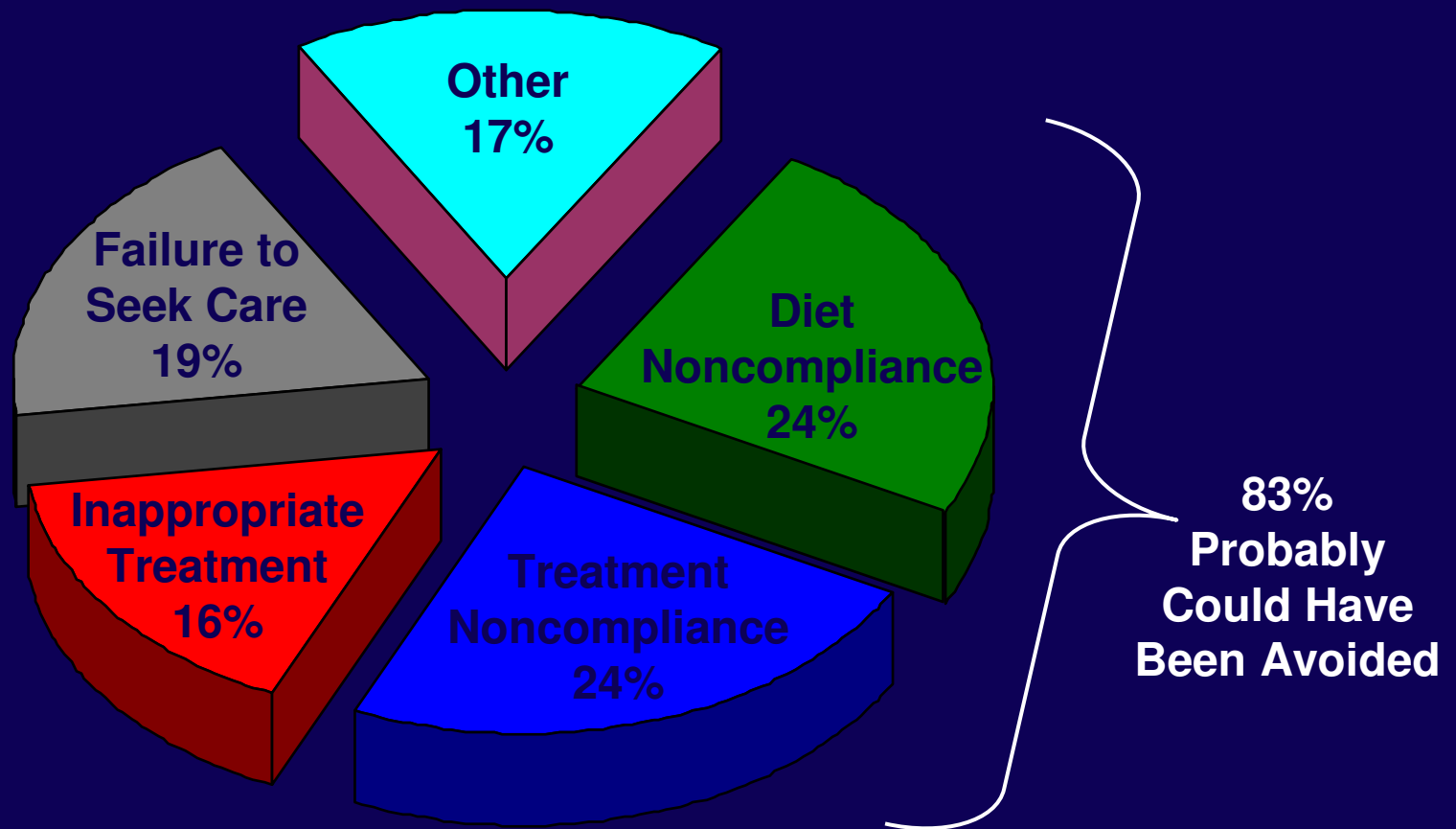
# Potential Strategies to Prevent /Reduce Hospitalization for Heart Failure

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- PRIMARY PREVENTION
  - Risk factor modification
  - Early diagnosis
  - **Patient education**
  - **Dietary and medication compliance**
- ACUTE TREATMENT
  - Alleviate symptoms
  - Avoid harm
  - Adhere to guidelines
- SECONDARY PREVENTION
  - Optimize evidence-based treatments
  - Incorporate disease management

# Causes of Hospital Readmission for Congestive Heart Failure

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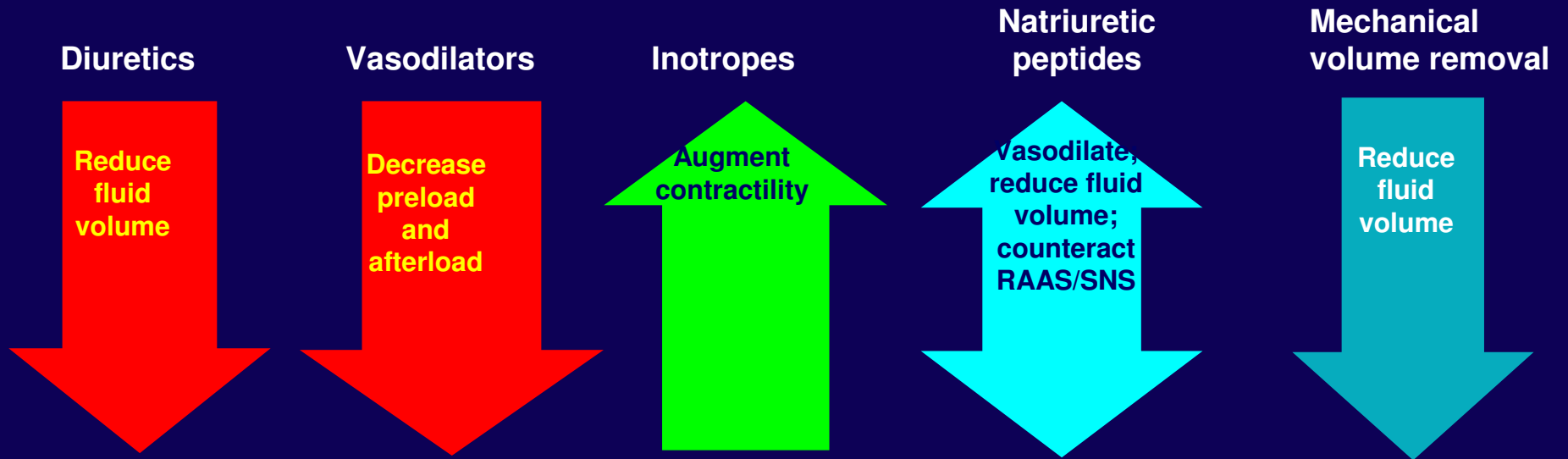
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# Management Options for patients hospitalized with Heart Failure

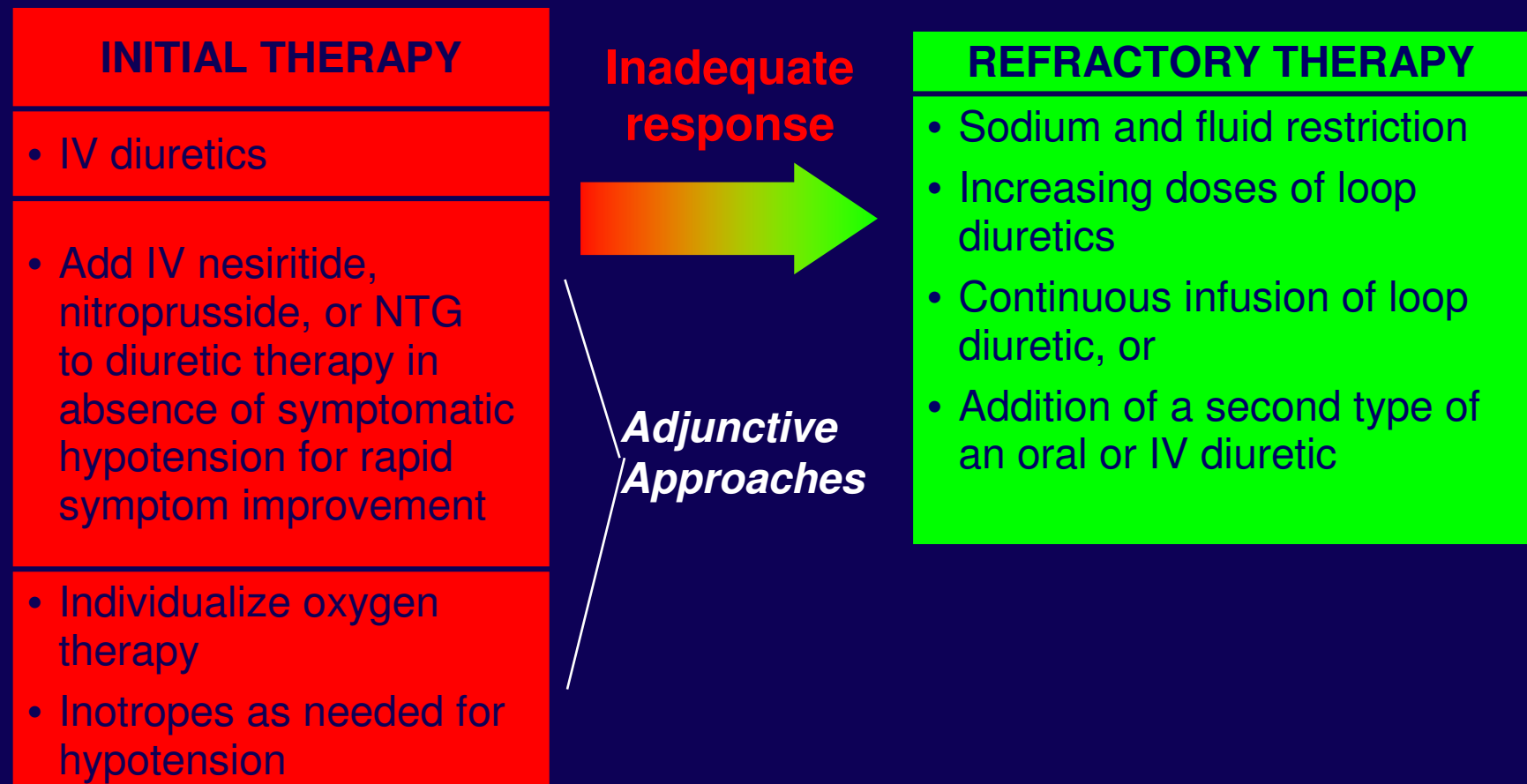
- Hemodynamic goals for achieving symptom relief and stabilization
  - Reduce right and left heart filling pressures
  - Reduce systemic vascular resistance
  - Increase cardiac output
- Treatment options



RAAS = renin-angiotensin-aldosterone system; SNS = sympathetic nervous system

# Treatment Algorithm for patients hospitalized with Heart Failure

## Patient is diagnosed with ADHF



ADHF = acute decompensated heart failure; IV = intravenous, NTG = nitroglycerine  
Heart Failure Society of America. *J Card Fail.* 2006;12(1):10-38.

# Clinical Effects of Therapies for ADHF

Therapy	Symptom Relief	Hospitalizations	Improves congestion	Effect on mortality	Worsens renal function
Diuretics	+	?	yes	?	poss
Ultrafiltration	poss	poss	yes	?	no?
Vasodilators	+	no	?	neutral	no
AVP antagonists	+	no	yes	neutral	no
Adenosine Antagonists	?	?	?	?	?
Inotropes	+?	No	No*	worrisome	poss
Natriuretic peptides	+	no	yes	?	poss

# Potential Strategies to Prevent hospitalization for Heart Failure

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- PRIMARY PREVENTION
  - Risk factor modification
  - Early diagnosis
- ACUTE TREATMENT
  - Alleviate symptoms
  - Avoid harm
  - Adhere to guidelines
- **SECONDARY PREVENTION**
  - **Optimize evidence-based treatments**
  - **Incorporate disease management**

## At Risk for Heart Failure

## Heart Failure

### STAGE A

At high risk for HF but without structural heart disease or symptoms of HF.

### STAGE B

Structural heart disease but without signs or symptoms of HF.

### STAGE C

Structural heart disease with prior or current symptoms of HF.

### STAGE D

Refractory HF requiring specialized interventions.

#### e.g. Patients with:

- hypertension
- atherosclerotic disease
- diabetes
- obesity
- metabolic syndrome or Patients
- using cardiotoxins
- with FHx CM

Structural heart disease

#### e.g. Patients with:

- previous MI
- LV remodeling including LVH and low EF
- Asympto-matic valvular disease

Development of symptoms of HF

#### e.g. Patients with:

- known structural heart disease and
- shortness of breath and fatigue, reduced exercise tolerance

Refractory symptoms of HF

#### e.g. Patients

who have marked symptoms at rest despite maximal medical therapy (e.g., those who are recurrently hospitalized or cannot be safely discharged from the hospital without specialized interventions)

#### Therapy Goals

- Treat hypertension
- Encourage smoking cessation
- Treat lipid disorders
- Encourage regular exercise
- Discourage alcohol intake, illicit drug use
- Control metabolic syndrome

#### Drugs

- ACEI or ARB in appropriate patients for vascular disease or diabetes

#### Therapy Goals

- All measures under Stage A Drugs
- ACEI or ARB in appropriate patients
- Beta-blockers in appropriate patients

#### Therapy Goals

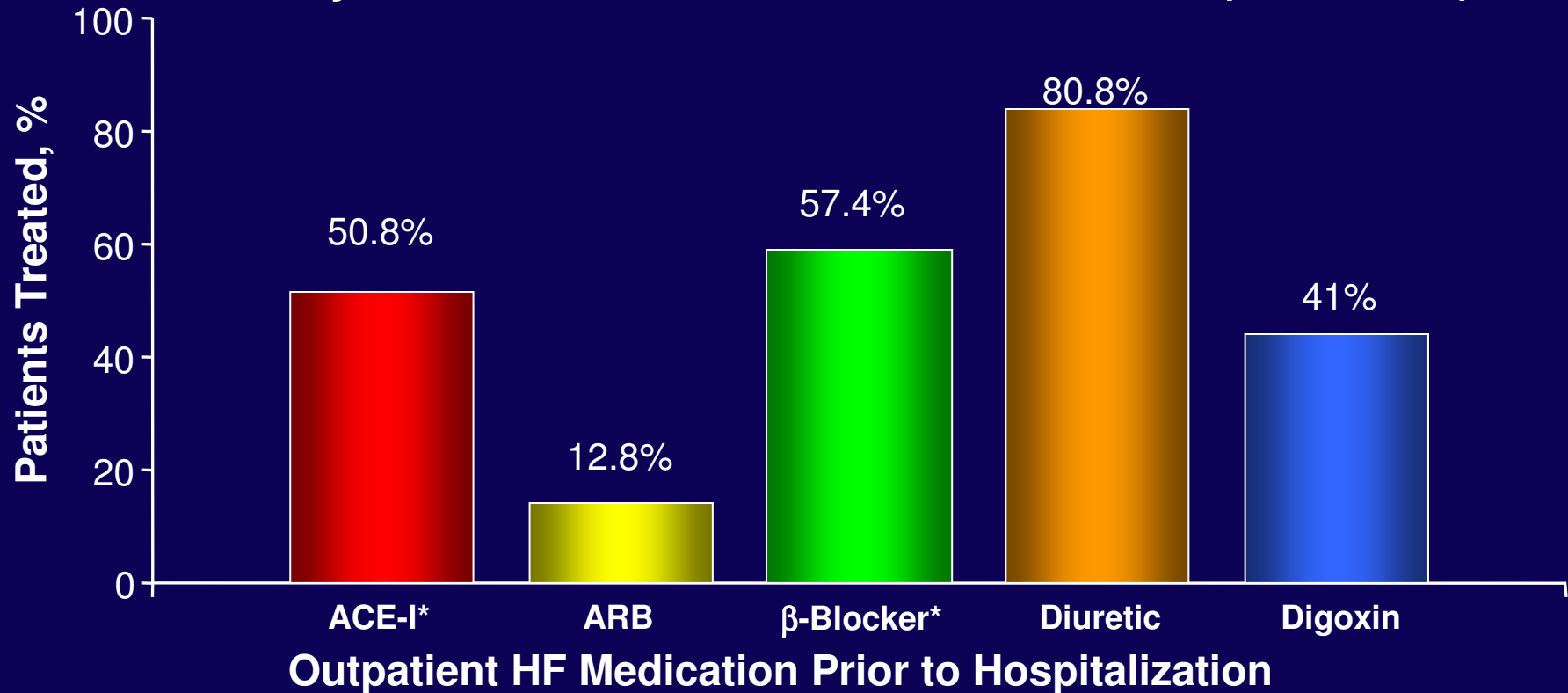
- All measures under Stages A and B
- Dietary salt restriction
- Drugs For Routine Use**
- Diuretics for fluid retention
- ACEI
- Beta-blockers
- Drugs in Selected Patients**
- Aldosterone antagonist
- ARBs
- Digitalis
- Hydralazine/nitrates
- Devices In Selected Patients**
- Biventricular pacing
- Implantable defibrillators

#### Therapy Goals

- Appropriate measures under Stages A, B, C
- Decision re: appropriate level of care
- Options**
- end –of life care
- Extraordinary measures
  - heart transplant
  - chronic inotropes
  - permanent mechanical support
  - experimental surgery or drugs

# Utilization of Evidence-Based Therapies in Heart Failure; Identifying the Quality Gap

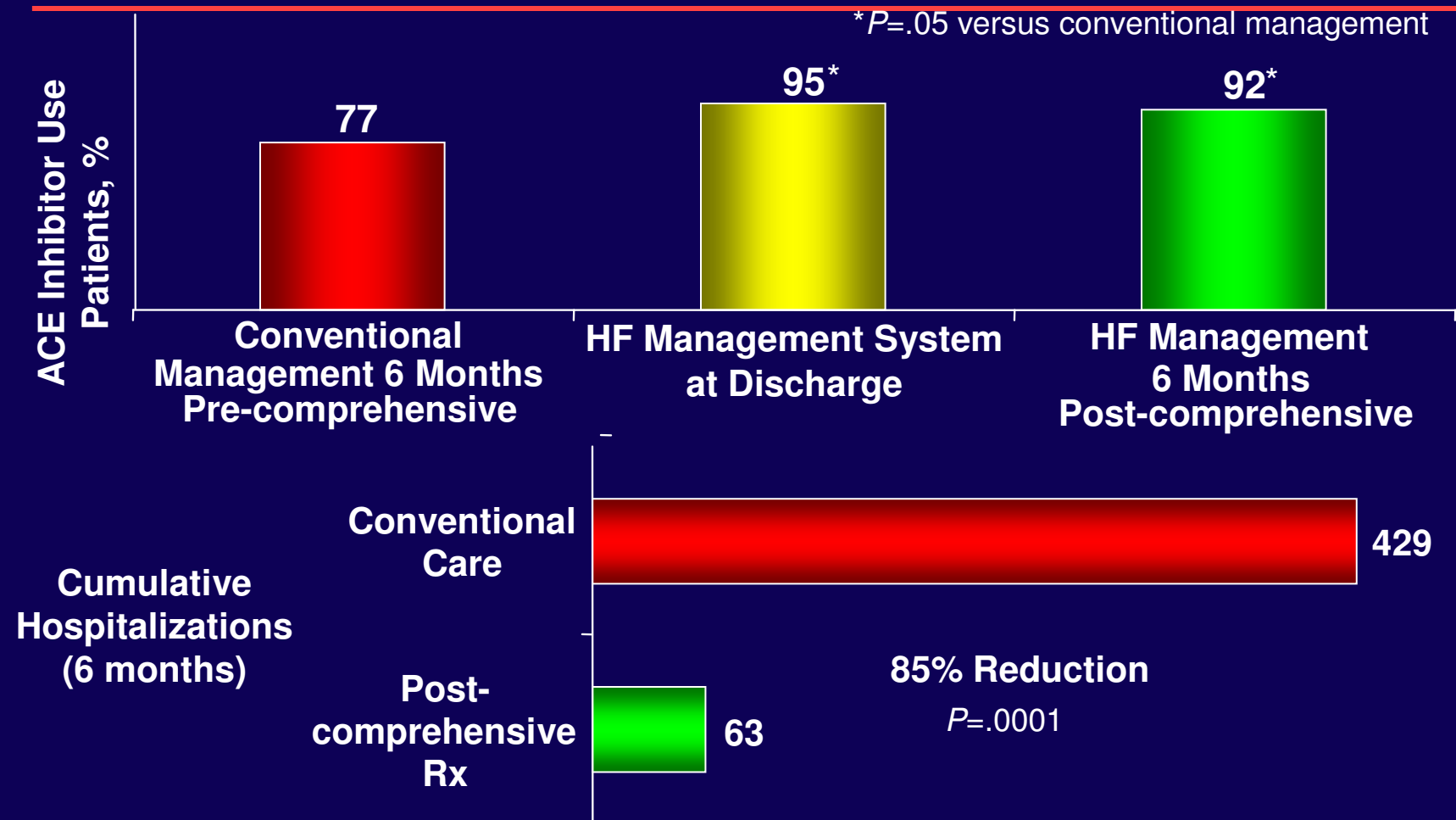
All Enrolled Discharges from October 2001 to January 2004  
with History of HF & LVEF Documented and  $< 0.40$  (n = 34,498)



\*Excludes patients with documented contraindications

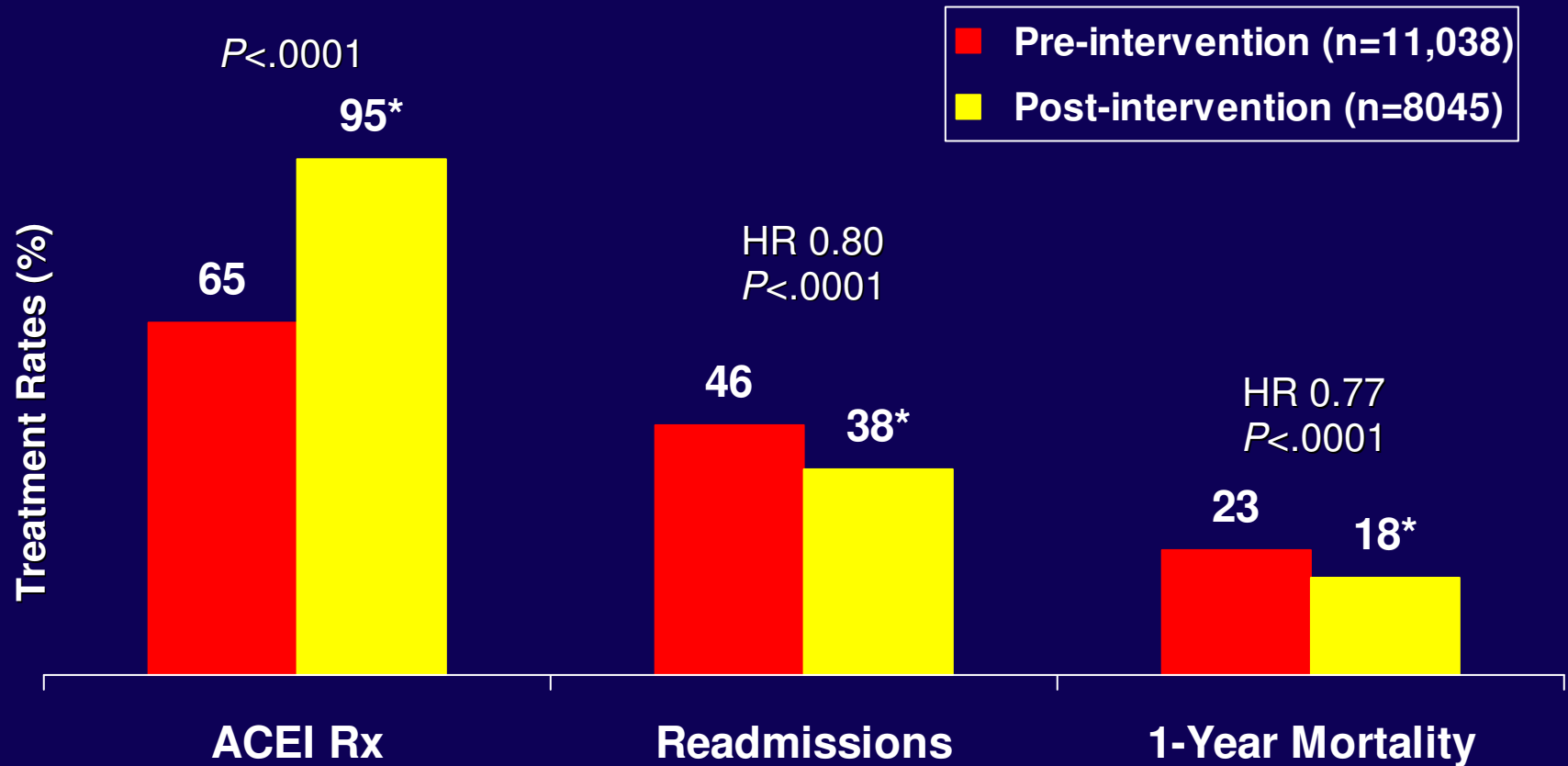
Adhere Registry "Insights from the Adhere Registry: Data from over 100,000 Patient cases".  
[http://www.adhereregistry.com/ADHERE\\_100k.pdf](http://www.adhereregistry.com/ADHERE_100k.pdf).

# HF Disease Management Program: Impact on Hospitalizations



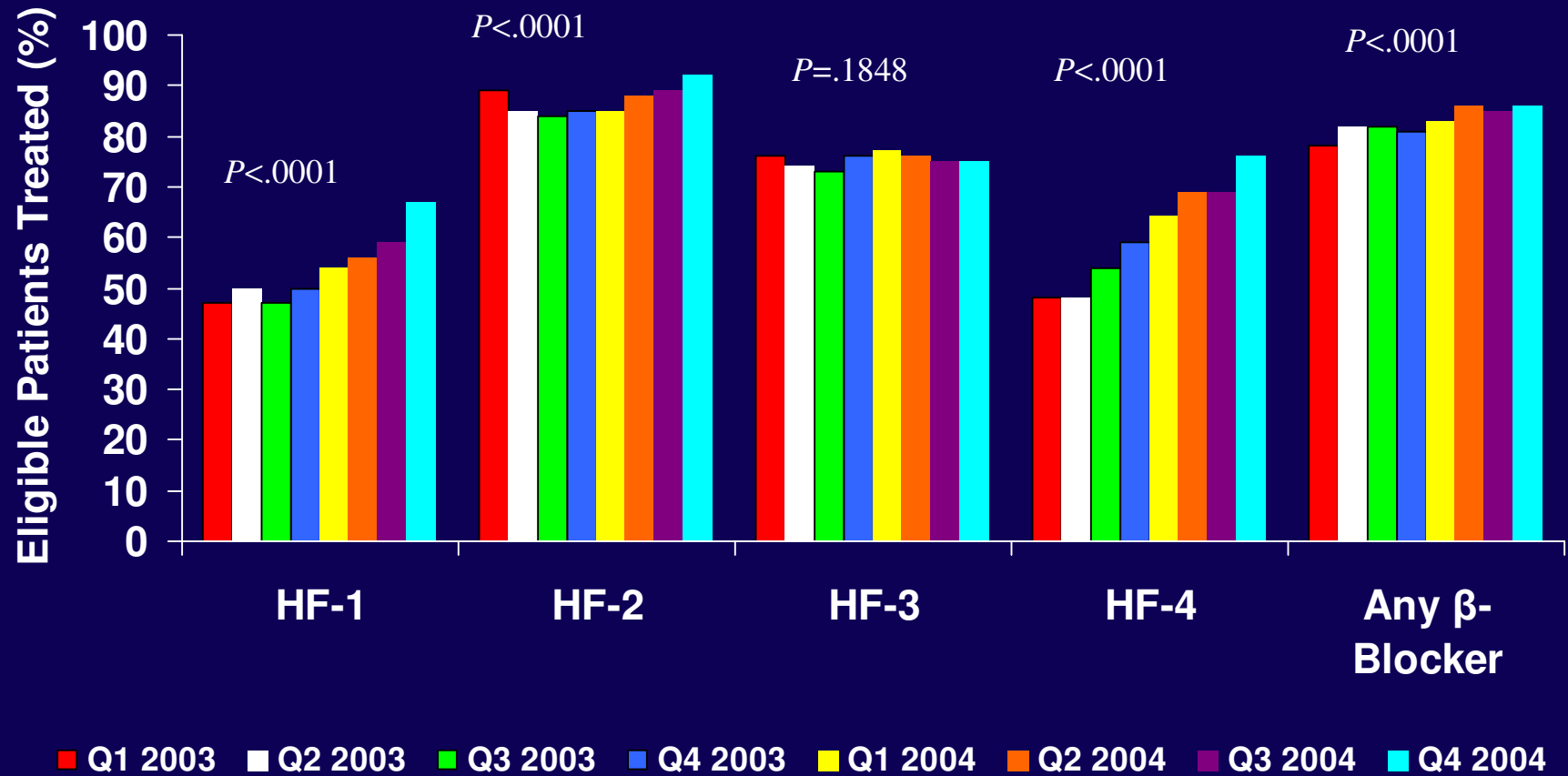
214 Patients, 6 months conventional treatment pre- versus 6 months post-comprehensive management.  
Total medical costs: Pre (\$18 808) versus Post (\$9555),  $P<.0001$ .

# Hospital-based System in Heart Failure Reduces Readmissions and Mortality

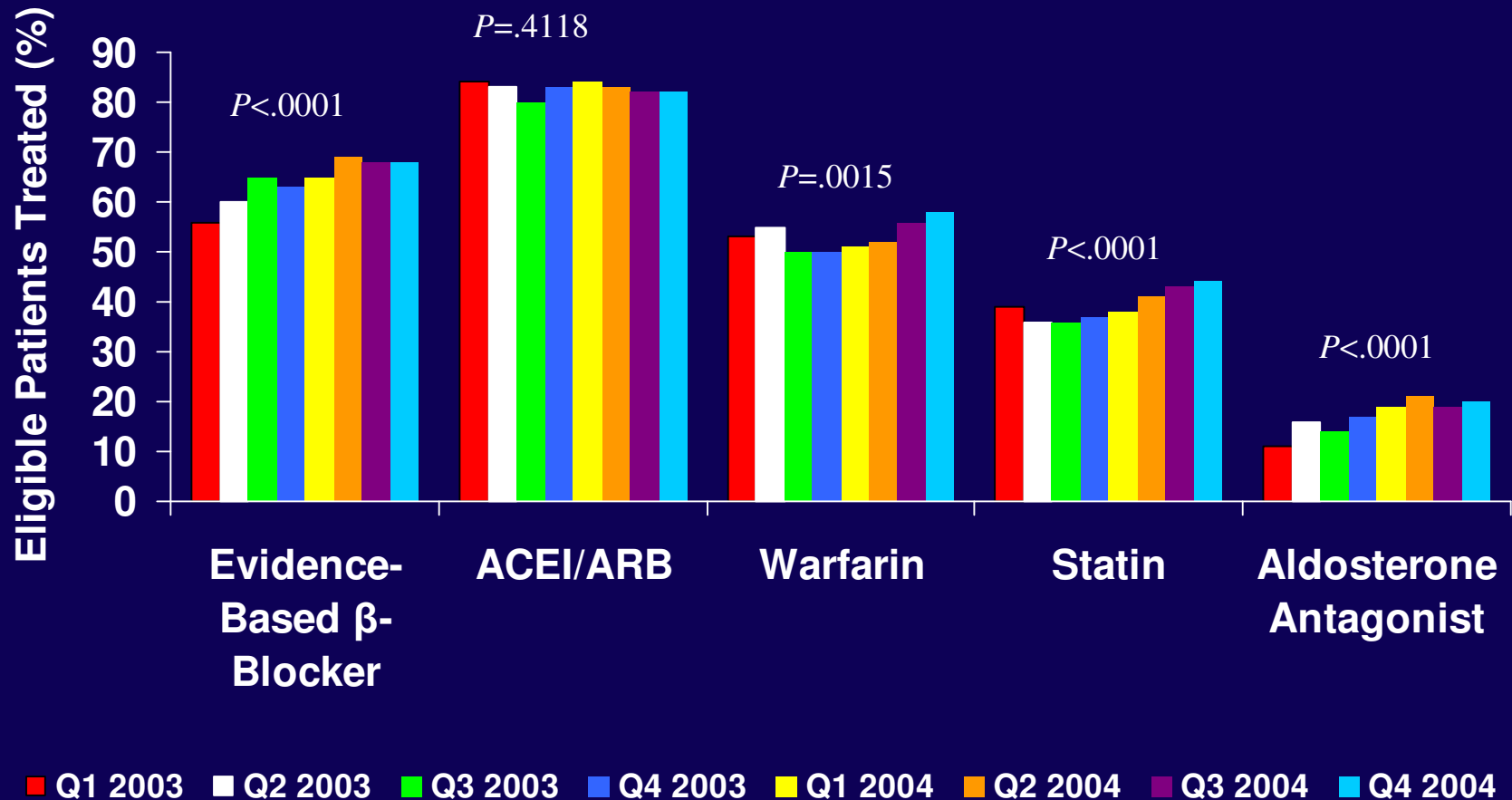


Intermountain Health Care: 10 hospitals 1/1996–12/1998 (n=11,038) to 1/1999–3/2000 (n=8045)  
Pearson RR et al. *Circulation*. 2001;104:II-838.

# Changes in Performance and Quality Measures Over Time- OPTIMIZE HF



# Changes in Quality Measures Over Time in OPTIMIZE-HF



# Unadjusted and Risk-Adjusted Process-Outcome Links for ACC/AHA Hospital Performance Measures for Heart Failure

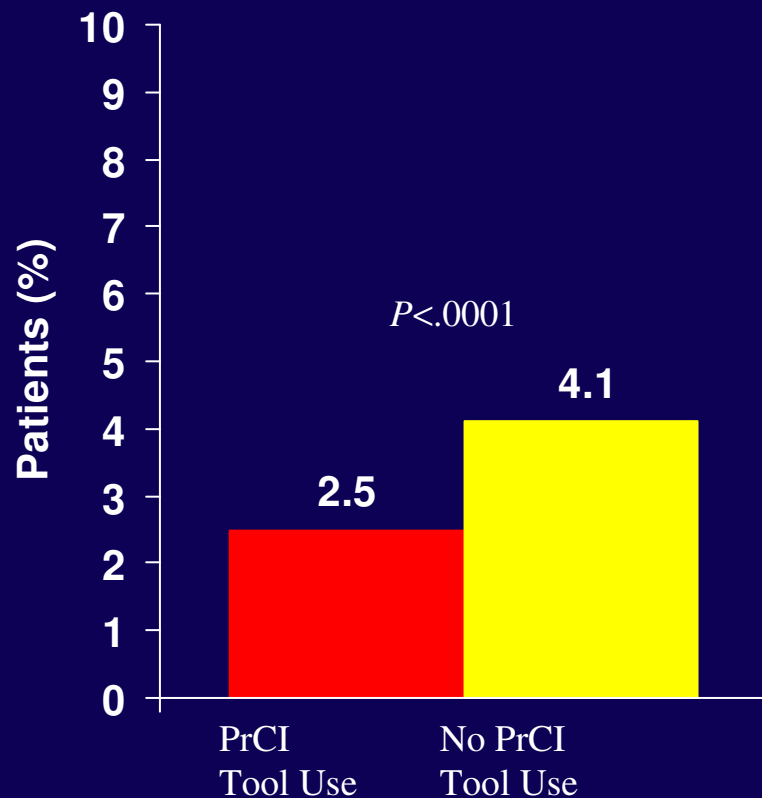
**Table 4.** Unadjusted and Risk-Adjusted Process-Outcome Links for ACC/AHA Hospital Performance Measures for Heart Failure

Performance Measures	Predictive of Mortality at 60- to 90-d Follow-up		Predictive of Mortality or Rehospitalization at 60- to 90-d Follow-up	
	Hazard Ratio (95% CI)	P Value	Odds Ratio (95% CI)	P Value
<b>Unadjusted</b>				
Discharge instructions	0.86 (0.66-1.13)	.29	0.97 (0.85-1.12)	.69
Evaluation of LV systolic function	0.75 (0.55-1.03)	.08	0.86 (0.71-1.04)	.11
ACE inhibitor/ARB for LV systolic dysfunction →	0.48 (0.31-0.73)	<.001	0.55 (0.43-0.70)	<.001
Smoking cessation counseling	0.54 (0.30-0.96)	.04	0.67 (0.49-0.92)	.01
Warfarin for atrial fibrillation	0.81 (0.58-1.13)	.22	0.87 (0.71-1.07)	.18
β-Blocker at discharge →	0.42 (0.27-0.63)	<.001	0.69 (0.52-0.91)	.008
<b>Risk-adjusted</b>				
Discharge instructions	0.90 (0.66-1.23)	.51	1.07 (0.89-1.28)	.46
Evaluation of LV systolic function	0.91 (0.65-1.28)	.59	1.06 (0.81-1.38)	.67
ACE inhibitor/ARB for LV systolic dysfunction →	0.61 (0.35-1.06)	.08	0.51 (0.34-0.78)	.002
Smoking cessation counseling	0.75 (0.41-1.37)	.35	0.74 (0.50-1.09)	.12
Warfarin for atrial fibrillation	0.74 (0.50-1.09)	.13	0.83 (0.64-1.09)	.19
β-Blocker at discharge →	0.48 (0.30-0.79)	.004	0.73 (0.55-0.96)	.02

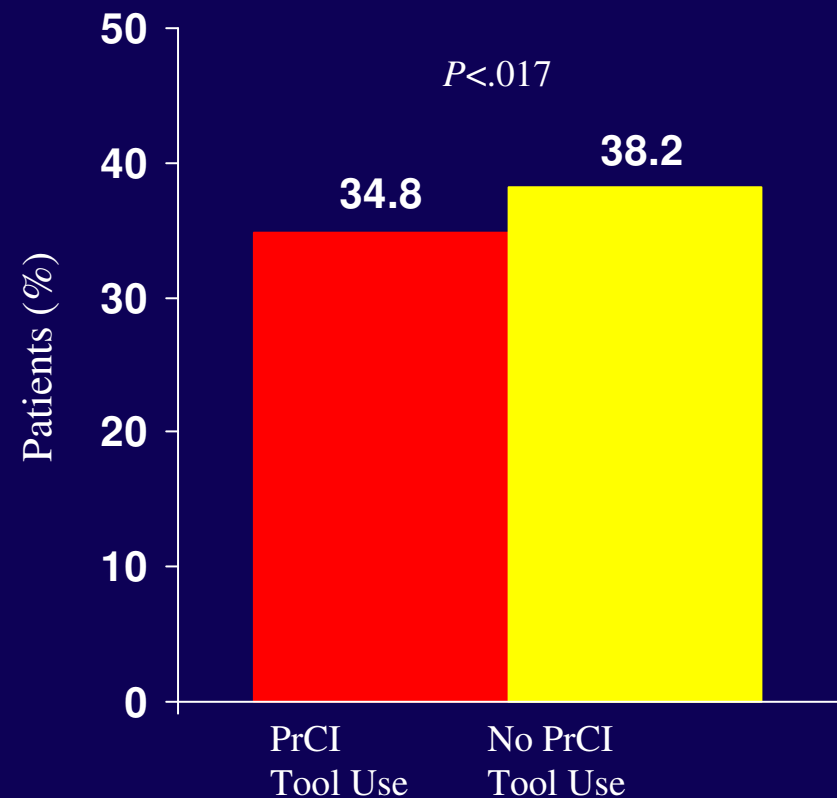
Abbreviations: ACC/AHA, American College of Cardiology/American Heart Association; ACE, angiotensin-converting enzyme; ARB, angiotensin receptor blocker; CI, confidence interval; LV, left ventricular.

# In-Hospital and Follow-Up Outcomes by Process of Care Improvement Tool Use

### In-Hospital Mortality



### 60- to 90-Day Mortality and Rehospitalization



PrCI tool use (admission order set or discharge checklist) was reported during hospitalization in 45.3% of patients (n=22,017/48,612).

Fonarow GC, et al. *Arch Intern Med.* 2007;167:1493–1502.

# Randomized Trials of Disease Management Programs for Heart Failure

Sensitivity analysis	Mortality		All-cause readmission		HF-related readmission	
	OR	CI	OR	CI	OR	CI
Overall	0.80	0.69–0.93 •	0.76	0.69–0.94 •	0.58	0.50–0.67 •
High quality studies	0.70	0.53–0.91 •	0.75	0.63–0.80 •	0.58	0.45–0.75 •
Low quality studies	0.85	0.71–1.03	0.75	0.66–0.86	0.58	0.46–0.70
Multidisciplinary	0.58	0.44–0.75 •	0.58	0.47–0.71	0.51	0.39–0.66 •
Nurse	0.93	0.77–1.11 •	0.82	0.74–0.91	0.61	0.51–0.73
Short intervention (0–3 m)	0.88	0.66–1.16	0.61	0.51–0.74 •	0.61	0.46–0.82 •
Medium intervention (3–6 m)	0.84	0.63–1.12 •	1.05	0.88–1.26 •	0.68	0.53–0.86 •
Long intervention (> 6 m)	0.73	0.59–0.91	0.71	0.62–0.82	0.47	0.37–0.61

• P < 0.01

33 Randomized Trials, 5308 patients

Roccaforte EJHF 2005;7:113-1144.

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**Why follow the guidelines?**

**PUBLIC ACCESS TO QUALITY DATA  
IS HERE!!**

**CMS Publicly  
Reported Heart  
Failure (HF) 30-Day  
Mortality Measures for  
Hospitals**

## **30-Day Mortality for HF**

National Experience for **July 2005 – June 2006** Discharges

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### Heart Failure (HF)

- Data from **423,294 eligible HF discharges** (749,650 cases were considered) from **4,807 acute care and critical access hospitals** in 2005-06 are included in this report
- HF volume per facility ranged from 1 to 1,162 across 4,807 hospitals
- The **30-day crude national mortality rate for Medicare patients with HF was 11.1%**
- Nationally, **risk-standardized HF mortality rates for hospitals ranged from 6.7% to 17.3% with a median of 11.1%**
- Nationally, **38 hospitals performed better than U.S. national rate, 35 hospitals performed worse than U.S. national rate and 4,734 hospitals performed no different than U.S. national rate for HF admissions** in 2005-06.

# Quality Improvement as an adjunct to heart failure therapy

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- Life-saving drug and device therapies continue to be underutilized
- Recommendations for medication and device therapies are rapidly evolving
- Collaboration among physicians (PCP, Cardiologist, HF specialist, EP) can be challenging but is necessary
- New approaches for encouraging the use of life-saving therapies are needed

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# SUMMARY

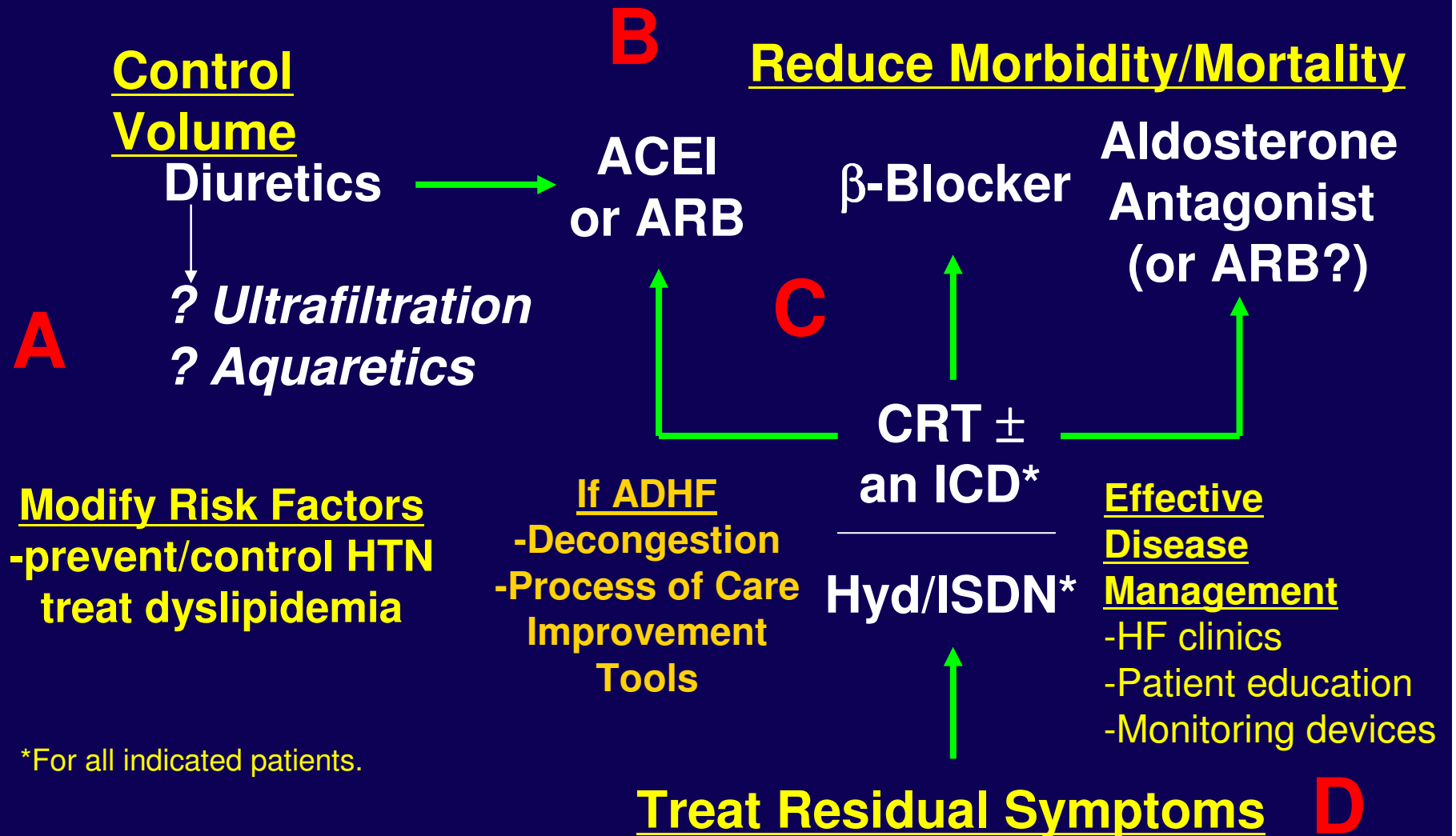
# Cumulative Impact of Heart Failure Therapies

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	Relative-Risk	2 Year Mortality
None	--	35%
ACE Inhibitor	↓ 23%	27%
Aldosterone Ant	↓ 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***

# Evidence-Based, Mechanism-Driven Treatment Across the Continuum of LVD and HF



\*For all indicated patients.

Digoxin, Transplant, Palliative Care

# Conclusions

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- A large treatment gap exists between guidelines and practice for heart failure and a large number of patients are having hospitalizations and fatal events that **can be prevented**
- Hospital-based management programs can significantly increase the utilization of evidence-based therapies
- Some outpatient-based HF disease management programs are highly effective, but the need for additional personnel and the requirement for significant resources has limited implementation; reimbursement for these programs remains an issue