Checklist for Treating Heart Failure

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Disclosure

- Novartis

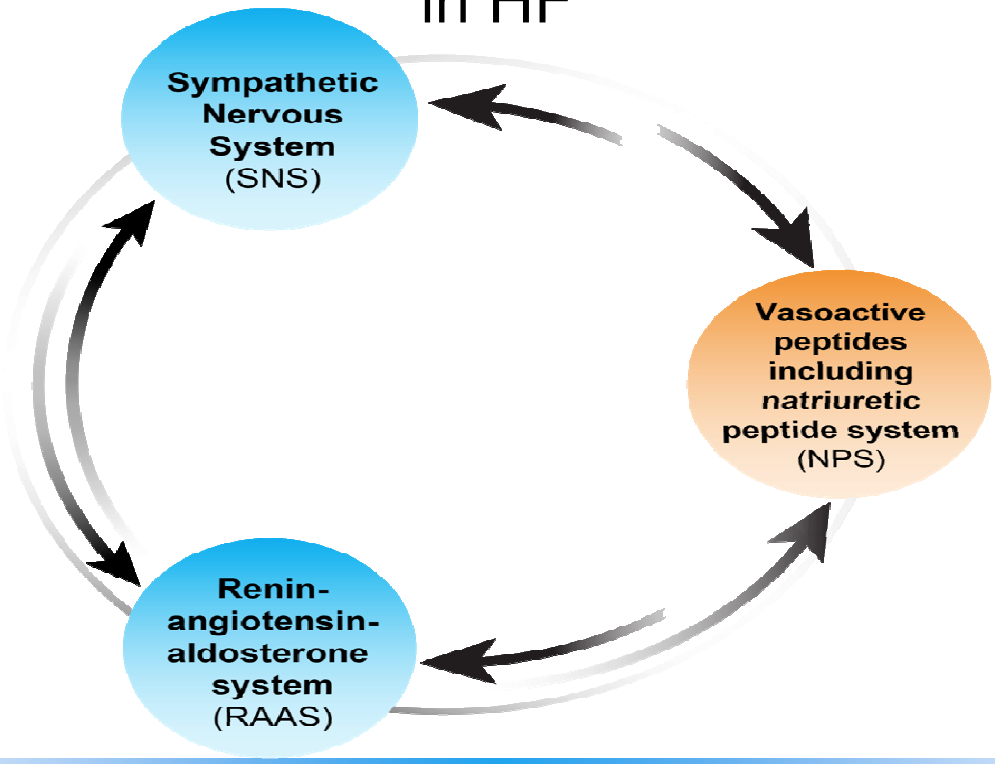
Heart Failure (HF)

- "…a complex clinical syndrome that arises secondary to abnormalities of cardiac structure and / or function (inherited or acquired) that impair the ability of the left ventricle to fill or eject blood" Otto M. Hess & John D. Carroll
- Systolic HF (HFrEF), approximately 50%.
- Diastolic HF (HFpEF)
- Asymptomatic HF (Asymptomatic LV dysfunction)

Heart Failure Epidemic

- Approximately 6.5 million Americans 20 years or older have HF.
- 1 in 8 deaths in the US is associated with HF.
- 20-45% of all individuals ages 45-95 will develop HF.
- About 960,000 new HF diagnoses are made each year, 1 person diagnosed every 2 minutes.
- Lifetime costs are approximately $110,000 direct costs.
- HF-related hospitalization costs a patient $23,000 annually.
- By 2030, we will have more than 8 million patients with HF.
- HF incidence in patients age $\geq$65 is 21 per 1000.

There Are Three Key Neurohormonal Systems Involved in HF



With long-term, chronic activation, the SNS and RAAS have a deleterious effect on the heart

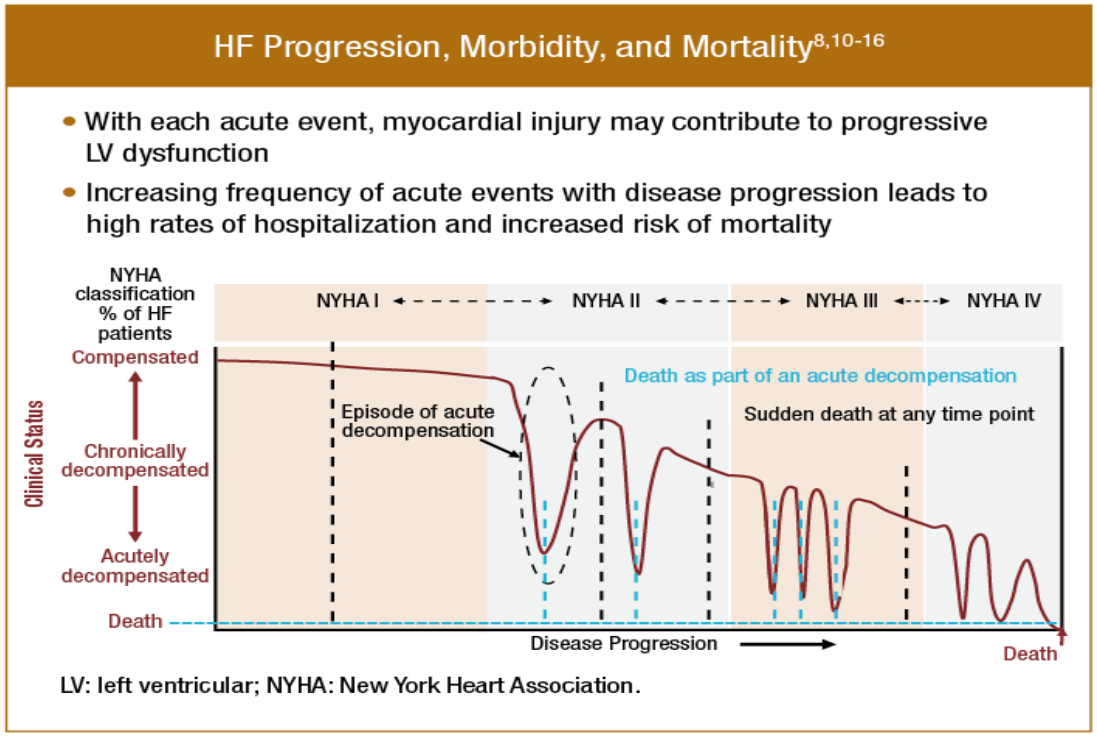
Hasenfuss G, Mann DL. Pathophysiology of heart failure. In: Mann DL, Zipes DP, Libby P, et al, eds. *Braunwald's Heart Disease*. 10th ed. Philadelphia, PA: Saunders; 2015.

Heart Failure (HF)

Classification	EF (%)	Description
I. HFrEF (systolic HF)	≤40	Efficacious therapies have been demonstrated in RCTs.
II. HFpEF (diastolic HF)	≥50	No efficacious therapies identified.
HFpEF, borderline	41-49	Intermediate group resembling HFpEF.
HFpEF, improved	>40	Previous HFrEF with improved EF, distinct from persistent HFpEF or HFrEF.

HF Progression, Morbidity, and Mortality

Figure 1.



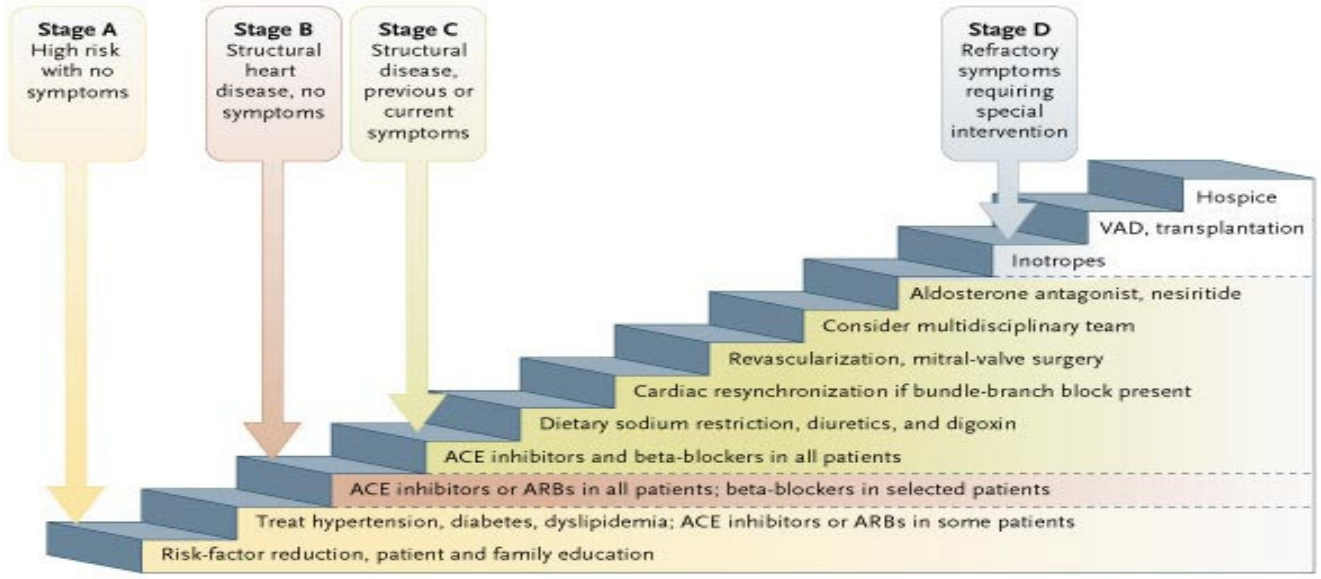
Georghiade et al. Am J Cardiiol 2005

Classification of HF: ACC/AHA HF Stage and NYHA Functional Class

ACC/AHA HF Stage	NYHA Functional Class
A At high risk for heart failure but without structural heart disease or symptoms of heart failure (eg, patients with hypertension or coronary artery disease)	None
B Structural heart disease but without symptoms of heart failure	I Asymptomatic
C Structural heart disease with prior or current symptoms of heart failure	II Symptomatic with moderate exertion
	III Symptomatic with minimal exertion
D Refractory heart failure requiring specialized interventions	IV Symptomatic at rest

[1]Hunt SA et al. *J Am Coll Cardiol.* 2001;38:2101–2113.
[2]New York Heart Association/Little Brown and Company, 1964.
Adapted from: Farrell MH et al. *JAMA.* 2002;287:890–897.

Stages of Heart Failure and Treatment Options for Systolic Heart Failure



Jessup, M. et al. N Engl J Med 2003;348:2007-2018

Checklist

- A list of things to be checked or done.
- A list that includes many or all things of a certain kind.
- A record of a series of items usually arranged according to some system.

Medication Checklist for HFrEF

- Beta Blocker (Class I)
- Angiotensin Converting Enzyme Inhibitor (ACE I) / Angiotensin Receptor Blocker (ARB) (Class I)
- Diuretics (Loop Diuretics) (Class I for fluid overload)
- Digoxin (Class IIa)
- Aldosterone Antagonist (Class I)
- Hydralazine / Nitrates (Class I for African American patients on GDEM)
- DOACs (direct oral anticoagulant) / Warfarin
- Aspirin
- Lipid lowering agents

Beta Blockers

Medication	Start Dose	# of Doses	Target Dose	Mean Dose
Bisoprolol	1.25 mg	1	10 mg	6.2 mg
Carvedilol	3.125 mg	2	50-100 mg	37 mg
Metoprolol Succinate	12.5 or 25 mg	1	200 mg	159 mg
Nebivolol	1.25 mg	1	10 mg	7.7 mg

McMurray, J. NEJM, 2010.

ACE Inhibitors

Medication	Start Dose	# of Doses	Target Dose	Mean Dose
Captopril	6.25 mg	3	150 mg	121 mg
Enalapril	2.5 mg	2	20-40 mg	16.6 mg
Lisinopril	2.5-5.0 mg	1	20-35 mg	NA
Ramipril	2.5 mg	1 or 2	10 mg	8.7 mg
Trandopril	1.0 mg	1	4 mg	3 mg

McMurray, J. NEJM, 2010

Angiotensin-Receptor Blockers

Medication	Start Dose	# of Doses	Target Dose	Mean Dose
Candesartan	4 mg	1	32 mg	24 mg
Valsartan	40 mg	2	320 mg	254 mg
Losartan	50 mg	1	150 mg	129 mg

McMurray, J. NEJM, 2010.

Aldosterone Blockers

Medication	Start Dose	# of Doses	Target Dose	Mean Dose
Eplerenone	25 mg	1	50 mg	43 mg
Spironolactone	25 mg	1	25-50 mg	26 mg

McMurray, J. NEJM, 2010.

Hydralazine-Isosorbide Dinitrate

Medication	Start Dose	# of Doses	Target Dose	Mean Dose
Hydralazine	37.5 mg	3	225 mg	143 mg
Isosorbide Dinitrate	20 mg	3	120 mg	60 mg

McMurray, J. NEJM, 2010.

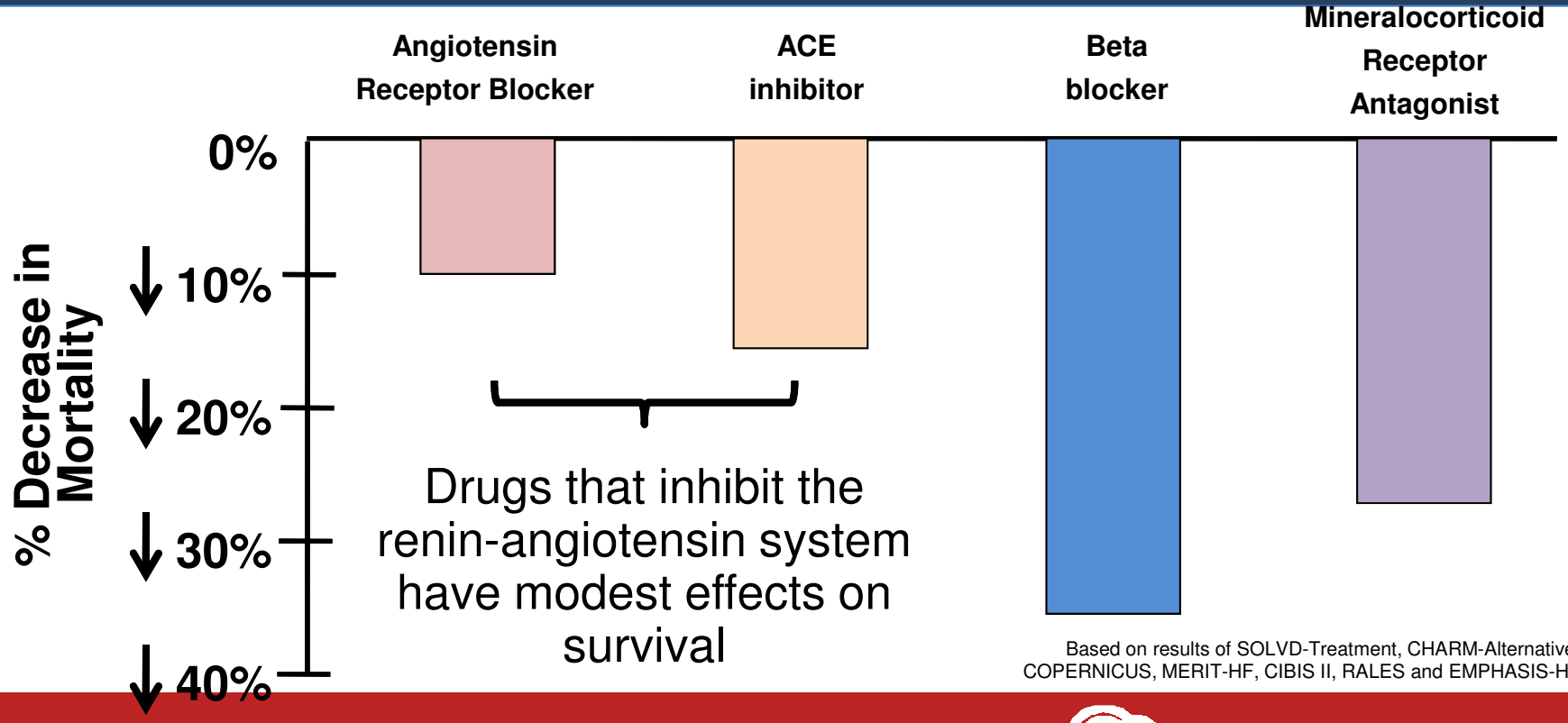
Angiotensin Receptor Neprilysin Inhibitor (ARNI)

- ARB combined with neprilysin inhibitor
- Sacubitril / Valsartan (Entresto)
- Reduced composite endpoint of CV death or HF hospitalization by 20%.
- Similar benefit seen in both death and HF hospitalization.
- Class I B-R indication with GDEM (guideline-directed evaluation and manangement) in treatment of Class II or III HFrEF.
- Class I B-R indication to replace ACE inhibitor or ARB in treatment of Class II or III HFrEF.

Ivabradine (Corlanor)

- Hyperpolarization-activated cyclic nucleotide-gated channel blocker with selective inhibition of the sodium and potassium channel that carries the I_f (inward flow) current of the SA node providing heart rate reduction.
- Class II B-R indication with GDEM in treatment of Class II-IV HFrEF (EF$\leq$35%) in sinus rhythm with resting heart rate $\geq$70 bpm on maximally tolerated BB or contraindication to BB.
- Reducing the composite endpoint of CV death or hospitalization by 18%, largely driven by the reduction in HF hospitalization.
- No statistically significant benefit on CV death.

Drugs That Reduce Mortality in Heart Failure With Reduced Ejection Fraction



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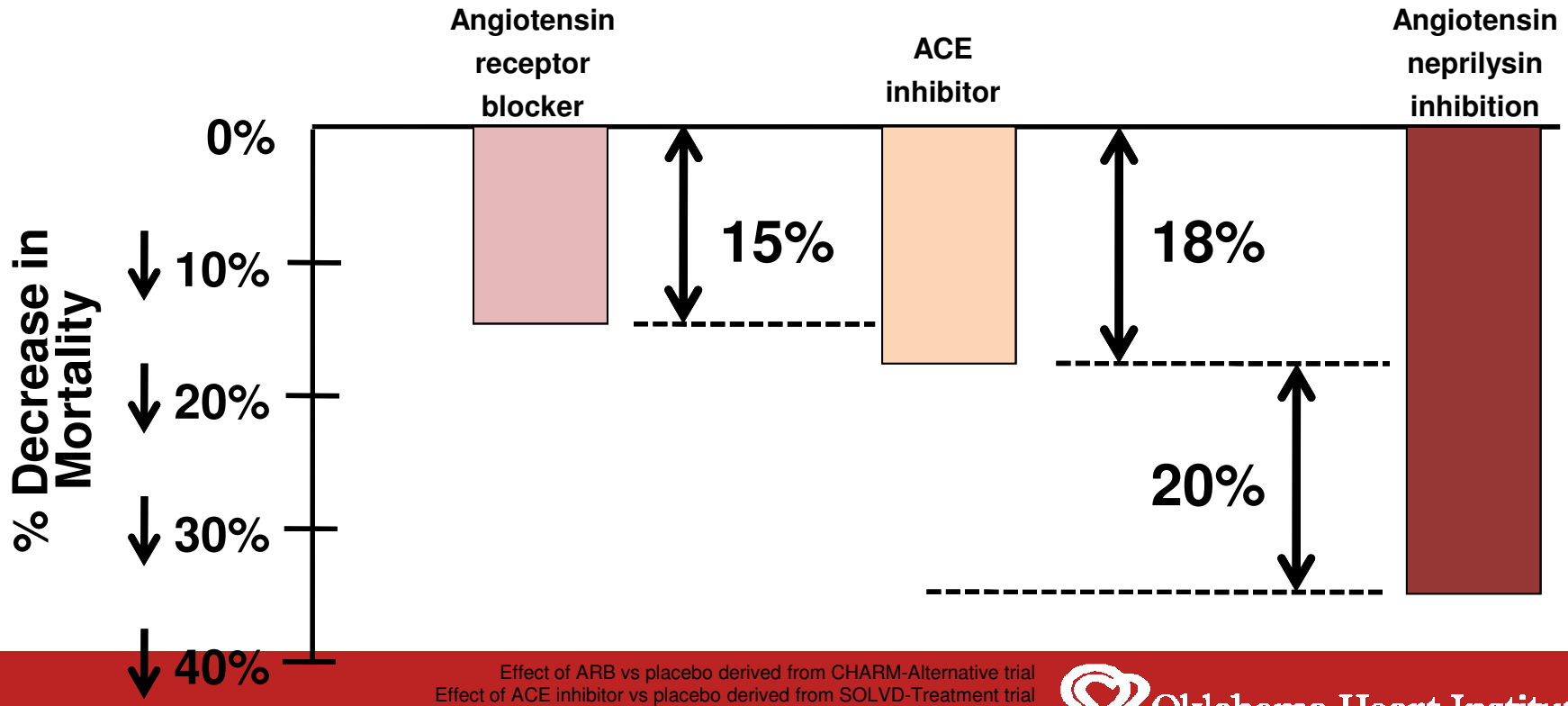
Angiotensin Neprilysin Inhibition Doubles Effect on Cardiovascular Death of Current Inhibitors of the Renin-Angiotensin System



Effect of ARB vs placebo derived from CHARM-Alternative trial
Effect of ACE inhibitor vs placebo derived from SOLVD-Treatment trial
Effect of LCZ696 vs ACE inhibitor derived from PARADIGM-HF trial

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Intervention / Counseling Checklist

- Risk factor modification education
- Compliance / adherence education
- HF monitoring (sodium and fluid restriction, daily weights, activity)
- Blood pressure control
- Smoking cessation counseling
- Monitoring blood sugars
- Dietician / nutritional counseling
- Cardiac rehab enrollment (HFrEF)

Followup Checklist

- Cardiologist/HF Midlevel/Nurses (HF Exacerbation Specialists)
- Primary Care
- Cardiac Rehabilitation
- Anticoagulation
- Home Healthcare
- Electrophysiology (Rhythm control, Device Therapy)
- Advanced HF Cardiologist

Checklist for HFpEF

- Diuretics and sodium restriction for volume control.
- Treatment for cardiovascular and noncardiovascular coexisting conditions.
  - Hypertension
  - CAD
  - Obesity / Hypoventilation Syndrome
  - Atrial and ventricular dysrhythmias
- Aerobic exercise to increase exercise tolerance.
- Disease management (self care) programs for patients with refractory symptoms or frequent hospitalizations.

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- Risk factor modification education
- Compliance / adherence education
- HF monitoring (sodium and fluid restriction, daily weights, activity)
- Blood pressure control
- Smoking cessation counseling
- Monitoring blood sugars
- Dietician / nutritional counseling
- Cardiac rehab enrollment (not approved as is HFrEF)

Followup Checklist

- Cardiologist/HF Midlevel/Nurses (HF Exacerbation Specialists)
- Primary Care
- Cardiac Rehabilitation
- Anticoagulation
- Home Healthcare
- Electrophysiology (Rhythm Control)
- Advanced HF Cardiologist

Conclusions

- Lower the likelihood of HF patient readmission.
- Improve quality of care.
- More likely to be on correct medications.
- More likely to be on appropriate drug doses.
- Reduction of readmission rate could translate into Medicare dollars saved.
- Provide consistency in care given to HF patients.