Heart Failure Management in 2019

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Disclosures

Speakers Bureau: Novartis

Research: Abbott

None of my discussion will be off label.
A 54-year-old post menopausal woman presents to her PCP for a routine general medical exam. She denies any lifestyle restrictions. Her provider heard a systolic murmur. The cardiac exam was otherwise normal. Her primary care provider requests an echocardiogram which demonstrates an LVEF of 32% with global hypokinesis, moderate LV enlargement, and trivial aortic stenosis but no other significant valve disease. Which of the following is the most appropriate medical therapy?

a) Beta blocker and sacubitril / valsartan  
b) ACE inhibitor and statin  
c) ACE inhibitor and beta blocker  
d) ACE inhibitor  
e) ACE inhibitor, beta blocker, and aldosterone antagonist
A 48-year-old African-American man with known HFrEF (LVEF = 28%) presents with exertional dyspnea climbing a flight of stairs and mild orthopnea. His medical therapy includes metoprolol tartrate 50 mg twice daily, lisinopril 20 mg daily, and Lasix 40 mg daily. BP is 122/76 and HR is 76. He is euvolemic on exam. Creatinine is 1.0 and potassium is 4.4.

Which of the following is the most appropriate change to his medical therapy?

a) Start sacubitril / valsartan
b) Start hydralazine and nitrates
c) Stop metoprolol tartrate and transition to carvedilol
d) Start spironolactone
e) Increase furosemide
• 56 year old man with history of MI presents with progressively increasing dyspnea and lower extremity edema

• ICD-CRT was implanted two years prior to this admission

• His outpatient regimen consists of Lisinopril 5 mg twice daily, carvedilol 3.125 mg twice daily, simvastatin 20 mg daily, aspirin 81 mg daily, spironolactone 25 mg daily and furosemide 80 mg daily
56-Year-Old Male

- On examination he is afebrile, heart rate is 62/min, blood pressure 86/60 mm Hg, JVP is significantly elevated with prominent v waves, lungs are clear, 3/6 pansystolic murmur over the precordium, S3 is present, 3+ pitting edema and cool extremities

- Laboratory tests reveal a hemoglobin of 8 g/dl, sodium 126 mmol/L, potassium 4.5 mmol/L, BUN 42 mg/dl and creatinine 1.9 mg/dl

- Electrocardiogram shows a 100% A-V paced rhythm

- He was admitted to the hospital for further management
56 year old man
All the statements are true regarding this patient’s management except

1. Decrease carvedilol until hemodynamically stable
2. Right heart catheterization may be indicated
3. Adding metolazone 5 mg orally daily may improve symptoms
4. Starting IV low dose dopamine may improve renal blood flow
5. IV furosemide as a continuous infusion is superior in diuretic efficacy to 12 hourly bolus dosing
Objectives

• Describe the evaluation of patients presenting with stable heart failure in the present.

• Use recent guideline directed medical therapy in patients with stable heart failure with reduced EF

• Develop appropriate management strategies for the patient with stable heart failure with preserved EF

• Recognize the patient with ADHF

• Use recent guidelines to select appropriate medical therapies for patients with ADHF
Framingham Criteria for Clinical Diagnosis of Congestive Heart Failure

• Major Criteria
  • PND
  • Orthopnea
  • Elevated JVP
  • Rales
  • S3
  • CXR cardiomegaly
  • CXR pulm edema

• Minor Criteria
  • Peripheral edema
  • Night cough
  • DOE
  • Hepatomegaly
  • Pleural effusion
  • HR >120/min
  • Wgt loss ≥4.5 kg in 5 days with diuretic

Validated CHF if 2 major or 1 major and 2 minor are present concurrently
ACC/AHA Stages of Heart Failure

- **At Risk**
  - Stage A: At high risk for HF but without structural heart disease
  - Stage B: Structural heart disease but without signs or symptoms of HF

- **Symptomatic Heart Failure**
  - Stage C: Structural heart disease with current or prior signs or symptoms of HF
  - Stage D: Refractory HF

*Yancy et al: J Am Coll Cardiol, 2013*
### ACCF/AHA Stages of HF and NYHA Functional Classification

<table>
<thead>
<tr>
<th>ACCF/AHA stages of HF</th>
<th>NYHA functional classification</th>
</tr>
</thead>
<tbody>
<tr>
<td>A  At high risk for HF but without structural heart disease or symptoms of HF</td>
<td>None</td>
</tr>
<tr>
<td>B  Structural heart disease but without signs or symptoms of HF</td>
<td>I  No limitation of physical activity</td>
</tr>
<tr>
<td>C  Structural heart disease with prior or current symptoms of HF</td>
<td>I  No limitation of physical activity</td>
</tr>
<tr>
<td></td>
<td>II  Slight limitation of physical activity</td>
</tr>
<tr>
<td></td>
<td>III Marked limitation of physical activity</td>
</tr>
<tr>
<td></td>
<td>IV  Unable to carry on physical activity without symptoms of HF, or symptoms of HF at rest</td>
</tr>
<tr>
<td>D  Refractory HF requiring specialized interventions</td>
<td>IV  Unable to carry on physical activity without symptoms of HF, or symptoms of HF at rest</td>
</tr>
</tbody>
</table>
Goals of the Initial Evaluation

Etiology

Common Causes
• Coronary artery disease
• Hypertension
• Valvular heart disease
• Tachycardia mediated
• Chemotherapy / radiation
• Alcohol / other toxins

Less Common Causes
• Amyloid
• SLE, scleroderma
• HCM
• Myocarditis
• Pericarditis
• Thyroid disease
• Diabetes
• Pheochromocytoma
• Postpartum
• Hemochromatosis
• Sarcoid
History

• Potential clues regarding the etiology
  • Alcohol, illicit drug use
  • Chemotherapy / radiation
  • Angina
  • Palpitations (tachycardia induced CM); syncope
  • Family history*

• Functional Status

• Volume status and hemodynamics
  • Orthopnea, ascites, early satiety, bendopnea

* Two or more 1st degree family members
Physical Exam

- **General**: SOB, cachexia, Δ MS, cyanosis
- **VS**: tachycardia, BP (orthostatics)
- **JVP**: volume status / filling pressures, AJR
- **Lungs**: usually clear ± effusions
- **Heart**: soft S1, loud P2, MR/TR murmurs (±), gallops, palpation for apical and RV impulses
- **Abdomen**: pulsatile hepatomegaly, ascites
- **Ext**: edema, cold (high SVR), pallor
- **Vascular**: pulsus alternans (low output)
Diagnostic Evaluation

- **Laboratory (class I)**
  - Renal function, lytes, CBC, LFTs, TSH, UA, HbA1c, lipids, NT-proBNP*  

- **Chest radiography (class I)**
  - Cardiomegaly, pulmonary edema  

- **Electrocardiogram (class I)**
  - Rhythm, QRS duration  

- **Overnight oximetry (class IIa)**
  - CPAP if OSA; avoid ASV in central sleep apnea

* Can be normal in HFpEF
Transthoracic Echocardiogram

*HFpEF: LVH, LA dilatation, diastolic dysfunction
Transthoracic Echocardiogram

Three questions:

1. What is the EF (reduced or preserved)?
   - HFrEF $< 40$
   - HFpEF* $> 50$

2. LV size and structure normal or abnormal?

3. Any other structural abnormalities (RV, valves, pericardium)?
Repeat Assessment of EF

- Obtain repeat EF after a major change in clinical status or after optimizing medical Rx, typically 3-6 months (class IIA)
- Implications for device therapy
- **Routine repeat measurement of LV function assessment in the absence of clinical status change or treatment interventions should not be performed (class III)**
Assessment for CAD

• Coronary angiography
  • Class I if angina or known ischemia
  • Class IIa if atypical CP, known, or suspected CAD

• Noninvasive stress imaging
  • Class IIa if known CAD but no angina
  • Class IIb to define likelihood of CAD
  • Wall motion/perfusion defects common in non ischemic HF
Other Evaluation

• Other labs (class IIa), especially for those at ↑ risk:
  • Iron studies, HIV, protein electrophoresis, autoimmune serologies and inflammatory markers, endocrine/metabolic

• Cardiac MRI – may be useful in iron overload, sarcoid, myocarditis, viability, pericardial disease

• PET – if concern for sarcoid (active disease)

• Cardiopulmonary exercise testing
  • Determine cardiac versus non-cardiac cause of symptoms and quantify severity in consideration of advanced therapies (<14 mL O2/kg*min)
Endomyocardial Biopsy

- Usually not indicated in systolic HF – (class III for routine evaluation of systolic HF)
- Only useful if results are likely to influence therapy
  - Sarcoidosis
  - Infiltrative cardiomyopathies
    - Amyloidosis
    - Hemochromatosis
  - Giant cell myocarditis
Goal of Therapies in HF with Reduced EF

Reverse remodeling

Left ventricular pressure vs. Left ventricular volume

Normal

CHF
ACC/AHA Stages of Heart Failure

- **At Risk**
  - Stage A
  - Address Risk Factors*
    - Hypertension
    - CAD
    - Diabetes

- **Asymptomatic**
  - Stage B

- **Symptomatic Heart Failure**
  - Stage C
  - Stage D
    - DT-VAD, Transplant, Palliation

*Yancy et al: J Am Coll Cardiol, 2013 HFSA 2010 Guidelines

Stage B

Survival

Years

No ALVD (EF >50%) and no HF history
Mild ALVD (EF 40% to 50%)
Moderate to severe ALVD (EF <40%)
Systolic HF (EF ≤50%)

Wang et al: Circulation, 2003
Stage B

ACEi or ARB (class I)

Beta blocker (class I)

Yancy et al. J Am Coll Cardiol, 2013
Stage B

ACEi or ARB (class I)

- Improved mortality and morbidity*
- Start with ACEi
- ARB† when ACEi contraindicated
- Routine combination ACEi / ARB contraindicated (class III)

†studied in Stage B HFrEF with prior MI; no data in absence of MI

Yancy et al. J Am Coll Cardiol, 2013
Stage B

Beta Blocker (class I)

- Improved mortality*
- No class effect
- Preferred agents:
  - Carvedilol
  - Metoprolol succinate
  - Bisoprolol

### Carvedilol vs Metoprolol Succinate

<table>
<thead>
<tr>
<th></th>
<th>Carvedilol</th>
<th>Metoprolol succinate</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Dosing</strong></td>
<td>Low-dose responsiveness</td>
<td>Once daily dosing</td>
</tr>
<tr>
<td></td>
<td>Goal dose = 25 mg BID</td>
<td>Goal dose = 200 mg QD</td>
</tr>
<tr>
<td><strong>Blood pressure effect</strong></td>
<td>• Greater BP ↓ actions</td>
<td>• Less BP ↓ actions</td>
</tr>
<tr>
<td></td>
<td>• Use in setting of concomitant</td>
<td>• May facilitate up-titration</td>
</tr>
<tr>
<td></td>
<td>hypertension</td>
<td>of other meds</td>
</tr>
<tr>
<td></td>
<td>• Preferred agent when BP not</td>
<td></td>
</tr>
<tr>
<td></td>
<td>limitation</td>
<td></td>
</tr>
<tr>
<td><strong>Specific populations</strong></td>
<td>• Less insulin resistance</td>
<td>Less bronchospasm</td>
</tr>
</tbody>
</table>

Bisoprolol similar to metoprolol succinate.
Stage C

ACEi or ARB (class I)

Beta Blocker (class I)

Aldosterone Antagonists (class I)

ARNI (class I)

If Volume Overloaded:

Diuretic(s)

Hydralazine / Nitrates

Digoxin

Ivabradine

Special Populations:

Yancy et al: J Am Coll Cardiol, 2013 and 2017
Aldosterone Antagonists

- NYHA Class II-IV with EF < 40% (class I)
- Follow potassium closely; do not initiate if > 5; recheck after 3 days, weekly for 1 month, then monthly for three months (HFSA guidelines)
- Avoid if Cr >2.5 in men and >2 in women (ACC guidelines)
- Start with spironolactone
- Transition to eplererone if gynecomastia with spironolactone

Yancy et al. J Am Coll Cardiol, 2013
HFSA 2010 Guidelines
## Loop Diuretics

<table>
<thead>
<tr>
<th>Agent</th>
<th>Initial daily dose (mg)</th>
<th>Max total daily dose (mg)</th>
<th>Bioavailability (%)</th>
<th>Duration of action (hr)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Furosemide</td>
<td>20-40 qd or bid</td>
<td>600</td>
<td>10-100%</td>
<td>4-6</td>
</tr>
<tr>
<td>Bumetanide</td>
<td>0.5-1.0 qd or bid</td>
<td>10</td>
<td>80-100%</td>
<td>6-8</td>
</tr>
<tr>
<td>Torsemide</td>
<td>10-20 qd</td>
<td>200</td>
<td>80-100%</td>
<td>12-16</td>
</tr>
<tr>
<td>Ethacrynic acid</td>
<td>25-50 qd or bid</td>
<td>200</td>
<td>90-100%</td>
<td>6</td>
</tr>
</tbody>
</table>

Consider torsemide or bumetanide in right-sided HF due to more consistent bioavailability.

Ethacrynic acid with sulfa allergy; very expensive (particularly intravenous).
Thiazide Diuretics

• Use in conjunction with loop diuretics

• **SEVERE** electrolyte disturbances
  • Hypokalemia
    • Consider supplement / K sparing diuretic
  • Hypomagnessemia
  • Hyponatremia

• Azotemia

• Careful with daily dosing
Intensifying Diuresis as an Outpatient

- Ensure adherence, assess for precipitants
- Double daily loop diuretic dose
- Triple daily loop diuretic dose
- Twice daily loop diuretic dosing
- Transition to an alternative loop diuretic (torsemide or bumetanide)
- Add a thiazide
- Outpatient IV diuresis
Hydralazine / Nitrates

- Class I for persistently symptomatic African-Americans (despite ACEi and beta blocker therapy)
- Class IIa for patients intolerant or ACEi or ARB due to renal dysfunction or hyperkalemia

Yancy et al: J Am Coll Cardiol, 2013
Digoxin

• Consider if LVEF <40%; decrease HF-related hospitalizations (class IIa)

• Consider in AF with suboptimal heart rate control despite (or intolerant to) beta blocker

• Goal level 0.5 to 0.9 ng/ml²
2016 (and 2017) ACC / AHA HF Guideline Update

- Sacubitril / valsartan (ARNI)
- Ivabradine
Sacubitril Mechanism of Action

- Pro-BNP
  - NT-proBNP (biologically inactive)
  - BNP (biologically active)

- Sacubitril inhibits neprilysin

- Inactive metabolites

- Neprilysin also mediates degradation of bradykinin, substance P, adrenomedullin, calcitonin gene related peptide
Sacubitril / Valsartan

- Paradigm-HF published in 2014, FDA approved in 2015
- ACC / AHA focused HF guideline update in 2016 and 2017
- Class I indication for patients with chronic symptomatic HFrEF (NYHA class II or III)
- 20% RRR in HFH and CV Death beyond Enalapril
- Avoid if history of angioedema
- Hold ACE or ARB for 48 hours prior to starting

Yancy et al: J Am Coll Cardiol, 2016
HFrEF Mortality ↓ With Medical Therapy

ACE inhibitors

+ Beta blockers

+ Aldo blockers

+ ARNi

Cumulative % decrease

NNT for mortality standardized to 36 months

* Beta blocker use ≈10-11%

Yancy et al: J Am Coll Cardiol, 2013
Pitt et al: NEJM, 1999
Ivabradine

- Inhibits the $I_f$ current in the sinoatrial node, reduces heart rate
- SHIFT trial (published 2010): reduced HF admissions among EF $<35\%$, NYHA II-IV, sinus rhythm, HR $>70$; no mortality benefit
- FDA approved in 2015
- IIa recommendations in the 2016 ACC / AHA HF guideline update
- Ensure goal beta blocker dose before starting
Tips to Optimize Medical Therapy

• Go slow (marathon, not a sprint); increase in small increments every 1-2 weeks

• Tolerate asymptomatic hypotension

• Diuretic requirements may decrease with positive remodeling

• “Treat the patient, not the creatinine”

• Share the Seattle Heart Failure Model with the patient to promote buy-in with medical therapy

• Repeat TTE 3-6 months after med optimization
Drugs to Avoid in HFrEF

- NSAIDs
- Calcium channel blockers (except amlodipine)
- Most antiarrhythmics (except amiodarone and dofetilide)
- Thiazolidinedione
Lifestyle and Non-Medical Interventions

- Sodium restriction: < 2 grams per day
- Fluid restriction: < 2 liters per day
- Exercise: 30 minutes, 5 times per week
- EtOH: ideally abstinence, otherwise ≤ 2 week
- Goals of care discussion and end of life discussion: never too early
Guidelines for Treatment of HFpEF…

2005 similar to 2001

2009 similar to 2005

2013 similar to 2009

HFpEF not addressed in 2016
HFpEF Medical Therapy

• Class I
  • Control hypertension
  • Diuretics if volume overload

• Class IIa
  • ACEi, ARB, and Beta blockers as first line hypertension therapy
  • Manage AF according to guidelines
  • Revascularize if angina or significant ischemia

• Class IIb – ARBs may reduce hospitalization

Yancy et al: J Am Coll Cardiol, 2013
Negative Trials in HFpEF

- RELAX – sildenafil
- NEAT HF – Isosorbide mononitrate
- CHARM, I-PRESERVE – ACE / ARBs
- TOPCAT – spironolactone*

* Pfeffer et al: Circulation, 2014
Clinical Pearls for Treatment of HFpEF

- Focus on aggressive treatment of hypertension (ACE or ARB preferred)
- Diuretics for volume overload
- If atrial fibrillation present and persistent symptoms, then trial of rhythm control
- Exercise program
- Aldosterone antagonist likely is beneficial
ADHF is….

- Frequent
  - Leading medical Medicare discharge Dx, avg LOS 5 days
- Fatal
  - ADHERE/EuroHeart 4-7% hospitalized mortality
  - 30 day mortality 8-14%, 1 yr 26-37%
- Formidable
  - Readmission rates: 20-25% 60 day, ~50% 6 month
Progression of Heart Failure

1. Heart failure care
2. Sudden death event
3. Transplant or ventricular assist device
4. Supportive care
5. Death

Functional status

Excellent

Time

Goodlin et al: J Cardiac Failure 10:200, 2004
Whom to hospitalize?

- Hemodynamically unstable
  - Tachycardia, i.e., >120 bpm
  - Symptomatic hypotension, SBP<80 mm
  - Tachypnea/hypoxia
  - Cardiogenic shock
  - Altered mentation

- Failed outpatient Rx
  - No improvement in dyspnea, edema or weight gain
  - Worsening CKD without improvement in symptoms
<table>
<thead>
<tr>
<th>Causes of Decompensation in HF</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Noncompliance</td>
<td>42</td>
</tr>
<tr>
<td>Ischemia</td>
<td>13</td>
</tr>
<tr>
<td>Inadequate pre-treatment</td>
<td>12</td>
</tr>
<tr>
<td>Arrhythmia</td>
<td>6</td>
</tr>
<tr>
<td>Miscellaneous</td>
<td>6</td>
</tr>
<tr>
<td>Hypertension</td>
<td>6</td>
</tr>
<tr>
<td>No definite factor</td>
<td>15</td>
</tr>
</tbody>
</table>
Other Causes of Decompensation in HF

- Addition of negative inotrope
- Thyroid abnormalities
- Infection (particularly viral)
- Anemia
- Iatrogenic volume overload
- Cardiotoxins: alcohol, cocaine, certain chemotherapy
- Right ventricular pacing induced dyssynchrony.
But remember.....

- Pulmonary rales may be absent
- Edema may be absent
- BNP levels may not always be elevated
- PND and orthopnea are reliable symptoms
- Weight gain
- JVP is a reliable sign
Recognize In-Hospital Mortality in ADHF

- **ADHERE**: BUN > 43 mg/dl, SBP < 115 mmHg, Scr ≥ 2.75
  - Mortality ↑ from 2.1 → 21.9%

- **OPTIMIZE-HF**: SBP ≤ 100 mmHg + Scr ≥ 2 = 16.3% mortality

- **GWTG-HF Risk Score**
  - Score < 33 < 1% probability of death, score > 79 > 50%

Palliative and Hospice Evaluation

Advanced Rx
Congestion? 
Orthopnea, rales, JVD, ascites, edema, weights, I/O

Adequate perfusion? 
Pulse pressure, cool extremities, altered mentation

Yes

No

Yes

No

Dry and Warm

Wet and Warm

Dry and Cold

Wet and Cold
Adequate perfusion?

Yes

No

Congestion?

Yes

No

Dry and Warm

Wet and Cold

Diurese + vasodilate, tap

Dry and Cold
Congestion?

Adequate perfusion?

Yes

No

Dry and Warm

Wet and Warm

Dry and Cold

Diurese, Inotropes, Vasodilate

Nohria A: Am J Cardiol 2005 [suppl]
Adequate perfusion?

No

Dry and Warm

Inotropes, VAD, Txp

Yes

Wet and Warm

Wet and Cold

Congestion?
Adequate perfusion?

Congestion?

Yes

No

Non-Cardiac?

Dry and Cold

Wet and Cold

Wet and Warm

No
Diuretic Dosage in “Naive”

- Furosemide 20-40 mg IV
- Torsemide 10-20 mg IV
- Bumetanide 1 mg IV
- Double at 2-hour intervals to response or maximal dose
- CKD may require higher bolus (i.e., up to 200 mg Furosemide)
Diuretic Dosage in “Wise”

• Initial IV dose should be equal to or greater than (2.5x) maintenance oral dose
  • e.g., 40 mg oral furosemide = IV bolus of 40-100 mg

• Diuretic conversion:
  • Torsemide 20 mg = furosemide 40 mg
  • Bumetanide 1 mg = furosemide 40 mg
Diuretics

• Guidelines favor beginning diuresis in the ED
• Bolus vs Continuous Infusion?
  • DOSE: Continuous infusion equivalent to 12 hourly bolus furosemide on symptoms and renal function
• Goal urine output should be 3-5 liters per day
Diuretic Resistant?

• Ultrafiltration or HD may be considered in diuretic unresponsive pts
  • UF: No clear benefit upfront over diuresis
  • Does not preserve renal function compared to diuresis
  • Consider safety, cost, access, staffing
  • UF is reserved for congested patients unresponsive to aggressive diuresis
Inotropic Therapy

• Dobutamine: Primary action beta-1 adrenergic receptors
  • ↑SV, ↑CO, modest drop in SVR/LV filling
  • Hypersensitivity myocarditis with chronic use

• Milrinone: PDE inhibitor
  • Not as impacted by concomitant beta-blockade

• Dopamine: Low dose renal/mesenteric dopamine-1
  • Data supporting renal impact/protection limited
Use of Inotropes

- Class I in cardiogenic shock
- Class IIa as bridge to transplant
- Class IIb for stage D patients as palliative therapy
- Class IIb indication to improve end organ perfusion in low output patients who have hypotension
- Use of low dose dopamine to improve diuresis is considered a Class IIb indication
Cardiorenal Syndrome

- Congestive rx limited by decline in GFR
- Measured best by GFR rather than creatinine
- Risks: DM, older age, CKD (GFR<60, ≈ 30-60% of HF)
- Develops in 25-30% of ADHF
- Causes?
  - Diuretic induced drop in GFR
  - Systemic congestion
  - Fall in SBP
Advanced or Refractory Heart Failure

- Fluid status management: requiring renal replacement?
- Not tolerating RAAS or SNS antagonism?
- Referral to HF center
  - Transplant, VAD
- Continuous infusion of palliative inotrope?
  - Discuss end-of-life care options, advanced directives, goals of treatment
23% of Medicare beneficiaries readmitted after a ADHF hospitalization within 30 days
Risk for Recurrence

• In most patients with ADHF, factors leading to admission can be identified and potentially mitigated

• Non-compliance higher in the elderly
  • Cognitive function, medical literacy
  • Comorbidities more frequent in elderly (HTN, CKD, COPD)

• Excess alcohol, non-cardiac medication (NSAIDS, TZDs)

• OPTIMIZE-HF 60% identifiable precipitant
High Risk for Readmission

- CKD
- Low output state
- DM
- COPD
- Persistent NYHA III/IV symptoms
- ≥7 Medications
- Substance Abuse
- Frequent admissions

- Multiple active comorbidities
- Depression/cognitive impairment
- HD/ESLD/HIV/CVA
- Metastatic CA, active hematologic CA
- Inadequate social support, poor health literacy, or persistent noncompliance
Diuretic-Based Clinical Strategies
Have We Achieved Euvolemia?

89% reported asymptomatic/improved
Yet 56% had minimal or no weight loss

European Heart Journal Supplements 7:B13–B19
Goals for Dismissal

- Optimize heart failure medications
- Assess readmission risk
- Consider readmission risk tools
- Coordinate transition and dismissal planning
A 54-year-old female presents to her primary care provider for a routine general medical exam. She is post menopause. She denies any lifestyle restrictions. Her provider heard a systolic murmur. The cardiac exam was otherwise normal. Her primary care provider requests an echocardiogram which demonstrates an LVEF of 32% with global hypokinesis, moderate LV enlargement, and trivial aortic stenosis but no other significant valve disease. Which of the following is the most appropriate medical therapy?

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c) **ACE inhibitor and beta blocker**

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• ICD-CRT was implanted two years prior to this admission

• His outpatient regimen consists of Lisinopril 5 mg twice daily, carvedilol 3.125 mg twice daily, simvastatin 20 mg daily, aspirin 81 mg daily, spironolactone 25 mg daily and furosemide 80 mg daily
56-Year-Old Male

- On examination he is afebrile, heart rate is 62/min, blood pressure 86/60 mm Hg, JVP is significantly elevated with prominent v waves, lungs are clear, 3/6 pansystolic murmur over the precordium, S3 is present, 3+ pitting edema and cool extremities

- Laboratory tests reveal a hemoglobin of 8 g/dl, sodium 126 mmol/L, potassium 4.5 mmol/L, BUN 42 mg/dl and creatinine 1.9 mg/dl

- Electrocardiogram shows a 100% A-V paced rhythm

- He was admitted to the hospital for further management
56 year old man
All the statements are true regarding this patient’s management except

1. Decrease carvedilol until hemodynamically stable
2. Right heart catheterization may be indicated
3. Adding metolazone 5 mg orally daily may improve symptoms
4. Starting IV low dose dopamine may improve renal blood flow
5. IV furosemide as a continuous infusion is superior in diuretic efficacy to 12 hourly bolus dosing
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