Improving Long-Term Outcomes in Chronic Heart Failure

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Faculty Affiliation and Disclosures

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- Disclosures
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  Speaker: Amgen, Otsuka Pharmaceuticals, Zoll
Learning Objectives

- Recognize and classify heart failure (HF) in patients according to disease stage and class
- Review current guidelines for the pharmacologic treatment and management of patients with chronic HF
- Assess clinical evidence on existing and emerging treatments in chronic HF to provide personalized therapy toward decreasing hospitalizations and mortality
- Identify nonphysiologic considerations in HF management and outcomes
Prevalence and Burden of HF

- HF affects ~5.1 million people in the US and continues to increase in prevalence as the population ages.
- The estimated lifetime risk for developing HF for individuals ≥40 years of age is ~20%.
- ~50% of people who develop HF die within 5 years of diagnosis.
- Reported hospitalizations for HF exceed 1 million each year and are associated with a 30-day readmission rate of 25%.
- In 2013, >$30 billion was spent on HF with the reported cost of hospitalizations alone being ≥$23,077 per patient.

Definition of HF

- Complex, progressive, clinical syndrome
- Results from structural or functional impairment of ventricular filling or contractility
- Major clinical manifestations
  - Dyspnea and fatigue
  - Fluid retention
- Patient presentation is variable
- HF is not synonymous with cardiomyopathy or LV dysfunction, which describe possible structural or functional bases for the development of HF

LV, left ventricular.
## Patterns of Cardiomyopathy

<table>
<thead>
<tr>
<th>Dilated</th>
<th>Hypertrophic</th>
<th>Restrictive</th>
</tr>
</thead>
<tbody>
<tr>
<td>▪ Large group of heterogeneous disorders</td>
<td>▪ Increased LV wall thickness</td>
<td>▪ Normal LV and RV systolic function is common</td>
</tr>
<tr>
<td>▪ EDD is a good measure of LV enlargement and chronicity</td>
<td>▪ Heterogeneous group of disorders</td>
<td>▪ Hallmark of decreased ventricular filling with diastolic dysfunction</td>
</tr>
<tr>
<td>▪ May have a genetic basis</td>
<td>▪ Some cases with a genetic basis</td>
<td>▪ May occur as a result of infiltrative process (iron, amyloid, other)</td>
</tr>
<tr>
<td>▪ Marked cellular, subcellular, and biochemical abnormalities</td>
<td>▪ Etiologies can include HTN and some infiltrative diseases</td>
<td>▪ Difficult to treat</td>
</tr>
</tbody>
</table>

EDD, end-diastolic dimension; HTN, hypertension; RV, right ventricular.

Classification of HF: Stage vs Class

- ACCF/AHA Stages of HF
  - Emphasizes disease development and progression
  - Describes both individuals and populations
- NYHA Functional Classification of HF
  - Focuses on exercise capacity and symptomatic status
- Stage and class provide complementary information about the presence and severity of disease

ACCF, American College of Cardiology Foundation; AHA, American Heart Association; NYHA, New York Heart Association.
## ACCF/AHA Stages of HF

<table>
<thead>
<tr>
<th>Stage</th>
<th>Characteristics</th>
</tr>
</thead>
</table>
| A     | - Significant risk factors for HF  
       | - No known structural heart disease  
       | - No signs or symptoms of HF |
| B     | - Structural heart disease  
       | - No signs or symptoms of HF |
| C     | - Structural heart disease  
<pre><code>   | - Prior or current symptoms of HF |
</code></pre>
<p>| D     | - Refractory HF requiring specialized interventions (eg, transplant, VAD, palliative care/hospice, and experimental therapies) |</p>
<table>
<thead>
<tr>
<th>Class</th>
<th>Characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>No functional limitation</td>
</tr>
<tr>
<td>II</td>
<td>Symptoms with activity beyond ADLs</td>
</tr>
<tr>
<td>III</td>
<td>Symptoms with ADLs</td>
</tr>
<tr>
<td>IV</td>
<td>Symptoms of HF at rest</td>
</tr>
</tbody>
</table>

ADLs, activities of daily living.
HF With Reduced Ejection Fraction (HFrEF)

- EF ≤40%*
- Systolic HF
- RCTs have primarily included patients with HFrEF
- Efficacious therapies are available for these patients

EF, ejection fraction; RCT, randomized controlled trial.

*HFrEF has been defined across different guidelines by left ventricular ejection fraction 35%, <40%, and 40%. ACCF/AHA Guidelines. *J Am Coll Cardiol.* 2013;62(16):e147-239.
HF With Preserved Ejection Fraction (HFpEF)

- EF ≥50%
- Diastolic dysfunction
- Challenging diagnosis
  - Largely by exclusion of other potential noncardiac causes of dyspnea and other related symptoms
- Efficacious therapies have not been identified in RCTs (focus is on risk factor control)
- Incidence rising; seen most often in the elderly; frequently comorbid with obesity, CAD, diabetes mellitus, atrial fibrillation, and hyperlipidemia

Chronic vs Acute Decompensated HF

- Chronic HF is characterized by ongoing stable symptoms of HF
- Acute decompensated HF describes exacerbations of HF
  - De novo presentation of HF
  - Worsening of previously stable chronic HF
- Although the goals of treatment for all patients with HF are to improve symptoms and prognosis, the approach is determined by the nature of the case

Diagnosis of HF
When evaluating a patient suspected of having HF, what components of the assessment are most relevant?
A careful history and physical examination remain cornerstones in the assessment of patients with HF.
Patient History

- Evaluate risk factors for HF (HTN, CAD/MI, diabetes, family history, thyroid disease, HIV, etc)
- Establish duration of symptoms
- Establish trigger for symptoms (relative to ADLs)
- Determine type and severity of symptoms
  - For congestion: DOE, PND, increased abdominal girth, edema
  - For poor perfusion: poor appetite/early satiety, mental status changes, fatigue, weakness

Patient History (cont’d)

- Development of peripheral edema or ascites
- Disordered breathing at night, sleep problems
- Recent/frequent prior hospitalizations for HF
- History of discontinuation or nonadherence to medications for HF
- Medication that may exacerbate HF
  - Increased salt retention (eg, NSAIDs)
  - Negative inotropy (eg, diltiazem)
- Increased dietary sodium intake
- De novo HF:
  - Inadequate BP control
  - New-onset or poorly controlled atrial fibrillation
  - New ischemia
  - Metabolic, respiratory, and other stressors

NSAID, nonsteroidal anti-inflammatory drug; BP, blood pressure.
Physical Examination

- Evidence of weight loss or gain
- BP (supine and upright)
- Pulse
- Jugular venous pressure at rest (sitting or standing) and/or a positive Kussmaul’s sign
- Presence of extra heart sounds and murmurs

- Size and location of point of maximal impulse
- Presence of RV heave
- Pulmonary status: respiratory rate and pleural effusion
- Hepatomegaly and/or ascites
- Peripheral edema
- Presence of cool lower extremities

Case Study #1: Background

- 64-year-old female
- Remote history of smoking
- Moderate alcohol consumption
- T2DM (controlled with metformin; HbA1c=6.9%)
- Mild COPD
- Reports increasing dyspnea on exertion over the previous month
- Orthopnea
- Moderate weight gain despite decreased appetite
- Ankle edema
- Serum sodium: 135 mEq/L
- Blood urea nitrogen (BUN): 31 mmoL/L
- Creatinine: 1.4 mg/dL

T2DM, type 2 diabetes mellitus; HbA1c, glycated hemoglobin; COPD, chronic obstructive pulmonary disease.
Case Study #1: Physical Exam

- BP: 130/86 mm Hg
- HR: 90 bpm
- Respirations: 24/minute
- Temperature: 98°F
- O₂ saturation: 97% on room air
- Lung sounds: clear
- JVD: 15 cm + positive Kussmaul’s sign
- Point of maximal impulse displaced

HR, heart rate; BPM, beats per minutes; JVD, jugular venous distention.
CLASS I

- Initial laboratory evaluation should include CBC, urinalysis, serum electrolytes (including calcium and magnesium), BUN, serum creatinine, glucose, fasting lipid profile, liver function, and TSH
- Serial monitoring, when indicated, should include serum electrolytes and renal function
- 12-lead ECG should be performed initially on all patients presenting with HF

CLASS IIa

- Screening for hemochromatosis, HIV, rheumatologic diseases, amyloidosis, and pheochromocytoma in selected patients

CBC, complete blood cell count; TSH, thyroid-stimulating hormone; ECG, electrocardiogram.
## Recommendations for Noninvasive Cardiac Imaging

<table>
<thead>
<tr>
<th>Recommendation</th>
<th>COR</th>
<th>LOE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patients with suspected, acute, or new-onset HF should undergo a chest x-ray</td>
<td>I</td>
<td>C</td>
</tr>
<tr>
<td>A 2-dimensional echocardiogram with Doppler should be performed for initial evaluation of HF</td>
<td>I</td>
<td>C</td>
</tr>
<tr>
<td>Repeat measurement of EF is useful in patients with HF who have had a significant change in clinical status or received treatment that might affect cardiac function or for consideration of device therapy</td>
<td>I</td>
<td>C</td>
</tr>
<tr>
<td>Noninvasive imaging to detect myocardial ischemia and viability is reasonable in HF and CAD</td>
<td>Ila</td>
<td>C</td>
</tr>
<tr>
<td>Viability assessment is reasonable before revascularization in HF patients with CAD</td>
<td>Ila</td>
<td>B (281-285)</td>
</tr>
<tr>
<td>Radionuclide ventriculography or MRI can be useful to assess LVEF and volume</td>
<td>Ila</td>
<td>C</td>
</tr>
<tr>
<td>MRI is reasonable when assessing myocardial infiltration or scar</td>
<td>Ila</td>
<td>B (286-288)</td>
</tr>
<tr>
<td>Routine repeat measurement of LV function assessment should not be performed</td>
<td>III: No Benefit</td>
<td>B (289, 290)</td>
</tr>
</tbody>
</table>

COR, Classification of Recommendation; LOE, Level of Evidence; LVEF, left ventricular ejection fraction; MRI, magnetic resonance imaging.

<table>
<thead>
<tr>
<th>Biomarker, Application</th>
<th>Setting</th>
<th>COR</th>
<th>LOE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Natriuretic peptides</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Diagnosis or exclusion of HF</td>
<td>Ambulatory, Acute</td>
<td>I</td>
<td>A</td>
</tr>
<tr>
<td>Prognosis of HF</td>
<td>Ambulatory, Acute</td>
<td>I</td>
<td>A</td>
</tr>
<tr>
<td>Achieve GDMT</td>
<td>Ambulatory</td>
<td>IIa</td>
<td>B</td>
</tr>
<tr>
<td>Guidance for acutely decompensated HF therapy</td>
<td>Acute</td>
<td>IIb</td>
<td>C</td>
</tr>
<tr>
<td>Biomarkers of myocardial injury</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Additive risk stratification</td>
<td>Acute, Ambulatory</td>
<td>I</td>
<td>A</td>
</tr>
<tr>
<td>Biomarkers of myocardial fibrosis</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Additive risk stratification</td>
<td>Ambulatory</td>
<td>IIb</td>
<td>B</td>
</tr>
<tr>
<td></td>
<td>Acute</td>
<td>IIb</td>
<td>A</td>
</tr>
</tbody>
</table>

GDMT, guideline-directed medical therapy.
Invasive Evaluation

<table>
<thead>
<tr>
<th>Recommendations for Invasive Evaluation</th>
<th>COR</th>
<th>LOE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Monitoring with a pulmonary artery catheter should be performed in patients with respiratory distress or impaired systemic perfusion when clinical assessment is inadequate</td>
<td>I</td>
<td>C</td>
</tr>
<tr>
<td>Invasive hemodynamic monitoring can be useful for carefully selected patients with acute HF with persistent symptoms and/or when hemodynamics are uncertain</td>
<td>IIa</td>
<td>C</td>
</tr>
<tr>
<td>When ischemia may be contributing to HF, coronary arteriography is reasonable</td>
<td>IIa</td>
<td>C</td>
</tr>
<tr>
<td>Endomyocardial biopsy can be useful in patients with HF when a specific diagnosis is suspected that would influence therapy</td>
<td>IIa</td>
<td>C</td>
</tr>
<tr>
<td>Routine use of invasive hemodynamic monitoring is not recommended in normotensive patients with acute HF</td>
<td>III: No Benefit</td>
<td>B (305)</td>
</tr>
<tr>
<td>Endomyocardial biopsy should not be performed in the routine evaluation of HF</td>
<td>III: Harm</td>
<td>C</td>
</tr>
</tbody>
</table>

Case Study #1: Laboratory Tests

- Blood tests
  - BNP level: 689 pg/mL
  - TSH and cardiac enzymes are normal

- Chest x-ray
  - Cardiomegaly
  - Mild pulmonary vascular redistribution

- Echocardiogram
  - LVEF: 38%
  - LVEDD: 7.0 cm
  - RV: mild dysfunction

- Evaluation for CAD/ischemia (stress, cath, other)

BNP, brain natriuretic peptide; LVEDD, left ventricular end-diastolic dimension.
Based upon the findings presented, how would you classify this patient with HF?

What are the first steps in management?
Case Study #1: Diagnosis and Classification

- De novo HF presentation
  - New diagnosis of cardiomyopathy?
  - New onset of cardiomyopathy?
- Stage C, NYHA class III
Case Study #1: Management

- Start ACE inhibitor (or ARB) unless contraindicated
- Start loop diuretic for congestive signs and symptoms
- Start beta-blocker when euvolemic
  - Low dose and up-titrate
  - Carvedilol or metoprolol succinate
- Low-salt diet*

ACE, angiotensin-converting enzyme; ARB, angiotensin receptor blocker.
*How low has not been determined.
Case Study #1: Management (cont’d)

- Additional considerations
  - Digoxin
  - MRA
  - Hydralazine and nitrate

- Education

- Close follow-up
  - LVEF reassessment
Predicting Outcomes in HF: Prognostic Models
Chronic HF Risk Models

- Patients with HFrEF or mixed
  - Seattle Heart Failure Model
  - Heart Failure Survival Score
  - Candesartan in Heart Failure: Assessment of Reduction in Mortality and Morbidity (CHARM)
  - Controlled Rosuvastatin Multinational Trial in Heart Failure (CORONA)

- Specific to chronic HFpEF
  - Irbesartan in Heart Failure with Preserved Ejection Fraction Study (I-PRESERVE)
EFFECT Risk Score

- Used to predict the risk of death at 30 days and 1 year
- Component risk variable categories:
  - Age
  - Vital signs
  - Laboratory tests
  - Comorbidities
- Intended to be applied to patients presenting with HF in a hospital-based setting
- May be used to stratify risk within hours of presentation
Observed 1-year Mortality Across EFFECT Risk Categories

1-Year Mortality Rate

1-Year Risk Score

Risk Category

Very Low
Low
Intermediate
High
Very High

1-Year Mortality, %

Derivation cohort
Validation cohort

Limitations of Predictive Modeling

- Clinical status is not static: changes over time
- Use of granular clinical data that may not be obtainable in large administrative databases or EHR
- Ability to predict inpatient versus outpatient
- Applicability to populations versus individuals
- Lack of trials of prospective decision making based on predictive models
- Projections may be based on results derived from randomized trials, not effectiveness data (Seattle)
Pharmacologic Therapy for the Management of Chronic HF
Guideline-Recommended Pharmacologic Treatments

<table>
<thead>
<tr>
<th>Therapy</th>
<th>NYHA Class</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
</tr>
<tr>
<td>ACE inhibitor, ARB</td>
<td>✓</td>
</tr>
<tr>
<td>Beta-blockers</td>
<td>✓</td>
</tr>
<tr>
<td>Aldosterone antagonists</td>
<td>✓</td>
</tr>
<tr>
<td>Diuretics</td>
<td>✓</td>
</tr>
<tr>
<td>Digoxin</td>
<td>✓</td>
</tr>
<tr>
<td>Hydralazine and isosorbide dinitrate</td>
<td>✓</td>
</tr>
</tbody>
</table>

(✓) For select patients
## New and Emerging Therapies for the Treatment of HF With Novel Mechanisms of Action

<table>
<thead>
<tr>
<th><strong>Agent</strong></th>
<th><strong>Mechanism of Action</strong></th>
<th><strong>FDA Approval Status</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Ivabradine</td>
<td>Selectively inhibits the sinus node $I_f$ channel, decreasing HR</td>
<td>Approved in April 2015 for patients with:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Stable, symptomatic HF</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• LVEF $\leq$35%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• In sinus rhythm with RHR $\geq$70 bpm</td>
</tr>
<tr>
<td></td>
<td></td>
<td>On maximally tolerated dose of beta blocker or with contraindications to beta blockers</td>
</tr>
<tr>
<td>Angiotensin receptor-</td>
<td>Combines angiotensin receptor blockade with inhibition of neprilysin,* inhibiting RAAS</td>
<td>Approved in July 2015 for patients with:</td>
</tr>
<tr>
<td>neprilysin inhibitor (ARNI)</td>
<td>and augmenting NP activity</td>
<td>• Chronic HF (NYHA 2 – 4)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Reduced ejection fraction</td>
</tr>
</tbody>
</table>

RAAS, renin-angiotensin-aldosterone system; NP, natriuretic peptide.

*The metallopeptidase neprilysin hydrolyzes natriuretic peptides.

Resting Heart Rate is an Important Prognostic Variable

<table>
<thead>
<tr>
<th>HR</th>
<th>Number of Events</th>
<th>HR (55% CI) vs Lowest Heart-rate Group</th>
<th>P Value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Cardiovascular (CV) death or hospital admission for worsening HF</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>70 to &lt;72</td>
<td>92</td>
<td>1.00</td>
<td>—</td>
</tr>
<tr>
<td>72 to &lt;75</td>
<td>157</td>
<td>1.15 (0.88-1.48)</td>
<td>.308</td>
</tr>
<tr>
<td>75 to &lt;80</td>
<td>197</td>
<td>1.33 (1.03-1.70)</td>
<td>.027</td>
</tr>
<tr>
<td>80 to &lt;87</td>
<td>205</td>
<td>1.80 (1.40-2.31)</td>
<td>&lt;.0001</td>
</tr>
<tr>
<td>≥87</td>
<td>286</td>
<td>2.34 (1.84-2.98)</td>
<td>&lt;.0001</td>
</tr>
</tbody>
</table>

Similar pattern for all-case mortality, cardiovascular mortality, and heart failure mortality.

Data from the SHIFT Study.

Data are number of first events, hazard ratio (HR; 95% confidence interval (CI)), with the HR for lowest heart rate group (70 to <72 bpm) fixed at unity, and P values versus lowest heart rate group.

Study description

- Phase 3 multicenter, randomized, double-blind, placebo-controlled, outcomes trial
- Comparison of ivabradine to placebo added on to standard-of-care therapies including beta-blockers
- >6500 patients with symptomatic chronic HF in sinus rhythm with reduced LV function and heart rate ≥70 bpm
Impact of Ivabradine Treatment on CV-related Death or Hospital Admission for Worsening HF

Changes in Heart Rate Observed With Ivabradine Treatment

Mean Heart Rate During the Study in the Total Study Population, by Allocation Groups

Considerations With Ivabradine

- Improvement in NYHA class
- Improvement in outcomes
- Limited side effect profile (phosphenes)
- Effect may be largely contingent on basal HR
- Is not a beta-blocker and is “add-on” therapy
- “Personalized” medicine based on HR?
Study description

- Randomized, double-blind phase 3 trial
- Evaluation of the efficacy and safety profile of angiotensin receptor-neprilysin inhibitor (ARNI) versus the ACE inhibitor, enalapril
- 8442 patients with HFrEF (NYHA class II-IV)
- Open-label run-in phase removed patients who were intolerant prior to randomization

ARNI Treatment Reduces the Risk of CV-related Death or First-Time Hospitalization for HF

Hazard ratio, 0.80 (95% CI, 0.73-0.87)
P < .001

## Primary and Secondary Outcomes Following Treatment With ARNI vs Enalapril

<table>
<thead>
<tr>
<th>Outcome</th>
<th>LCZ (N=4187)</th>
<th>Enalapril (N=4212)</th>
<th>Hazard Ratio or Difference (95% CI)</th>
<th>P Value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Primary composite outcome — no. (%)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Death from CV causes or first hospitalization for worsening HF</td>
<td>914 (21.8)</td>
<td>1117 (26.5)</td>
<td>0.80 (0.73-0.87)</td>
<td>&lt;.000</td>
</tr>
<tr>
<td>Death from CV causes</td>
<td>558 (13.3)</td>
<td>693 (16.5)</td>
<td>0.80 (0.71-0.87)</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>First hospitalization for worsening HF</td>
<td>537 (12.8)</td>
<td>658 (15.6)</td>
<td>0.79 (0.71-0.89)</td>
<td>&lt;.001</td>
</tr>
<tr>
<td><strong>Secondary outcomes — no. (%)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Death from any cause</td>
<td>711 (17.0)</td>
<td>835 (19.8)</td>
<td>0.84 (0.76-0.93)</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Change in KCCQ clinical summary score at 8 mo</td>
<td>-2.99 ± 0.36</td>
<td>-4.64 ± 0.36</td>
<td>1.64 (0.63-2.65)</td>
<td>.001</td>
</tr>
<tr>
<td>New-onset atrial fibrillation</td>
<td>84 (3.1)</td>
<td>83 (3.1)</td>
<td>0.97 (0.72-1.31)</td>
<td>.83</td>
</tr>
<tr>
<td>Decline in renal function</td>
<td>94 (2.2)</td>
<td>108 (2.6)</td>
<td>0.86 (0.65-1.13)</td>
<td>.28</td>
</tr>
</tbody>
</table>

Case Study #2: Background

- 54-year-old male
- Four previous hospital admissions for worsening HF over 2 years
- Nonobstructive CAD on cardiac catheterization at time of initial diagnosis
- Previous echocardiograms have indicated moderate LV systolic dysfunction (EF 26%, pulmonary artery systolic 55 mm Hg, EDD 6.7 cm)
- Chronic bilateral edema of the legs
- Has difficulty bathing and dressing
- Reports no paroxysmal nocturnal dyspnea or orthopnea
- Status post implantable cardioverter defibrillator (ICD)
- Sinus rhythm, QRS width 110 ms
Case Study #2: Background (cont’d)

- Current medications
  - Aspirin
  - Furosemide
  - Enalapril
  - Carvedilol
  - Spironolactone
Case Study #2: Physical Exam

- BP: 98/78 mm Hg
- HR: 100 bpm
- Respirations: 25/minute
- Temperature: 97°F
- S4
- Point of maximal impulse displaced
Blood tests

- Electrolytes: normal
- BUN: 32 mg/dL
- Creatinine: 2.0 mg/dL
Discussion Questions

- How would you characterize the stage and class of HF in this patient?
- What are the goals of therapy?
- What are the options for treatment?
- How would you characterize this patient’s future risk?
Case Study #2: Classification

- Stage C (D)
- NYHA class III (IIIb)
Goals of Therapy for Patients With Chronic HF

<table>
<thead>
<tr>
<th>Stage</th>
<th>Goals</th>
</tr>
</thead>
</table>
| A     | ▪ Risk factor reduction  
        ▪ Prevent ischemic events  
        ▪ Prevent development of LV structural abnormalities |
| B     | ▪ Prevent HF symptoms  
        ▪ Prevent further cardiac remodeling |
| C     | ▪ Control symptoms  
        ▪ Improve HRQoL  
        ▪ Prevent hospitalization  
        ▪ Prevent mortality |
| D     | ▪ Control symptoms  
        ▪ Improve HRQoL  
        ▪ Prevent hospitalizations  
        ▪ Establish end-of-life goals |

HRQoL, health related quality of life.  
Additional Considerations for the Management of Chronic HF
Additional Considerations for HF Management

- Compliance, compliance, compliance (Adherence, adherence, adherence!!!)
- Discontinuation of drugs that may worsen HF
- Biomarker-directed therapeutic goals?
- HF-related devices (ICD, MCS, CRT)
- Management of comorbidities
- Exercise rehabilitation
- Hemodynamic monitoring
Strategies to Improve Medication Adherence in Patients With HF

- Increased collaboration across healthcare professionals
  - Nurse specialists
  - Pharmacists
- Telehealth interventions
  - Telemanagement
  - M-health intervention (app on a smartphone)

*Area of significant controversy and uncertainty*

Considerations for Optimizing HRQoL in Patients With HF

- Depressive symptoms
- Sleep disturbances
- Support systems
- Patient expectations
  - Despite worse prognosis and physical status, older patients have better HRQoL than younger patients (expectations differ)

## Predictors of 30-day Readmission for HF

<table>
<thead>
<tr>
<th>Variable</th>
<th>Odds Ratio (all $P&lt;.05$)</th>
</tr>
</thead>
<tbody>
<tr>
<td>History of depression/anxiety</td>
<td>1.44</td>
</tr>
<tr>
<td>Single/male</td>
<td>1.47/1.37</td>
</tr>
<tr>
<td>Number of home address changes</td>
<td>1.13</td>
</tr>
<tr>
<td>Residence in lowest socioeconomic quartile</td>
<td>1.30</td>
</tr>
<tr>
<td>History of cocaine abuse</td>
<td>1.78</td>
</tr>
<tr>
<td>History of missed clinic visit</td>
<td>1.35</td>
</tr>
<tr>
<td>Use of health system pharmacy</td>
<td>0.72</td>
</tr>
<tr>
<td>Prior inpatient hospitalizations</td>
<td>1.17</td>
</tr>
<tr>
<td>Presented to ED between 6:00 AM – 6:00 PM</td>
<td>1.38</td>
</tr>
</tbody>
</table>

HF is a complex, progressive clinical syndrome resulting from structural or functional impairment of ventricular filling or contractility.

Although the classic signs of HF are dyspnea and fatigue, patients can exhibit a wide range of clinical presentations and can vary significantly in their disease trajectory.

Despite the availability of a range of pharmacologic therapies, patient outcomes remain unsatisfactory.

Optimal management of chronic HF requires that patients be accurately evaluated for stage and class, and that treatment be individualized accordingly.

With the ongoing development of novel therapies, clinicians may soon have additional strategies to achieve treatment goals.
Thank You!