Evidence Based Review of Heart Failure Treatment
No disclosures to report.
OBJECTIVES

1. Design an evidence based medication therapy regimen for patients with heart failure

2. Assess the appropriateness of a patient’s current heart failure treatment

3. Propose a role for pharmacists in meeting core measure requirements related to heart failure
Heart Failure (HF)

- Inability of the heart to provide sufficient output to meet perfusion and oxygenation requirements

Systolic HF

- Impaired contractile function
- Left Ventricular Ejection Fraction (LVEF) < 50%

Diastolic HF

- Abnormal relaxation, stiffness or filling
- Normal “preserved” LVEF
TODAY’S AGENDA

1. Treatment
2. Pharmacist’s Role
3. Heart Failure Staging
4. Patient Cases
1. Improving symptoms and quality of life

2. Slowing progression of cardiac dysfunction

3. Reduce mortality
PHARMACOLOGIC THERAPY
Which of the following medications have been shown to prevent mortality due to HF?

- Aldosterone antagonists
- Angiotensin Converting Enzyme Inhibitors (ACE-I)
- Angiotensin Receptor Blockers (ARB)
- Aspirin
- Beta Blockers (BB)
- Calcium Channel Blocker
- Digoxin
- Diuretics
- Hydralazine plus nitrate
- Metformin
- Statin
The most effective way to reduce morbidity and mortality in HF patients is to titrate pharmacologic therapy to reach:

- Target Doses
- Blood Pressure Goals
- Heart Rate Goals
- None of the above. Therapy is based on number of hospitalizations per year.
### Table 7.1. ACE-inhibitor, Angiotensin Receptor Blocker, and Beta-Blocker Therapy in Heart Failure with Low Ejection Fraction

<table>
<thead>
<tr>
<th>Generic Name</th>
<th>Trade Name</th>
<th>Initial Daily Dose</th>
<th>Target Dose</th>
<th>Mean Dose Achieved in Clinical Trials</th>
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</thead>
<tbody>
<tr>
<td>ACE-inhibitors</td>
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</tbody>
</table>
| Captopril                     | Capoten    | 6.25 mg tid        | 50 mg tid   | 122.7 mg/day
| Enalapril                     | Vasotec    | 2.5 mg bid         | 10 mg bid   | 16.6 mg/day
| Fosinopril                    | Monopril   | 5-10 mg qd         | 80 mg qd    | n/a
| Lisinopril                    | Zestril, Prinivil | 2.5-5 mg qd | 20 mg qd    | n/a
| Quinapril                     | Accupril   | 5 mg bid           | 80 mg qd    | 32 mg qd
| Ramipril                      | Altace     | 1.25-2.5 mg qd     | 10 mg qd    | 4 mg qd
| Trandolapril                  | Mavik      | 1 mg qd            | n/a         | n/a
| Angiotensin Receptor Blockers |            |                    |             |                                      |
| Candesartan                  | Atacand    | 4-8 mg qd          | 32 mg qd    | 24 mg/day
| Losartan                     | Cozaar     | 12.5-25 mg qd      | 150 mg qd   | 129 mg/day
| Valsartan                    | Diovan     | 40 mg bid          | 160 mg bid  | 254 mg/day
| Beta-blockers                 |            |                    |             |                                      |
| Bisoprolol                    | Zebeta     | 1.25 mg qd         | 10 mg qd    | 8.6 mg/day
| Carvedilol                    | Coreg      | 3.125 mg bid       | 25 mg bid   | 37 mg/day
| Carvedilol                    | Coreg CR   | 10 mg qd           | 80 mg qd    | 159 mg/day
| Metoprolol succinate CR/XL   | Toprol XL  | 12.5-25 mg qd      | 200 mg qd   | 159 mg/day
| Aldosterone Antagonists       |            |                    |             |                                      |
| Sparanolactone                | Aldactone  | 12.5 to 25 mg qd   | 25 mg qd    | 25 mg/day
| Eplerenone                    | Inspra     | 25 mg qd           | n/a         | 42.6 mg/day
| Other Vasodilators            |            |                    |             |                                      |
| Fixed dose Hydralazine/       | BiDil      | 37.5 mg hydralazine/20 mg isosorbide dinitrate tid | 75 mg hydralazine/40 mg isosorbide dinitrate tid | 142.5 mg hydralazine/76 mg isosorbide dinitrate/day
| Isosorbide dinitrate          |            |                    |             |                                      |

*No difference in mortality between high and low dose groups, but 12% lower risk of death or hospitalization in high dose group vs. low dose group.*
Role of ACE-I

Renin-angiotensin-aldosterone system

- Angiotensinogen → Angiotensin I → Angiotensin II
- Renin
- Decrease in renal perfusion (juxtaglomerular apparatus)
- Renin
- Kidney
- Lungs
- Surface of pulmonary and renal endothelium: ACE
- Adrenal gland: cortex
- Aldosterone secretion
- Arteriolar vasoconstriction. Increase in blood pressure
- ADH secretion
- Pituitary gland: posterior lobe
- Collecting duct: H₂O absorption
- Sympathetic activity
- Tubular Na⁺ Cl⁻ reabsorption and K⁺ excretion. H₂O retention
- Water and salt retention. Effective circulating volume increases. Perfusion of the juxtaglomerular apparatus increases.

Legend:
- secretion from an organ
- stimulatory signal
- inhibitory signal
- reaction
- active transport
- passive transport
ACE-I REDUCTION IN MORTALITY

The SOLVD Investigators. NEJM. 1991;325:293

Figure 1. Mortality Curves in the Placebo and Enalapril Groups.

The numbers of patients alive in each group at the end of each period are shown at the bottom of the figure. P = 0.0036 for the comparison between groups by the log-rank test.
ACE-I FOR BLACK HF PATIENTS

Exner et al. NEJM 2001;344:1351
ACE-I FOR BLACK HF PATIENTS

Exner et al. NEJM 2001;344:1351
Conclusion:

♦ Patients should not be maintained on low dose ACE-I
♦ Titrate to target doses if tolerated
♦ Difference between intermediate and high dose outcomes likely small

<table>
<thead>
<tr>
<th></th>
<th>Low Dose</th>
<th>High Dose</th>
<th>p value</th>
</tr>
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<tbody>
<tr>
<td>All-cause mortality</td>
<td>717 (44.9)</td>
<td>666 (42.5)</td>
<td>0.128</td>
</tr>
<tr>
<td>All-cause mortality +</td>
<td>1338 (83.8)</td>
<td>1250 (79.7)</td>
<td>0.002</td>
</tr>
<tr>
<td>hospitalization for any reason</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hospitalizations for HF</td>
<td>1576</td>
<td>1199</td>
<td>0.002</td>
</tr>
</tbody>
</table>

Packer et al. Circulation 1999;100:2312
ACE-I TARGET DOSES

Target doses recommended due to use in trials where survival benefit was demonstrated

♦ Evidence is not clear as to difference in effect between intermediate and high doses

♦ Aim for target dose or highest tolerated dose

Jessup et al. JACC 53(15);2009:1343-82
HFSA 2010 Guideline Executive Summary. Journal of Cardiac Failure. 16(6)2010
Which three beta blockers have been shown to decrease mortality in HF patients?

- Atenolol, Carvedilol, Metoprolol tartrate
- Atenolol, Nebivolol, Propranolol
- Bisoprolol, Carvedilol, Metoprolol succinate
- Carvedilol, Metoprolol succinate, Propranolol
## Differences Between Beta Blockers

<table>
<thead>
<tr>
<th>Type of BB</th>
<th>Comments</th>
</tr>
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<tbody>
<tr>
<td>Carvedilol</td>
<td>IR and XL ↑ event-free survival and ↓ mortality in HF</td>
</tr>
<tr>
<td>Non-Selective α-1 blockade</td>
<td>Trend toward ↑ LVEF over metoprolol succinate</td>
</tr>
<tr>
<td></td>
<td>Preferred in patients with uncontrolled hypertension</td>
</tr>
<tr>
<td></td>
<td>Labetalol similar but not studied for use in HF</td>
</tr>
<tr>
<td>Bisoprolol</td>
<td>↑ event-free survival and ↓ mortality in HF</td>
</tr>
<tr>
<td>Metoprolol</td>
<td>Succinate ↑ event-free survival and ↓ mortality in HF</td>
</tr>
<tr>
<td></td>
<td>MERIT-HF showed higher BP with metoprolol succinate than placebo</td>
</tr>
<tr>
<td></td>
<td>Go et al. retrospective study that showed tartrate (IR) was not beneficial but atenolol may have benefit</td>
</tr>
</tbody>
</table>

MERIT-HF. Lancet 1999;353:2001
Figure 1. Kaplan–Meier Analysis of Time to Death in the Placebo Group and the Carvedilol Group. The 35 percent lower risk in the carvedilol group was significant: P=0.00013 (unadjusted) and P=0.0014 (adjusted).
**Benefit of BB In Severe HF**

**Figure 4.** Hazard Ratios (and 95 Percent Confidence Intervals) for the Combined Risk of Death or Hospitalization for Any Reason in Subgroups Defined According to Baseline Characteristics. LVEF denotes left ventricular ejection fraction. Recent hospitalization refers to hospitalization for heart failure within the year before enrollment.

COPERNICUS Trial. NEJM 2001;34:1651
BB Dose Related LVEF Improvement

* p<.005 vs. placebo
** p<.0001 vs. placebo

Bristow et al. Circulation. 1996;94:2807
BB Dose Related Mortality Reduction

Bristow et al. Circulation. 1996;94:2807
BB Target Doses

LVEF improvement and mortality benefit are dose dependent

♦ Aiming for a particular HR or resting HR has not been shown to improve any outcome

♦ Aim for target dose or highest tolerated dose

Jessup et al. JACC 53(15);2009:1343-82
HFSA 2010 Guideline Executive Summary. Journal of Cardiac Failure. 16(6)2010
Drug therapy should be titrated, as tolerated, to target doses for optimum clinical benefit.
Common and expected

- Only alter regimen for symptoms of hypoperfusion

Consult cardiologist if patient has difficulty reaching target doses

Jessup et al. JACC 53(15);2009:1343-82

HFSA 2010 Guideline Executive Summary. Journal of Cardiac Failure. 16(6)2010
WHEN TO INITIATE THERAPY

Initiate in patients with asymptomatic LV dysfunction

Figure 2. Death or Hospitalization for Congestive Heart Failure (CHF) and Death or Development of Heart Failure in the Prevention Trial.

The SOLVD Investigators. NEJM. 1992;327:685
ACE-I before BB

♦ All BB trials conducted in patients on ACE-I therapy
♦ Survival benefit of BB is additive to that of ACE-I

Results of BB first trials

♦ Willenheimer et al. could not prove non-inferiority but concluded that initiating BB therapy first “may be safe”
♦ Silwa et al. found that initiating BB first resulted in higher tolerable doses of BB and improved LVEF

Willenheimer et al. Circulation 2005;112:2426
Silwa et al. J Am Coll Cardiol 2004;44:1825
Further Rationale

Hemodynamic benefit of ACE-I occurs rapidly and does not exacerbate HF.

Hemodynamic benefits of BB are delayed and there can be transient worsening of cardiac function with initiation.
COMMON PRACTICE

1. Initiate low dose ACE-I
2. Titrate to intermediate dose in 1-2 weeks
3. Initiate BB
4. Titrate BB to target dose or highest tolerated dose
5. Complete ACE-I titration
Prior to initiation patient should have minimal evidence of fluid retention

May lead to increase of symptoms for 4 – 10 weeks before improvement is noted

Initiate at low doses

- Lowest possible dose if recently decompensated or SBP < 85 mmHg
- Typical titration schedule is every 2 weeks

Patient Education Point

Jessup et al. JACC 53(15);2009:1343-82
HFSA 2010 Guideline Executive Summary. Journal of Cardiac Failure. 16(6)2010
What is the goal of diuretic therapy in HF patients?

- Minimize clinical evidence of fluid retention
- Improved quality of life
- Maximize benefit of other therapies
- All of the above
**Appropriate Diuretic Dose**

- **Dose too low**: fluid retention will minimize effect of ACE-I and increase risk of decompensation with BB

- **Dose too high**: volume contraction which increases risk of hypotension and renal insufficiency with ACE-I and BB
Initial: furosemide 20 – 40 mg daily
- Self-management with daily weights

Call provider for weight gain of 2 – 4 lbs

Patients who are volume overloaded
- Goal is reduction of 2 lb/day
- When patients do not respond, single daily dose should be titrated rather than giving the same dose twice daily

Jessup et al. JACC 53(15);2009:1343-82
HFSA 2010 Guideline Executive Summary. Journal of Cardiac Failure. 16(6)2010
RESISTANT EDEMA

If increasing initial diuretic dose is ineffective consider:

♦ Conversion to torsemide
  ▪ Furosemide 40 mg = torsemide 20 mg

♦ BB dose reduction or temporary discontinuation
Basic Therapy

- Reduced morbidity and mortality
- Improved LVEF
  - ACE Inhibitor
  - Beta Blocker
  - Diuretic
Consider ARB

♦ CHARM-Alternative trial found significant reduction in cardiovascular death and hospitalization for HF with ARB therapy

Jong et al. conducted a meta-analysis that showed ARB therapy to be slightly less effective than ACE-I at reducing morbidity and mortality in HF patients

Jong et al. J Am Coll Cardiol 2002;39:463
Granger et al. Lancet 2003;362:772
Which of the following medications has the lowest incidence of cough reported in the literature?

- Candesartan
- Enalapril
- Lisinopril
- Losartan
Which of the following statements is true when ARB therapy is added to ACE-I?

- [ ] Further reduction in mortality
- [ ] Increase side effects such as hyperkalemia
- [ ] Further reduction in morbidity
- [ ] Both yellow and green

McMurray et al. Lancet 2003;362:767
Vasodilators: hydralazine + isosorbide dinitrate
♦ For patients intolerant of ACE-I/ARB due to hyperkalemia and/or renal dysfunction

Headache and gastrointestinal side effects limit use
♦ High incidence of discontinuation in all trials

Cohen et al. post-hoc analysis
♦ African American patients experienced increased efficacy of vasodilator therapy compared to enalapril

Loeb et al. Circulation. 1993;87:V178-V187
Jessup et al. JACC 53(15);2009:1343-82
**Vasodilators in African Americans**

Figure 1. Kaplan–Meier Estimates of Overall Survival.

Add to optimized ACE-I/ARB, BB and diuretic therapy in symptomatic patients

♦ Especially in African American patients

In place of ACE-I/ARB in patients intolerant due to hyperkalemia or renal dysfunction

Jessup et al. JACC 53(15);2009:1343-82
HFSA 2010 Guideline Executive Summary. Journal of Cardiac Failure. 16(6)2010
# Dosing Vasodilators

<table>
<thead>
<tr>
<th></th>
<th>Starting Dose</th>
<th>Target Dose</th>
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<tbody>
<tr>
<td>Hydralazine</td>
<td>25 mg TID</td>
<td>75 mg TID</td>
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<tr>
<td>Isosorbide dinitrate</td>
<td>20 mg TID</td>
<td>40 mg TID</td>
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</tbody>
</table>

Isosorbide mononitrate 40-120 mg daily

Titrate every 2 – 4 weeks

♦ Monitor for symptomatic hypotension

Jessup et al. JACC 53(15);2009:1343-82

HFSA 2010 Guideline Executive Summary. Journal of Cardiac Failure. 16(6)2010
Additional mortality reduction with low-dose aldosterone antagonist added to optimized ACE-I, BB and diuretic therapy found in:

♦ HF symptoms and recent decompensation

♦ Post-MI with LVEF < 40% and symptomatic HF or diabetes

♦ NYHA II with LVEF < 30%

♦ NYHA III-IV with LVEF < 35%

Pitt et al.. N Engl J Med. 1999;341:709-17
HFSA 2010 Guideline Executive Summary. Journal of Cardiac Failure. 16(6)2010
**DOSING ALDOSTERONE ANTAGONISTS**

Prevent adverse effects

- Stable SCr < 2.5 mg/dL in men and <2.0 mg/dL in women
- Potassium < 5.0 mEq/L without history severe hyperkalemia
- Only given in combination with loop diuretic therapy

<table>
<thead>
<tr>
<th></th>
<th>Starting Dose</th>
<th>Target Dose</th>
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<tr>
<td>Spironolactone</td>
<td>12.5-25 mg</td>
<td>25 mg</td>
</tr>
<tr>
<td>Eplerenone</td>
<td>25 mg</td>
<td>50 mg</td>
</tr>
</tbody>
</table>

Jessup et al. JACC 53(15);2009:1343-82
HFSA 2010 Guideline Executive Summary. Journal of Cardiac Failure. 16(6)2010
Which of the following statements is true?

- Spironolactone costs more than eplerenone.
- Spironolactone has a higher incidence of side effects.
- Eplerenone non-selectively binds to androgen and progesterone receptors.
- All of the above.
Recommended for use in patients who continue to be symptomatic despite optimal therapy

- ACE-I, BB, Diuretic, Aldosterone Antagonists, Vasodilators at target, or highest tolerated, dose
- No mortality benefit but does decrease hospitalizations

Usual daily dose is 0.125 mg or less

- Serum concentration goal 0.5-0.9 ng/ml
- Reduced benefit and increased mortality with > 1.2 ng/ml

Rathore et al. JAMA 2003;289:871
Jessup et al.. JACC 53(15):2009:1343-82
HFSA 2010 Guideline Executive Summary. Journal of Cardiac Failure. 16(6)2010
Ventricular arrhythmias are common in HF and sudden cardiac death is a significant cause of mortality

- HF patients are at increased risk of arrhythmias caused by antiarrhythmic agents
- Majority of these agents are contraindicated

Amiodarone recommended in patients with HF and an implantable cardioverter defibrillator (ICD)

- To prevent symptomatic arrhythmias
- As secondary prevention, not primary

Jessup et al. JACC 53(15);2009:1343-82
HFSA 2010 Guideline Executive Summary. Journal of Cardiac Failure. 16(6)2010
Overall evidence of recommendations is weak

CCBs can lead to worsening HF and are associated with increased risk of cardiovascular events

- Diltiazem and verapamil contraindicated
- Amlodipine and felodipine
  - Do not impact mortality
  - May be used as additional agents in patients with angina and hypertension

Jessup et al. JACC 53(15);2009:1343-82
HFSA 2010 Guideline Executive Summary. Journal of Cardiac Failure. 16(6)2010
Non-steroidal Anti-inflammatory Drugs (NSAIDs)
♦ Cause sodium retention and peripheral vasoconstriction
♦ Increase effectiveness and risk of adverse events of diuretics and ACE-I

Serotonin Norepinephrine Reuptake Inhibitors
♦ Elevated norepinephrine to compensate for poor cardiac output increases demand and worsens HF
♦ There are reports of HF exacerbations with initiation of SNRIs

Jessup et al. JACC 53(15);2009:1343-82
Colucci and Berry. Ann Pharmacother 2008;42:882
COMORBIDITIES

Depression
- Uncontrolled depression worsens HF outcomes
- Preference is SSRI therapy

Iron Deficiency
- FAIR-HF trial demonstrated benefit with treatment of iron deficient heart failure patients
- Over 45% of patients improved NYHA class to I or II
- Effective in anemic and non-anemic patients
  - Defined as Hgb <12 g/dL

Pelle et al. J Card Fail 2008;14:341
Schiffer et al. Eur J Heart Fail 2008
Ischemic heart disease is the leading cause of HF in America

Recommendations:

♦ Aspirin 81 mg daily
♦ Statin therapy with goal of < 70 mg/dL
Non-Pharmacologic Therapy
Lifestyle Modification

Smoking cessation

Restricted alcohol consumption

Weight reduction in obese patients
  ♦ Goal: within 10% of IBW

Routine physical activity is recommended to avoid deconditioning

Jessup et al. JACC 53(15);2009:1343-82
HFSA 2010 Guideline Executive Summary. Journal of Cardiac Failure. 16(6)2010
Current Guidelines

- Salt restriction to < 2 – 3 grams per day
  - < 2 grams in severe HF
- Fluid Restriction < 2 L
  - Hyponatremic patients
  - Patients with resistant fluid retention
- Daily weight monitoring
  - To detect fluid accumulation before it becomes symptomatic

Jessup et al. JACC 53(15);2009:1343-82
HFSA 2010 Guideline Executive Summary. Journal of Cardiac Failure. 16(6)2010
**Seasonal Variation**

*Figure 1.* Monthly moving average of mortality (total population 1992 through 1996), hospitalizations (public hospitals 1995 through 1997), and in-hospital deaths (public hospitals 1995 through 1997) for chronic heart failure.

Boulay et al. Circulation 1999;100:280
Annual influenza

Pneumococcal

— adults younger than age 65 years with chronic lung disease (including chronic obstructive pulmonary disease, emphysema, and asthma); chronic cardiovascular diseases; diabetes mellitus; chronic renal failure; nephrotic syndrome; chronic liver disease (including cirrhosis); alcoholism; cochlear implants; cerebrospinal fluid leaks; immunocompromising conditions; and functional or anatomic asplenia (e.g., sickle cell disease and other hemoglobinopathies, congenital or acquired asplenia, splenic dysfunction, or splenectomy [if elective splenectomy is planned, vaccinate at least 2 weeks before surgery]);

— residents of nursing homes or long-term care facilities; and

— adults who smoke cigarettes.

Jessup et al. JACC 53(15);2009:1343-82
HFSA 2010 Guideline Executive Summary. Journal of Cardiac Failure. 16(6)2010
What is the appropriate immunization schedule for pneumococcal vaccination in a 62 year old patient recently diagnosed with HF?

- [ ] One dose now
- [ ] One dose at 65 years old
- [ ] Two doses, now and at 65 years old
- [ ] Two doses, now and at 67 years old
PHARMACIST’S ROLE
Which of the following is considered by HF guidelines to be the most effective, but least used approach to management of HF?

- Utilization of cardiac rehabilitation services
- Referral to cardiologist for therapy management
- Pharmacist involvement in medication management
- Close observation and follow-up
PHARMACIST’S CHART REVIEW

- **ACE-I/ARB therapy?**
  - Hydralazine plus nitrate

- **Beta blocker therapy?**

- **At target doses?**
  - Time since last titration?

- **Contraindicated medications?**

- **Blood pressure & HR**

- **Labs- Na, K, Cr, Mg**

- **Vaccines**

- **Patient education**
  - Medications
  - Lifestyle

- **Depression screening**
<table>
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<th>COMMON FACTORS PRECIPITATING HOSPITALIZATION</th>
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<table>
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<tr>
<th>Noncompliance with</th>
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<td>♦ medical regimen</td>
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<tr>
<td>♦ sodium restriction</td>
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<td>♦ fluid restriction</td>
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<table>
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<table>
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<th>Addition of negative inotropes</th>
<th>Concurrent infections</th>
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<tbody>
<tr>
<td>♦ Verapamil</td>
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<td>♦ Nifedipine</td>
<td>♦ Viral illnesses</td>
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<td>♦ Diltiazem</td>
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<tr>
<td>♦ Beta blockers</td>
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<td>♦ DM</td>
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<tr>
<td>♦ Hypothyroidism</td>
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Jessup et al. JACC 53(15);2009:1343-82
Centers for Medicare and Medicaid Services (CMS) and The Joint Commission

1. Evaluation of EF

2. ACE-I/ARB prescribed or clear statement in medical record of rationale for not prescribing

3. Discharge instructions
1.0 FTE

- Cross trained to function as a clinical and staff pharmacist in other areas of the hospital

Primary focus is meeting CMS Core Measures

Since initiation of the position the hospital has had 100% adherence to HF core measures

Stephen.Gunadi@providence.org
HEART FAILURE STAGING
STAGES OF HEART FAILURE

Figure 1. Stages in the Development of Heart Failure/Recommended Therapy by Stage. ACEI indicates angiotensin-converting enzyme inhibitors; ARB, angiotensin II receptor blocker; EF, ejection fraction; FHx CM, family history of cardiomyopathy; HF, heart failure; LVH, left ventricular hypertrophy; and MI, myocardial infarction.

Josepp et al. JACC 53(15);2009:1343
Stage A

Definition
- High risk of HF without structural disease or symptoms

Patients with
- HTN
- Atherosclerotic Disease
- Diabetes
- Obesity
- Metabolic Syndrome

Goals
- Treat HTN
- Smoking cessation
- Treat lipid disorders
- Regular exercise
- Discourage alcohol intake
- Curb metabolic syndrome

Therapy
- ACE-I/ARB in appropriate patients with vascular disease or diabetes

Jessup et al. JACC 53(15);2009:1343
**Definition**

- Structural heart disease without signs or symptoms of HF

**Patients with**

- Previous MI
- LV remodeling-hypertrophy and reduced EF
- Asymptomatic valvular disease

**Goals**

- Treat HTN
- Smoking cessation
- Treat lipid disorders
- Regular exercise
- Discourage alcohol intake
- Curb metabolic syndrome

**Therapy**

- ACE-I/ARB and BB in appropriate patients

Jessup et al. JACC 53(15);2009:1343
**Stage C**

**Definition**
- Structural heart disease with prior or current symptoms of HF

**Patients with**
- Known structural heart disease AND
- Shortness of breath
- Reduced exercise tolerance
- Fatigue

**Goals**
- Same as stages A & B
- Dietary salt restriction

**Therapy**
- All Patients: ACE-I/ARB, BB, Diuretic
- Appropriate Patients: Aldosterone Antagonist, Vasodilator, Digitalis

Jessup et al. JACC 53(15);2009:1343
STAGE D

Definition

Refractory HF requiring specialized interventions

definition

Patients

Who have marked symptoms at rest despite maximal medical therapy
e.g. those who are recurrently hospitalized

Goals

Appropriate measures under stages A, B & C
Decisions regarding appropriate measures of care

Therapy

End-of-life care/hospice

Special interventions: heart transplant, chronic inotropes, permanent mechanical support

Jessup et al. JACC 53(15);2009:1343
High Risk of HF

**Stage A**
- Provides early identification of patients who are at risk of HF

**Stage B**
- Asymptomatic Left Ventricular Dysfunction (ASLVD) patients benefit from the same treatments as symptomatic HF
- Recommendation for ACE-I is stronger than BB

HF Diagnosis

**Stage C**
- Current or past symptoms of HF and underlying structural heart disease

**Stage D**
- Refractory HF

Jessup et al. JACC 53(15);2009:1343
## NYHA Classification

<table>
<thead>
<tr>
<th>Class</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>Cardiac disease without limitations of physical activity.</td>
</tr>
<tr>
<td>II</td>
<td>Cardiac disease with a slight limitation of physical activity. Comfortable at rest but ordinary physical activity results in fatigue, palpitation, dyspnea or anginal pain.</td>
</tr>
<tr>
<td>III</td>
<td>Cardiac disease resulting in marked limitation of physical activity. Comfortable at rest but less than ordinary physical activity causes fatigue, palpitation, dyspnea, or anginal pain.</td>
</tr>
<tr>
<td>IV</td>
<td>Cardiac disease with all physical activity causing discomfort. Symptoms may be present even at rest.</td>
</tr>
</tbody>
</table>
Use is limited by

♦ Inter-observer variability

♦ Insensitive to changes in exercise capacity

Limitations can be overcome by formal tests of exercise tolerance

♦ Measurement of how far a patient can walk in 6 minutes may have prognostic value

♦ However, serial changes in walking distance may not parallel changes in clinical status

Jessup et al. JACC 53(15);2009:1343-82
Patient Cases
CF is a 67yo AA male who has persistent symptoms of HF. His exercise tolerance is diminishing and he complains of increased fatigue. Clinically he appears to be euvolemic. He was last hospitalized for a HF exacerbation 2 months ago.

Current HF Regimen

Lisinopril 10 mg daily
Carvedilol 25 mg BID
Furosemide 20 mg daily

Vitals
BP 114/66
HR 62

What is the next best step in therapy?
- Increase lisinopril to 20 mg daily
- Increase furosemide to 40 mg daily
- Add spironolactone 12.5 mg daily
- Add hydralazine 25 mg + isosorbide dinitrate 20 mg three times daily
TB is a 73yo Caucasian female with symptomatic HF. She has been hospitalized twice in the last 90 days. To improve her LVEF and reach target doses carvedilol has been titrated to 6.125 mg BID. She presents today reporting symptoms of orthostatic hypotension. She states she has reduced her dose back to 3.125 mg BID “to feel better”.

**Current HF Regimen**
- Lisinopril 20 mg daily
- Carvedilol 3.125 mg BID
- Furosemide 20 mg daily

**Vitals**
- BP Sitting 115/62
- BP Standing 78/54
- HR 60

What is the most appropriate next step in therapy?

- **Red** ▲ lisinopril to 40 mg; continue carvedilol 3.125 mg BID
- **Yellow** ▲ carvedilol to 6.25 mg BID; ▼ lisinopril to 10 mg
- **Green** Switch to metoprolol succinate 12.5 mg daily; continue lisinopril 20 mg
- **Orange** Hold furosemide; ▲ carvedilol to 6.25 mg BID
JR is a 56yo AA male with resistant edema. In an effort to avoid hospitalization his furosemide dose was increased to 80 mg twice daily with instructions to track daily weights. At follow-up 3 days later JR has lost 1 lb and continues with 3+ pitting edema.

<table>
<thead>
<tr>
<th>Current HF Regimen</th>
<th>Vitals</th>
</tr>
</thead>
<tbody>
<tr>
<td>Valsartan 160 mg BID</td>
<td>BP 124/72</td>
</tr>
<tr>
<td>Bisoprolol 10 mg daily</td>
<td>HR 64</td>
</tr>
<tr>
<td>Furosemide 80 mg BID</td>
<td>3+ pitting edema</td>
</tr>
</tbody>
</table>

Which of the following will address resistant edema?

- [ ] Temporarily decrease bisoprolol to 5 mg daily
- [X] Switch to torsemide 40 mg BID
- [ ] Add eplerenone 25 mg daily
- [ ] Both Pink and Yellow
GK is a 65yo AA female with HF and history of MI 3 years ago and Type 2 DM. Her HF has been stable for over a year. She presents today for her 6 month check-up.

**Current Medications**
- Enalapril 10 mg BID
- Carvedilol CR 80 mg daily
- Furosemide 40 mg daily
- Spironolactone 25 mg daily
- Metformin 1000 mg BID
- Insulin glargine 24 units daily
- Lovastatin 20 mg daily

**Vitals**
- BP 152/88
- HR 60
- LDL 67
- A1C 7.2%

Which of the following would be appropriate changes?

- Add amlodipine 5 mg daily to improve BP control
- Add aspirin 81 mg for cardiovascular risk reduction
- Add hydralazine 25 mg + isosorbide dinitrate 20 mg TID
- All of the above
ACE-I/ARB therapy?
- Hydralazine plus nitrate

Beta blocker therapy?

At target doses?
- Time since last titration?

Contraindicated medications?

Blood pressure & HR

Labs- Na, K, Cr, Mg

Vaccines

Patient education
- Medications
- Lifestyle

Depression screening
DON’T FAIL YOUR PATIENTS:
Evidence Based Review of Heart Failure Treatment

Andrea Bishop, PharmD, BCACP, CDE
Andrea.Bishop2@providence.org
Northwest Pharmacy Convention
Coeur d’Alene, ID
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