Adult (Age ≥ 18) Heart Failure (HF) Guideline

### Therapy for AHA STAGE A

Provide patient with maximum medical therapy:
- Hypertension (Sanford Hypertension Guideline)
- Diabetes (Sanford Diabetes Guideline)
- Lipid disorders
- Control metabolic syndrome

Provide patient education (TABLE A / TABLE B):
- Encourage to exercise regularly
- Smoking cessation
- Achieve normal body weight
- Avoid illicit drugs and alcohol in excess

### Therapy for AHA STAGE B

Provide patient with all measures listed under Therapy for STAGE A.

In appropriate patients, the use of angiotensin converting enzyme inhibitor (ACE-I)/angiotensin receptor blockers (ARB) (TABLE C) and/or beta-blockers (TABLE D) should be considered.

Screen for depression/anxiety, consider Behavioral Health referral.

### Therapy for AHA STAGE C

Provide patient with all measures listed under Therapy for STAGE A.

Refer to Page 2 of Sanford HF Guideline

### Therapy for AHA STAGE D

Refer to Cardiologist

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This guideline is not intended to replace a provider’s judgment, but rather to support the decision-making process, which must be individualized for each patient’s circumstances.
### AHA STAGE C: Assess Patient with Known HF or Symptoms Suspicious of HF

- Unrelieved shortness of breath with exertion or at rest
- Unexplained fatigue
- Orthopnea
- Paroxysmal nocturnal dyspnea
- Peripheral edema
- Decreased exercise capacity
- Weight gain of > 5lbs in one week
- Chest pain or tightness
- Palpitations
- Dizziness/lightheadedness/syncope

### Patient Examination

**Stable Patient**

- Patient examination should include the following:
  - Evaluation of jugular venous distention
  - Palpation of cardiac apex and precordium
  - Assessment for galls or murmurs
  - Assessment of cardiac rhythm

**Unstable Patient**

- Patients who are clinically unstable should be immediately referred for emergency management and admitted if necessary

### Obtain the following laboratory tests and diagnostic studies:

- CBC
- UA
- Serum electrolytes
- Calcium
- Magnesium
- BUN
- Cr
- Glucose/lipid profile
- Liver enzymes
- TSH
- BNP
- Chest Xray
- EKG

### Echocardiogram

- **EF < 40%**
  - Refer to Cardiologist
  - Initiate Therapies
  - Stress Testing and/or Cardiology Referral IS Indicated

- **EF 40-49%**
  - Initiate Therapies
  - Stress Testing and/or Cardiology Referral IS Indicated

- **EF ≥ 50%**
  - Initiate Therapies
  - Stress Testing and/or Cardiology Referral IS Indicated

### Initiate Therapies

- **Initiate non-pharmacologic therapies (TABLE A / TABLE B)**
- **Initiate pharmacologic therapy beginning with ACEI/ARB (TABLE C) and/or beta-blocker (TABLE D)**
- **Add diuretic for evidence of volume overload (TABLE E)**
- **Consider aldosterone antagonist therapy (spironolactone) for refractory symptoms when ACEI/ARB, beta-blockers and diuretic therapy have been maximized/optimized (TABLE F)**
- **If EF< 35% after three months of maximal medical therapy, electrophysiology referral is indicated for sudden cardiac death risk evaluation and potential interventions**

- **Focus of treatment should be vigorous blood pressure control (see Sanford Hypertension Guideline)**
- **Utilize ACEI/ARB (TABLE C), beta-blocker (TABLE D), or diuretic (TABLE E) based upon blood pressure and volume status**

### Failure to Respond

- Refer to Cardiologist

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### TABLE A: Non-pharmacologic Management in Patients with HF

- Dietary instruction regarding sodium intake for all patients. Instruction on diabetes, dyslipidemia or severe obesity in selected patients.
- Dietary restriction of sodium 2-3g for all patients with HF. Further restriction (Na < 2g) in moderate to severe HF.
- Restriction of daily fluid intake < 2L in severe hyponatraemia (< 130 mEq/L). Consider in all patients with difficult to control fluid retention despite high dose diuretics and low sodium diet.
- Recommend daily multivitamins in patients with diet restrictions; evaluation for specific vitamin/nutrient deficiencies is rarely necessary.
- Document naturoceutical products. Avoid products containing ephedra (ma huang), ephedrine, or its metabolites (increased mortality and morbidity). Avoid products with significant drug interactions with digoxin, vasodilators, beta blockers, antiarrhythmic drugs and anticoagulants.

### TABLE B: Additional Therapies and Routine Health Maintenance

- CPAP in patients with sleep apnea (up to 50% of HF patients have sleep apnea)
- Supplemental oxygen not recommended in the absence of indication of underlying pulmonary disease. Evaluate for fluid retention of pulmonary disease if hypoxemic.
- Consider referral to Behavioral Health for difficulty with behavioral change and adherence
- Non-pharmacologic techniques for stress reduction
- Smoking cessation and limit alcohol to 2 drinks/day in men or 1 drink/day in women
- Pneumococcal and annual influenza vaccination
- Avoid NSAIDs

### TABLE C: Angiotensin Converting Enzyme Inhibitors (ACEI)

| Patient Exclusion: allergy, angioedema, intolerable cough, hyperkalemia (K ≥ 5.5) severe aortic stenosis, shock, symptomatic hypotension, bilateral renal artery stenosis, pregnancy |
| Initial Dose | Titration Steps | Target Dose |
| Captopril: 6.25 mg three times daily | Captopril: 12.5 mg or 25 mg three times daily | Captopril: 50 mg three times daily |
| Enalapril: 2.5 mg twice daily | Enalapril: 5 mg twice daily | Enalapril: 10 mg twice daily |
| Lisinopril: 2.5-5 mg daily | Lisinopril: 5 mg daily, 10 mg daily | Lisinopril: 20 mg daily |
| Ramipril: 2.25 mg daily | Ramipril: 5 mg daily | Ramipril: 10 mg daily |
| Quinapril: 10 mg daily | Quinapril: 20 mg daily, 40 mg daily | Quinapril: 80 mg daily |
| Fosinopril: 5-10 mg daily | Fosinopril: 20 mg daily, 40 mg daily | Fosinopril: 80 mg daily |

### Angiotensin Receptor Blockers (ARB) (if ACE intolerant)

| Patient Exclusion: hypersensitivity, shock, symptomatic hypotension, hyperkalemia, bilateral renal artery stenosis, pregnancy |
| Initial Dose | Titration Steps | Target Dose |
| Candesartan: 4-8 mg daily | Candesartan: 16 mg daily | Candesartan: 32 mg daily |
| Losartan: 12.5-25 mg daily | Losartan: 50 mg daily, 100 mg daily | Losartan: 150 mg daily |
| Valsartan: 40 mg twice daily | Valsartan: 80 mg twice daily | Valsartan: 160 mg twice daily |

### ACEI/ARB Patient Monitoring:

- Patients who cannot achieve target dose should be maintained on highest tolerated dose
- Titration steps are generally at 2 week intervals
- Monitor Na, K, BUN/Cr at least biweekly while titrating
- Check weights frequently and monitor volume status, as diuretic requirements may be altered
- Notify provider if symptomatic hypotension (mild hypotension, SBP 80-90, may be acceptable if tolerated without significant symptoms)
- ACEI/ARB are Class D in pregnancy, but probably safe in lactating females
This guideline is not intended to replace a provider’s judgment, but rather to support the decision-making process, which must be individualized for each patient’s circumstances.
TABLE E: Volume Overload – Loop Diuretic Dosing

| Signs: rales, JVP evaluation, positive hepato-jugular reflex, S3, sacral or lower extremity edema |
| Symptoms: dyspnea on exertion, PND, orthopnea, weight gain, abdominal bloating, decreased appetite, extremity swelling |

<table>
<thead>
<tr>
<th>Initial Dose</th>
<th>Maximum Dose</th>
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<tbody>
<tr>
<td>Furosemide: 40 mg once daily</td>
<td>Furosemide: 160-200 mg per day</td>
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<tr>
<td>Bumetanide: 1 mg once daily</td>
<td>Bumetanide: 4-8 mg per day</td>
</tr>
<tr>
<td>Torsemide: 10 mg once daily</td>
<td>Torsemide: 100-200 mg once daily</td>
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Diuretic Maintenance Dosing

<table>
<thead>
<tr>
<th>Action</th>
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<tbody>
<tr>
<td>Weight returned to baseline (identifiable cause for weight increase, e.g. non-adherence)</td>
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<tr>
<td>Weight returned to baseline, but patient failed original dose previously, or no known cause for weight increase</td>
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<tr>
<td>Weight returned to baseline, but required two or more diuretic titrations</td>
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<tr>
<td>Symptoms improved but weight has not returned to baseline</td>
</tr>
<tr>
<td>Persistent symptoms with no change in weight</td>
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</tbody>
</table>

Persistent or worsening symptoms, and/or increase in weight, and/or history of frequent hospitalizations for volume overload Consider adding metolazone, IV diuretic, or hospitalization. PO metolazone may be added in resistant cases for no more than 3 days, then reassess

Volume Overload – Loop Diuretic Dosing/Patient Monitoring:

- Indicated for fluid overload (edema, ascites, dyspnea, weight gain)
- Volume status and electrolytes must be closely monitored with adjustment or when on multiple diuretics; daily chronic use of metolazone should be avoided if possible
- Increasing administration frequency to 2 or even 3 times per day will provide more diuresis with less physiologic perturbation than larger single dose
- Determine from patient subjective diuretic effect when adjusting dosage. If good response noted, increase dose frequency. If no diuretic response noted, increase dose.
- Instruct patient on maintaining sodium-restrictive diet, and limiting fluid intake < 2 L/day when serum sodium <130 mEq/L
- Daily weights
- With recent adjustment of dose, electrolytes, BUN, Cr should be monitored (weekly with each titration)
- If worsening renal function occurs, patient re-evaluation is required
- Assess volume status on every visit; watch for hypovolemia/over diuresis

Volume Overload – Metolazone Dosing

<table>
<thead>
<tr>
<th>Initial Dose</th>
<th>Maximum Dose</th>
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<tbody>
<tr>
<td>Metolazone: 2.5 mg daily</td>
<td>Metolazone: 5 mg daily</td>
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</table>

Volume Overload – Metolazone Dosing/Patient Monitoring:

- Use only when volume overload refractory to maximal loop diuretic therapy
- May use daily initially for 3 days, but chronic daily use is discouraged. Target no more than every other day or 3 times per week.
- Metabolic derangements (hypokalemia, renal failure) may be substantial. Weekly Na, K, BUN/Cr should be monitored weekly initially, or after dosage titration, until stability assured.
- Risk of sudden volume shifts is significant. Monitor weights and blood pressure closely.
Regarding HF with preserved LV function (EF > 50%):

- No specific treatment has been shown to produce long term mortality benefit, and primary treatment should focus on vigorous blood pressure control, with use of diuretics as needed to control signs and symptoms of volume overload.
- Ischemic heart disease may still be causal, and stress testing is indicated.
- In the absence of ischemic heart disease or risk factors, consider hypertrophic (restrictive) cardiomyopathy and constrictive pericarditis.

Maximizing dosing of ACEI/ARB and beta-blocker dosing is important for long-term benefits, irrespective of blood pressure levels, and lower blood pressures (SBP 80-90) if asymptomatic or minimally symptomatic should not deter up-titration of medication dosing.

**TABLE F: Aldosterone Antagonists**

<table>
<thead>
<tr>
<th>Initial Dose</th>
<th>Titration Steps</th>
<th>Target Dose</th>
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<tbody>
<tr>
<td>Spironolactone: 12.5 mg daily</td>
<td>Spironolactone: 25 mg daily</td>
<td>Spironolactone: 25 mg daily</td>
</tr>
</tbody>
</table>

**Aldosterone Antagonists Dosing/Patient Monitoring:**
- Given complexity of therapy/monitoring, consider cardiology consultation prior to institution of therapy.
- Metabolic effects and renal impact may be significant. Na, K, BUN/Cr should be monitored at 3 days, 1 week, 1 month, then at 3 months at initiation, or after dosage change.
- Therapy should be held for K > 5.2, rapidly rising Cr, or absolutely if Cr > 40.
- Monitor closely for fluid and hemodynamic shifts (weights, blood pressure).

<table>
<thead>
<tr>
<th>Stage</th>
<th>Definition</th>
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<tbody>
<tr>
<td>Stage A</td>
<td>At high risk for HF but without structural heart disease or symptoms of HF (pre-clinical)</td>
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<tr>
<td>Stage B</td>
<td>Structural heart disease but without signs or symptoms of HF</td>
</tr>
<tr>
<td>Stage C</td>
<td>Structural heart disease with prior or current symptoms of HF</td>
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<tr>
<td>Stage D</td>
<td>Refractory HF (heart failure) requiring specialized interventions</td>
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**American Heart Association and American College of Cardiology’s Staging System**

**New York Heart Association (NYHA) Classification**

<table>
<thead>
<tr>
<th>Class</th>
<th>Patient Symptoms</th>
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<tbody>
<tr>
<td>Class I (Mild)</td>
<td>No limitation of physical activity. Ordinary physical activity does not cause undue fatigue, palpitation, or dyspnea (shortness of breath).</td>
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<tr>
<td>Class II (Mild)</td>
<td>Slight limitation of physical activity. Comfortable at rest, but ordinary physical activity results in fatigue, palpitation, or dyspnea.</td>
</tr>
<tr>
<td>Class III (Moderate)</td>
<td>Marked limitation of physical activity. Comfortable at rest, but less than ordinary activity causes fatigue, palpitation, or dyspnea.</td>
</tr>
<tr>
<td>Class IV (Severe)</td>
<td>Unable to carry out any physical activity without discomfort. Symptoms of cardiac insufficiency at rest. If any physical activity is undertaken, discomfort is increased.</td>
</tr>
</tbody>
</table>

**Clinical Pearls**

- Regarding HF with preserved LV function (EF > 50%):
  - No specific treatment has been shown to produce long term mortality benefit, and primary treatment should focus on vigorous blood pressure control, with use of diuretics as needed to control signs and symptoms of volume overload.
  - Ischemic heart disease may still be causal, and stress testing is indicated.
  - In the absence of ischemic heart disease or risk factors, consider hypertrophic (restrictive) cardiomyopathy and constrictive pericarditis.

- Maximizing dosing of ACEI/ARB and beta-blocker dosing is important for long-term benefits, irrespective of blood pressure levels, and lower blood pressures (SBP 80-90) if asymptomatic or minimally symptomatic should not deter up-titration of medication dosing.

**References**