APPENDICES
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.
**Adult (Age ≥ 18) Heart Failure (HF) Guideline**

**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**

<table>
<thead>
<tr>
<th>Stable Patient</th>
<th>Unstable Patient</th>
</tr>
</thead>
<tbody>
<tr>
<td>Obtain the following laboratory tests and diagnostic studies:</td>
<td>Patients who are clinically unstable should be immediately referred for emergency management and admitted if necessary</td>
</tr>
<tr>
<td>CBC</td>
<td>Magnesium</td>
</tr>
<tr>
<td>UA</td>
<td>BUN</td>
</tr>
<tr>
<td>Serum electrolytes</td>
<td>SCR</td>
</tr>
<tr>
<td>Calcium</td>
<td>Glucose/lipid profile</td>
</tr>
<tr>
<td>Liver enzymes</td>
<td>Chest Xray</td>
</tr>
<tr>
<td>EF 40-49%</td>
<td>EKG</td>
</tr>
<tr>
<td>EF ≥ 50%</td>
<td></td>
</tr>
<tr>
<td>EF &lt; 40%</td>
<td>Refer to Cardiologist</td>
</tr>
<tr>
<td>EF 40-49%</td>
<td>Initiate therapies</td>
</tr>
<tr>
<td>EF ≥ 50%</td>
<td>Initiate therapies</td>
</tr>
</tbody>
</table>

**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 H)
- If EF < 35% after three months of maximal medical therapy, electrophysiology referral is indicated for sudden cardiac death risk evaluation and potential interventions
- If EF remains < 40% and still symptoms worsen, recommend changing ACEI/ARB to ARNI (Entresto)
- For comments regarding ivabradine (Corlanor), see “Clinical Pearls” section

**Echocardiogram**

<table>
<thead>
<tr>
<th>EF &lt; 40%</th>
<th>EF 40-49%</th>
<th>EF ≥ 50%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Refer to Cardiologist</td>
<td>Initiate therapies</td>
<td>Initiate therapies</td>
</tr>
</tbody>
</table>

**Stress Testing and/or Cardiology Referral IS Indicated**

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

**Failure to Respond**

- Refer to Cardiologist

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 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.
- Restriction of daily fluid intake < 2L in severe hyponatremia (< 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 naturopathic 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) (First Line)

Patient Exclusion: allergy, angioedema, intolerable cough, hyperkalemia (K ≥ 5.0) severe aortic stenosis, shock, symptomatic hypotension, bilateral renal artery stenosis, pregnancy, SCr > 3 mg/dl

<table>
<thead>
<tr>
<th>Initial Dose</th>
<th>Titration Steps</th>
<th>Target Dose</th>
</tr>
</thead>
<tbody>
<tr>
<td>Captopril: 6.25 mg three times daily</td>
<td>Captopril: 12.5 mg or 25 mg three times daily</td>
<td>Captopril: 50 mg three times daily</td>
</tr>
<tr>
<td>Enalapril: 2.5 mg twice daily</td>
<td>Enalapril: 5 mg twice daily</td>
<td>Enalapril: 10-20 mg twice daily</td>
</tr>
<tr>
<td>Lisinopril: 2.5-5 mg daily</td>
<td>Lisinopril: 5 mg daily, 10 mg daily</td>
<td>Lisinopril: 20-40 mg daily</td>
</tr>
<tr>
<td>Ramipril: 2.25 mg daily</td>
<td>Ramipril: 5 mg daily</td>
<td>Ramipril: 10 mg daily</td>
</tr>
<tr>
<td>Quinapril: 5 mg twice daily</td>
<td>Quinapril: 10 mg twice daily</td>
<td>Quinapril: 20 mg twice daily</td>
</tr>
<tr>
<td>Fosinopril: 5-10 mg daily</td>
<td>Fosinopril: 20 mg daily, 40 mg daily</td>
<td>Fosinopril: 20-40 mg daily</td>
</tr>
</tbody>
</table>

Angiotensin Receptor Blockers (ARB) (if ACE intolerant) (Second Line)

Patient Exclusion: hypersensitivity, shock, symptomatic hypotension, hyperkalemia, bilateral renal artery stenosis, pregnancy

<table>
<thead>
<tr>
<th>Initial Dose</th>
<th>Titration Steps</th>
<th>Target Dose</th>
</tr>
</thead>
<tbody>
<tr>
<td>Candesartan: 4-8 mg daily</td>
<td>Candesartan: 16 mg daily</td>
<td>Candesartan: 32 mg daily</td>
</tr>
<tr>
<td>Losartan: 25 -50 mg daily</td>
<td>Losartan: 50 mg daily, 100 mg daily</td>
<td>Losartan: 150 mg daily</td>
</tr>
<tr>
<td>Valsartan: 20 - 40 mg twice daily</td>
<td>Valsartan: 80 mg twice daily</td>
<td>Valsartan: 160 mg twice daily</td>
</tr>
</tbody>
</table>

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/SCr at least biweekly while titrating
- ACEI inhibitor therapy should not be discontinued unless serum SCr level rises above 30% over baseline during the first two months after initiation of therapy or hyperkalemia develops
- 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

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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.

### TABLE D
Angiotensin–receptor/neprilysin inhibitor (ARNI)

*First line therapy if symptoms worsen on ACEI or ARB*

<table>
<thead>
<tr>
<th>Patient Exclusion: Allergy, angioedema to ACEI or ARB, concomitant use of ACEI or Aliskiren, hyperkalemia &gt; 5.0, symptomatic hypotension, pregnancy</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Initial Dose</th>
<th>Titration Steps</th>
<th>Target Dose</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sacubitril/valsartan: 24/26 mg BID</td>
<td>49/51 mg BID</td>
<td>97/103 mg BID</td>
</tr>
</tbody>
</table>

**ARNI Monitoring (see ACEI/ARB monitoring for comparison)**
- Patients who cannot achieve target dose, maintained on highest tolerated dose
- Titrations every 2-4 weeks
- Monitor sodium, potassium, BUN/SCr one week after titration
- Check weights
- Notify provider
- Class D in pregnancy
- When changing from any ACEI to ARNI, stop taking ACEI and allow a 36 hour washout before starting ARNI
- When changing from any ARB to ARNI, stop taking ARB, and ARNI can be administered next scheduled dose
- Recommend changing from ACEI/ARB to ARNI if symptoms worsen

### TABLE E
Beta Blockers

<table>
<thead>
<tr>
<th>Patient Exclusion: cardiogenic shock, unstable or decompensated HF, symptomatic bradycardia, symptomatic hypotension, 2nd/3rd degree heart block without pacemaker, severe reactive airway</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Initial Dose</th>
<th>Titration Steps</th>
<th>Target Dose</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carvedilol: 3.125 mg twice daily</td>
<td>Carvedilol: 6.25 mg twice daily, 12.5 mg twice daily</td>
<td>Carvedilol: 25 mg twice daily, 50 mg twice daily if weight &gt; 85 kg</td>
</tr>
<tr>
<td>Metoprolol (sustained release): 12.5-25 mg daily</td>
<td>Metoprolol (sustained release): 50 mg daily, 100 mg daily, 150 mg daily</td>
<td>Metoprolol (sustained release): 200 mg daily</td>
</tr>
</tbody>
</table>

**Beta-Blocker Patient Monitoring:**
- Patients who cannot achieve target dose should be maintained on highest tolerated dose
- Titrations steps are generally at 2 week periods
- Daily weights: Patient should compile daily weight log and notify if weight increase 3-5 or more pounds in 1 week
- Symptoms: Notify MD if symptomatic hypotension or bradycardia develops
- Blood pressure and heart rate; if SBP < 80 mmHg or HR < 55 bpm, assess carefully for signs of hypoperfusion
- Diuretic dosage: If volume overload develops, continue beta-blocker unless the following develops:
  - Cardiogenic shock
  - Symptomatic hypotension
  - Narrow pulse pressure
- Use of only approved beta blocker in HF recommended
- Mild hypotension (SBP 80-90) may be acceptable if tolerated without significant symptoms

### TABLE F
Vasodilators

- Vasodilators are used in combination with ACEI/ARB/ARNI or single therapy in patients with chronic kidney disease.
- The combination of hydralazine and isosorbide dinitrate is recommended to reduce morbidity and mortality for African American patients with NYHA III to IV HF and EF < 40% despite optimal therapy with ACEI and beta blockers
- A combination of hydralazine and isosorbide dinitrate can be useful to reduce morbidity or mortality in patients with current or prior heart failure with reduced EF who cannot be given an ACEI or ARB because of drug intolerance, hypotension, or renal insufficiency

<table>
<thead>
<tr>
<th>Initial Dose</th>
<th>Titration Steps</th>
<th>Target Dose</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hydralazine 25 mg TID</td>
<td>50-75 mg TID</td>
<td>75 mg TID</td>
</tr>
<tr>
<td>Isosorbide Dinitrate 10 mg TID</td>
<td>20-30 mg TID</td>
<td>40 mg TID</td>
</tr>
</tbody>
</table>

**Vasodilator patient monitoring:**
- Titration every 2 weeks
- BP Monitoring
### TABLE G: Volume Overload – Loop Diuretic Dosing

<table>
<thead>
<tr>
<th>Signs</th>
<th>Symptoms</th>
</tr>
</thead>
<tbody>
<tr>
<td>rales, JVP evaluation, positive hepato-jugular reflex, S3, sacral or lower extremity edema</td>
<td>dyspnea on exertion, PND, orthopnea, weight gain, abdominal bloating, decreased appetite, extremity swelling</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Initial Dose</th>
<th>Maximum Dose</th>
</tr>
</thead>
<tbody>
<tr>
<td>Furosemide: 40 mg once daily</td>
<td>Furosemide: 160-200 mg per day</td>
</tr>
<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>
</tr>
</tbody>
</table>

#### Diuretic Maintenance Dosing

| Weight returned to baseline (identifiable cause for weight increase, e.g. non-adherence) | Resume original dose |
| Weight returned to baseline, but patient failed original dose previously, or no known cause for weight increase | Continue at current increased dose |
| Weight returned to baseline, but required two or more diuretic titrations | Resume dose prior to last increase (down one titration level) |
| Symptoms improved but weight has not returned to baseline | Continue at current increased dose |
| Persistent symptoms with no change in weight | Continue next titration level |
| 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, SCR 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>
</tr>
</thead>
<tbody>
<tr>
<td>Metolazone: 2.5 mg daily</td>
<td>Metolazone: 5 mg daily</td>
</tr>
</tbody>
</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/SCr 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.

**American Heart Association and American College of Cardiology’s Staging System**

<table>
<thead>
<tr>
<th>Stage</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stage A</td>
<td>At high risk for HF but without structural heart disease or symptoms of HF (pre-clinical)</td>
</tr>
<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>
</tr>
<tr>
<td>Stage D</td>
<td>Refractory HF (heart failure) requiring specialized interventions</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Class</th>
<th>Patient Symptoms</th>
</tr>
</thead>
<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>
</tr>
<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**

- 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.
- Ivabradine (Corlanor) may be considered to reduce HF hospitalization for NYHA class II-III patients with EF ≤ 35% who are taking maximum tolerated dose of beta blocker, are in sinus rhythm, with HR ≥ 70 bpm

- 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.

**REFERENCES**


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.
Clinical support staff check Blood Pressure at each visit per Blood Pressure Measurement Standard

Provider Identifies Patient Goal
- Diabetes: 140/90 (any age)
- Chronic Kidney Disease: 140/90 (any age)
- Vascular Disease: 140/90 (any age)
- Age ≥ 60: 150/90
- All others: 140/90

Provider enters goal into Goals Section of One Chart, indicating patient specific target

Is blood pressure running above goal?

Provider confirms elevation of blood pressure over time to make diagnosis of hypertension

Provider or Health Coach RN educate on:
- Hypertension
- Exercise
- Low Sodium Diet
- Other Therapeutic Lifestyle Choices
- Home Blood Pressure Monitoring
  - ORDER Home Blood Pressure Cuff

HANDOUTS
- What is High Blood Pressure?
- Exercise for Healthier Heart
- Tips for Using Less Salt
- Checking Your Own Blood Pressure

Provider decides if treatment will be started today?

Patients that may NOT be appropriate for RN managed protocol:
- Those who may need lower doses or more time between titration do to other factors [extremely elderly &/or those with fluid dynamic issues (eg. CHF)]
- Those with initial BP>160/100 where provider would like to start two medications initially
- Those with allergies to the protocol medications
- Pregnant Patients

RN: Is the patient Black?

RN: Is the patient diabetic?

RN: Is the patient Male?

 Initiate “Female (non-Diabetic) or Black” Provider Treatment Protocol (page 2)

 Initiate “Male (non-Black) or Diabetic” Provider Treatment Protocol (page 3)

Initiate provider treatment protocol by Gender (page 2 or 3)
**Provider Hypertension Treatment Protocol – Female (non-diabetic) or Black**

**Used for all Blacks (even if Diabetic or mixed race) & Female without Diabetes**
- Visit every two weeks until controlled
- Dose/medication adjustment at every visit until controlled
- Controlled defined as BP to goal on all readings, including in clinic value
- Assess for non-adherence/medication understanding at each visit
- If home blood pressures are controlled, but clinic blood pressures are not, consider ambulatory blood pressure monitoring

### Visit & Treatment Schedule

<table>
<thead>
<tr>
<th>No.</th>
<th>Instructions</th>
</tr>
</thead>
</table>
| 1   | Start HCTZ 12.5mg daily in morning  
Give HCTZ handout |
| 2   | BMP Today  
If not to goal, increase HCTZ to 25mg daily in morning |
| 3   | BMP today  
If not to goal, add amlodipine 5mg daily in evening  
Give amlodipine handout |
| 4   | If not to goal, increase amlodipine to 10mg daily in evening |
| 5   | If not to goal, add lisinopril 10mg daily  
Give lisinopril handout |
| 6   | BMP Today  
If not to goal, increase lisinopril to 10mg twice daily  
If cough has developed, discontinue lisinopril, switch to losartan 25mg daily  
Give losartan handout |
| 7   | BMP Today  
If not to goal, increase lisinopril to 20mg twice daily  
If using losartan and not controlled, increase to 50mg daily |
| 8   | BMP Today  
If not to goal, consider further evaluation for underlying cause of resistant hypertension  
SEE SIDEBAR |
| 9   | If not to goal, start Metoprolol XL 50mg daily  
Do not initiate Metoprolol XL if:  
• Patient has short gut or feeding tube (use non-XL formulation of beta blocker)  
• Patient has heart rate of <60  
Give Metoprolol handout |
| 10  | If not to goal, increase Metoprolol XL to 100mg daily  
Do not increase if heart rate is <60 |
| 11  | If not to goal, increase Metoprolol XL to 200mg daily  
Do not increase if heart rate is <60 |
| 12  | If not to goal, referral to hypertension specialty clinic or nephrology depending on local resources |

**Other HANDOUTS as Needed**
- Controlling High Blood Pressure
- Manage Stress with a Healthy Lifestyle
- Walking for Fitness
- Low-Salt Choices
- Tips for Quitting Smoking
- Coping with Smoking Withdrawal

**Further evaluation of resistant hypertension**
- If PCP is an APP, then APP will touch base with a doctor regarding the patient and the direction to proceed with evaluation/treatment.

**Provider(s) should consider:**
1) Further evaluation for secondary causes:
   a. Laboratory Studies including  
      • TSH  
      • PTH (if baseline Ca [prior to starting HCTZ] > 10.7)  
      • Renin (done in AM)  
      • Aldosterone
   b. Imaging with Renal Ultrasound with doppler  
   c. Sleep Apnea evaluation
2) Other Contributing Factors
   a. Consider non-adherence or medication confusion  
      • Obtain dispensing history from Pharmacy  
      • Ask patient to bring in pill bottles & explain what they are taking & when
   b. Considering interfering agents (NSAIDs, allergy medications)
   c. Review alcohol, nicotine, recreational drug usage
   d. Evaluate for depression  
   e. Evaluation for patient activation or engagement
   f. Diet/exercise patterns
3) Medication adjustment
   a. Consider change of HCTZ to Chlorthalidone if HCTZ does not seem to be achieving 24 hour coverage
4) Referral to
   a. Behavioral health regarding activation
   b. Designated hypertension specialist (HTN clinic, nephology, etc., depending on local resources)
   c. Dietician
This protocol is used when the provider is managing the patient.

Used for all Diabetics (except Blacks) and all Men (except Blacks)
- Visit every two weeks until controlled
- Dose/medication adjustment at every visit until controlled
- Controlled defined as BP to goal on all readings, including in clinic value
- Assess for non-adherence/medication understanding at each visit
- If home blood pressures are controlled, but clinic blood pressures are not, consider ambulatory blood pressure monitoring

### Visit & Treatment Schedule

<table>
<thead>
<tr>
<th>Step</th>
<th>Description</th>
</tr>
</thead>
</table>
| 1    | o Start lisinopril 10mg daily  
  • Give lisinopril handout |
| 2    | o BMP Today  
  o If not to goal, increase lisinopril to 10mg twice daily  
  o If cough has developed, discontinue lisinopril, switch to losartan 25mg daily  
  • Give losartan handout |
| 3    | o BMP Today  
  o If not to goal, increase losartan to 20mg twice daily  
  o If using losartan and not controlled, increase to 50mg daily |
| 4    | o BMP Today  
  o If not to goal, add amlodipine 5mg daily in evening  
  • Give amlodipine handout |
| 5    | o If not to goal, increase amlodipine to 10mg daily in evening |
| 6    | o If not to goal, start HCTZ 12.5mg daily in morning  
  • Give HCTZ handout |
| 7    | o BMP Today  
  o If not to goal, increase HCTZ to 25mg daily in morning |
| 8    | o BMP Today  
  o If not to goal, consider further evaluation for underlying cause of resistant hypertension  
  • SEE SIDEBAR |
| 9    | o If not to goal, start Metoprolol XL 50mg daily  
  o Do not initiate Metoprolol XL if:  
    ▪ Patient has short gut or feeding tube (use non-XL formulation of beta blocker)  
    ▪ Patient has heart rate of <60  
  • Give Metoprolol handout |
| 10   | o If not to goal, increase Metoprolol XL to 100mg daily  
  o Do not increase if heart rate is <60 |
| 11   | o If not to goal, increase Metoprolol XL to 200mg daily  
  o Do not increase if heart rate is <60 |
| 12   | o If not to goal, referral to hypertension specialty clinic or nephrology depending on local resources |

### Further evaluation of resistant hypertension
- If PCP is an APP, then APP will touch base with a doctor regarding the patient and the direction to proceed with evaluation/treatment.

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   a. Laboratory Studies including
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      ▪ PTH (if baseline Ca [prior to starting HCTZ] > 10.7)
      ▪ Renin (done in AM)
      ▪ Aldosterone
   b. Imaging with Renal Ultrasound with doppler
   c. Sleep Apnea evaluation
2) Other Contributing Factors
   a. Consider non-adherence or medication confusion
      ▪ Obtain dispensing history from Pharmacy
      ▪ Ask patient to bring in pill bottles & explain what they are taking & when
   b. Considering interfering agents (NSAIDs, allergy medications)
   c. Review alcohol, nicotine, recreational drug usage
   d. Evaluate for depression
   e. Evaluation for patient activation or engagement
   f. Diet/exercise patterns
3) Medication adjustment
   a. Consider change of HCTZ to Chlorthalidone if HCTZ does not seem to be achieving 24 hour coverage
4) Referral to
   a. Behavioral health regarding activation
   b. Designated hypertension specialist (HTN clinic, nephology, etc., depending on local resources)
   c. Dietician

### Other HANDOUTS as Needed
- Controlling High Blood Pressure
- Manage Stress with a Healthy Lifestyle
- Walking for Fitness
- Low-Salt Choices
- Tips for Quitting Smoking
- Coping with Smoking Withdrawal

References
Appendix C

Lipid Screening & Treatment Protocol

Primary Prevention – No Known Vascular Disease

<table>
<thead>
<tr>
<th>Age 18-21</th>
<th>Screen for secondary causes of elevation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Draw TSH, BMP</td>
</tr>
<tr>
<td></td>
<td>Dietician Referral</td>
</tr>
</tbody>
</table>

This symbol means Nurses can place these screening orders per nursing treatment protocol.

Hyperlipidemia
- Total cholesterol > 240
- LDL > 190
- 10 year risk ≥ 7.5%
- Known vascular disease

Action: Put hyperlipidemia on the Problem List and the story of treatment decisions in the overview.

<table>
<thead>
<tr>
<th>Age 21-39</th>
<th>Screen once during this time frame with Lipid Panel</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Is LDL &gt; 190 or TG &gt; 500?</td>
</tr>
<tr>
<td></td>
<td>NO</td>
</tr>
<tr>
<td></td>
<td>YES</td>
</tr>
<tr>
<td></td>
<td>Screen for secondary causes of elevation</td>
</tr>
<tr>
<td></td>
<td>Draw TSH, BMP</td>
</tr>
<tr>
<td></td>
<td>Dietician Referral</td>
</tr>
<tr>
<td></td>
<td>Treat with high intensity statin</td>
</tr>
</tbody>
</table>

Most insurers, including Medicaid & most BCBS plans do cover dietician visits for hyperlipidemia. Medicare does not, but if the patient has a BMI of >30 they will cover with the diagnosis of obesity & generally the same topics will be covered by the dietician.

Handouts: Cholesterol (controlling); Exercise for a Healthier Heart; Understanding Fat and Cholesterol; Recommendations for Laboratory Testing in Lipid Treatment

<table>
<thead>
<tr>
<th>Age 40-75</th>
<th>Diabetic?</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>YES</td>
</tr>
<tr>
<td></td>
<td>Other CVD risk factors?</td>
</tr>
<tr>
<td></td>
<td>NO</td>
</tr>
<tr>
<td></td>
<td>NO</td>
</tr>
<tr>
<td></td>
<td>Check lipid panel &amp; calculate 10 year ASCVD risk every 5 years</td>
</tr>
<tr>
<td></td>
<td>Is the 10 year ASCVD risk ≥ 7.5%?</td>
</tr>
<tr>
<td></td>
<td>YES</td>
</tr>
<tr>
<td></td>
<td>Treat with moderate to high intensity statin</td>
</tr>
<tr>
<td></td>
<td>Refer to Dietician</td>
</tr>
</tbody>
</table>

If risk factors change, recheck lipid panel & recalculate risk sooner than 5 years.

Consider treatment for risk > 5.0% if family history, pre-diabetes & other known risks.

As age approaches 75, many patients will have risk > 7.5%. As always, a discussion of risk/benefit ratio of medications is appropriate.

<table>
<thead>
<tr>
<th>Age &gt; 75</th>
<th>No Screening Recommended</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>If previously met criteria for statin for primary prevention, consider discontinuation after discussing benefit/risk with patient.</td>
</tr>
</tbody>
</table>

Secondary Causes for Hyperlipidemia Most Commonly Encountered in Clinical Practice (see references)

<table>
<thead>
<tr>
<th>Secondary Cause</th>
<th>Elevated LDL-C</th>
<th>Elevated Triglycerides</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diet</td>
<td>Saturated or trans fats, weight gain, anorexia</td>
<td>Weight gain, very low-fat diets, high intake of refined carbohydrates, excessive alcohol intake</td>
</tr>
<tr>
<td>Drugs</td>
<td>Diuretics, cyclosporine, glucocorticoids, amiodarone</td>
<td>Oral estrogens, glucocorticoids, bile acid sequestrants, protease inhibitors, retinoic acid, anabolic steroids, sirolimus, relaxifene, tamoxifen, beta blockers (not carvedilol), thiazides</td>
</tr>
<tr>
<td>Disease</td>
<td>Biliary obstruction, nephrotic syndrome</td>
<td>Nephrotic syndrome, chronic renal failure, lipodystrophies</td>
</tr>
<tr>
<td>Disorders &amp; altered states of metabolism</td>
<td>Hypothyroidism, obesity, pregnancy</td>
<td>Diabetes (poorly controlled), hypothyroidism, obesity, pregnancy</td>
</tr>
</tbody>
</table>

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.
Primary prevention in non-diabetics already on a statin, but risk not previously calculated using ASCVD model & 2013 guidelines

**Do you know a pre-statin LDL?**

- **YES**
  - **Was it >190?**
    - **YES**
      - **Prescribe** high intensity statin
    - **NO**
  - **NO**

- **NO**

**Use pre-statin LDL to calculate ASCVD risk**

**Is the 10 yr ASCVD risk ≥ 7.5%?**

- **YES**
  - **Consider** 2-3 month trial of statin; **recheck** fasting lipid panel; **recalculate** ASCVD risk with new number
  - **Treat with moderate to high intensity statin**
  - **Refer to Dietician**

**Secondary Prevention – All Vascular Disease: Cardiac, Stroke, Peripheral**

**New acute cardiac event?**

- **NO**
  - **Patient previously on statin or evaluated for secondary causes of hyperlipidemia?**
    - **NO**
      - **Age > 75?**
        - **YES**
          - **Treat with high intensity statin**
        - **NO**
        - **Draw TSH or BMP**
        - **Refer to Dietician**
    - **YES**
      - **See Acute Cardiovascular Event**

**Most insurers, including Medicaid & most BCBS plans do cover dietician visits for hyperlipidemia. Medicare does not, but if the patient has a BMI of >30 they will cover with the diagnosis of obesity & generally the same topics will be covered by the dietician.**

**Acute Cardiovascular Event**

**Patient presents with Acute MI**

- **Start atorvastatin 80 mg daily**
- **Draw lipid panel first AM fasting**
- **At discharge, consider continuation of 80mg atorvastatin daily (especially in younger patients with known additional disease) vs. 40mg daily**

**Positive Calcium Score**

**What was calcium score?**

- **> 400**
  - **Cardiology Referral**
- **100 - 400**
  - **Follow primary prevention guidelines**
- **< 100**
  - **Follow primary prevention guidelines**

Even though these patients are told their score is abnormal, primary prevention is the only needed intervention.
**Treatment of Lipids**

- **Lifestyle modifications of diet & exercise recommended for all**
- **Is the patient female of child bearing age?**
  - **YES**
    - Patient can *not* be on a statin while pregnant. **Evaluate** risk of treatment vs. future pregnancy
  - **NO**
    - **What intensity will be used?**
      - **MODERATE**
        - Give Atorvastatin Handout
        - **Prescribe** Atorvastatin 10mg tablet
        - Days 1-7
        - Days 8-14: Then 1 full tablet daily
        - Days 15-28: Then 2 tablets daily
        - Days 29 & Beyond: Increase to one 80mg tablet daily
        - **Recheck** lipid panel with provider visit at 12 weeks
      - **HIGH**
        - Give Atorvastatin Handout
        - **Prescribe** Atorvastatin 20mg tablet, tablet daily
        - Days 1-7
        - Days 8-14: Then 1 full tablet daily
        - Days 15-28: Then 2 tablets daily
        - Days 29 & Beyond: Increase to one 80mg tablet daily
        - **Recheck** lipid panel with provider visit at 12 weeks

- **Did you get the expected decrease in LDL (30%)?**
  - **YES**
    - **Continue treatment,** see **Ongoing Lab Evaluation**
  - **NO**
    - **Insufficient Response Evaluation** - Assess for:
      - Medication adherence
      - Lifestyle change adherence
      - Possible secondary causes of hyperlipidemia – at a minimum draw TSH if not already completed
    - **Increase** Atorvastatin to 20mg tablet
    - **Recheck** lipid panel at 8-12 weeks
    - **Consider adding** Ezetimibe 10mg
    - **Give** Ezetimibe Handout
    - **If no response**, refer to endocrinology or cardiology for use of newer injectable agents

- **Did you get the expected decrease in LDL (50%)?**
  - **YES**
    - **Continue treatment,** see **Ongoing Lab Evaluation**
  - **NO**
    - **Insufficient Response Evaluation** - Assess for:
      - Medication adherence
      - Lifestyle change adherence
      - Possible secondary causes of hyperlipidemia – at a minimum draw TSH if not already completed
    - **Consider adding** Ezetimibe 10mg
    - **Give** Ezetimibe Handout
    - **If no response**, refer to endocrinology or cardiology for use of newer injectable agents

- **Ongoing Laboratory Evaluation**
  - Lipid Panel 1x Annually
  - ALT/AST only if symptoms of hepatic toxicity (unusual fatigue or weakness, loss of appetite, abdominal pain, dark colored urine, yellowing of skin or sclera)
  - CK should only be done if myalgias

- **Nurses can help place lipid panel order every 12 months in stable dose med or 12 weeks after med or dose change.**

**Comments on Other Agents**
- **Niacin**: If patient is on Niacin, this medication should be discontinued as it may increase death rate
- **Gemfibrozil** or other fibrates
  - Increases risk of muscle toxicity
  - Can be used for prevention of pancreatitis in those with elevated TGs, but there is no evidence to support using it for cardiac prevention
- **Ezetimibe** should not be used as mono-therapy unless no statin is tolerated. There is some evidence in secondary prevention literature that this may be of benefit.
- **Cholestyramine**: Recommended only for pregnant women with extremely high LDL who are felt to need treatment during pregnancy
- **Co-Enzyme Q10**: Debatable evidence for myalgia reduction with statin treatment
- **Omega 3 Fatty Acids**: No current evidence as to cardiovascular benefit
- **Vitamin E**: No current evidence as to cardiovascular benefit
- **Red Yeast Rice**: No proven benefit.

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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.
**Myalgia at any point in treatment**

1. **Draw CK & TSH**
   - CK elevated? **YES**
     - No statin 2 months
     - Recheck CK
     - Reevaluate treatment options
   - CK elevated? **NO**
     - 2-4 week trial off statin

2. **Resume drug at previous decreased dose**
   - Did myalgias return? **YES**
     - Draw SLCO1B1
     - SLCO1B1 Abnormal? **YES**
       - Does patient need a high intensity statin? **YES**
         - Rosuvastatin 20mg
         - Consider use of:
           - Rosuvastatin (5) – 10mg daily
           - Simvastatin – 20-40mg daily
           - Pravastatin 40 – 80mg daily
           - Fluvastatin XL – 80mg daily
           - Fluvastatin – 40mg 2x daily
           - Pitavastatin – 2-4mg daily
     - SLCO1B1 Abnormal? **NO**
       - Every other day dosing regimen or consider alternative medication
     - Does patient need a high intensity statin? **NO**
       - Repeat 2-4 week trial off statin

3. **Repeat 2-4 week trial off statin**
   - Did myalgias return? **NO**
     - Give Myalgias in Statins Handout
     - Observation
      
4. **Draw SLCO1B1**
   - SLCO1B1 Abnormal? **YES**
     - Does patient need a high intensity statin? **YES**
       - Rosuvastatin 20mg
       - Consider use of:
         - Rosuvastatin (5) – 10mg daily
         - Simvastatin – 20-40mg daily
         - Pravastatin 40 – 80mg daily
         - Fluvastatin XL – 80mg daily
         - Fluvastatin – 40mg 2x daily
         - Pitavastatin – 2-4mg daily

Note: Doses in *italics* have not been validated in randomized controlled trials.

**Recommendation**

- **Recommendation** is to titrate patient to maximum tolerated dose (up to the recommended dose for their intensity level) of whichever medication is selected. Every other day dosing may help with tolerance of medication.

**Hypothyroidism**

- Hypothyroidism is the most common of the conditions that may increase the risk for myalgia. If abnormal, evaluate and treat as you otherwise would.

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.
**Clinical Pearls**

1. Grapefruit juice inhibits CYP3A4; however, daily consumption of eight ounces of grapefruit juice, or one-half of a grapefruit or less, is unlikely to increase the risk of an adverse interaction or muscle injury. (See Concurrent Drug Therapy above.)

2. There is no evidence that atorvastatin is better taken in the evening. It can be taken at any time of day.

3. **Hypothyroidism and other disorders** — Enhanced susceptibility to statin-associated myopathy occurs in patients with hypothyroidism, acute or chronic renal failure, and obstructive liver disease. In one hypothyroid patient, the myopathy resolved promptly after discontinuation of pravastatin and before initiation of thyroid hormone replacement [54], but in a second case the myopathy persisted until thyroid hormone was replaced [55]. These reports suggest that hypothyroidism may predispose to the development of statin-associated myopathy and that use of statins may “unmask” hypothyroid myopathy. (See “Hypothyroid myopathy”.)

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**References**

2. American Diabetes Association—Standards of Care in Diabetes—2015
POLICY/PROCEDURE:
Quality-Clinic

DEVELOPED/REVISED BY: DATE: REVIEWED/REVISED: REV/REV:

DISTRIBUTION: REV/REV: REV/REV: REV/REV:

GOALS:
To provide high quality patient care through systematic, ongoing monitoring, thereby identifying problems or potential problems with that care or with individual competence and through the evaluation of the data collected, track sources of the difficulties and effect resolutions.

RESPONSIBILITY:
The Administrator shall be responsible for the implementation of the QAPI in the department. There shall be a designated quality assurance person in the department to help the supervisor carry out the implementation and functions of the Clinic QAPI program.

SCOPE OF PATIENT SERVICES:
The Clinic Department will provide services to all patients who have been recommended by a medical staff, consulting, or other qualified physician to have such tests performed.

FUNCTIONS:
The functions of the Clinic Department will be to:

1. To design effective mechanisms for identification, assessment, resolution, evaluation and performance improvement of nursing practice.
2. Providers will adhere to Government quality regulations (MACRA, ACO).
3. To develop effective systems for the documentation and dissemination of quality assessment and performance improvement activity findings to appropriate persons and /or committees.
4. To enhance skills and knowledge of health care through performance improvement and educational opportunities.
5. To minimize potential for malpractice and liability claims.

ACTION:
Clinic staff will perform a continual assessment of performance with implementation of solutions, assessment of the effectiveness of the solutions, and evaluations to determine what can be done better. If a problem is identified, an analysis of the cause will follow and action will be

This policy was developed as a guide for the delivery of health services and is not intended to define the standard of care. This policy should be used as a guide for the delivery of service, although hospital personnel may deviate from this guide to provide appropriate individualized care.
taken to correct the problem with a follow-up to determine the effectiveness of the action. Any problem that cannot be resolved within the department shall be referred to the Administrator or QAPI Coordinator.

**REPORTING:**

The Clinic shall submit a report of its Quality Assessment and Performance Improvement Activities to the QAPI Coordinator on a scheduled basis or as indicated. This will consist of the results of monitoring, identification of problems based on an analysis of the results, steps taken to correct the problem and whether the problem was corrected.

**PROGRAM EVALUATION:**

The Clinic shall review their entire Quality Assessment/Performance Improvement Program on an scheduled basis for effectiveness, assessment of critical indicators, effective checking to ensure problems are not lost or ignored and sustained elimination or reduction of problems. The use of findings from the QAPI programs may be used in the individual clinical competence of its employees.
GOALS:

The Patient Care Quality Assessment / Performance Improvement (QAPI) Program at Hospital is a part of the hospital wide QAPI program. The goal of the plan is to develop and establish a well defined, organized patient care service QAPI program designed to enhance patient care and assess appropriate allocation of healthcare resources through ongoing objective assessment of important aspects of patient care and the performance improvement of identified problems.

OBJECTIVES:

1. To assess the delivery of inpatient, surgical services, outpatient and emergency room care at an optimally achievable level of quality in a safe and cost-effective manner.
2. To design effective mechanisms for identification, assessment, resolution, evaluation and performance improvement of nursing practice.
3. To identify, assess and resolve problems in patient care areas.
4. To include in the quality assessment and performance improvement of the patient care departments, the review that nursing care practices and professional competency are routinely and reliably evaluated.
5. To develop effective systems for the documentation and dissemination of quality assessment and performance improvement activity findings to appropriate persons and / or committees.
6. To enhance skills and knowledge of nursing staff through performance improvement and educational opportunities.
7. To minimize potential for malpractice and liability claims.

MAJOR ASPECTS OF CARE:

1. To identify important or potential problems or related concerns in the care of patients.
2. To assess objectively the cause and scope of problems / concerns, including the determination of priorities for both investigating and solving problems.
3. To implement by appropriate individuals, or through designating mechanisms, decisions...
4. To monitor activities designed to assess and improve desirable results that have been achieved and sustained.

5. To document and reasonably substantiate the effectiveness of the overall program to enhance patient care and assess and improve sound clinical performance.

6. To monitor discharge planning for continuity of care for the patient during the post hospital phase.

RESPONSIBILITY:

The Director of Nursing will appoint nursing staff to research and report on a specific quality assessment indicator needing improvement. The staff member(s) will give the completed report to the Director of Nursing.

Other responsibilities will include, but are not limited to:

1. Reviewing proposed monitoring activities to prevent unnecessary duplication, avoid conflicts within and outside the nursing department and assist in the identification of potential multi-disciplinary studies.

2. Facilitating and coordinating nursing monitoring activities.

3. Assisting in generating and coordinating ideas for monitoring activities.

4. Coordinating a schedule of monitoring activities based on their impact to patient care.

5. Assisting in the selection / development of criteria for monitoring activities.

6. Accounting for the completion of objectives of the Patient Care Quality Assessment / Performance Improvement Program.

ACTION:

Once a problem is identified, an analysis of the cause will follow and action will be taken to correct the problem with a follow up to determine the effectiveness and performance improvement of the action. Actions shall result in the sustained alleviation or elimination of the problem. Any problem that cannot be resolved within the department shall be referred to the Administrator or QAPI Coordinator.

REPORTING:

The Nursing Department shall submit a report of its Quality Assessment and Performance Improvement Activities to the QAPI Coordinator on a yearly basis. This will consist of the results of monitoring, identification of problems based on an analysis of the results, steps taken to correct the problem and whether the problem was corrected.
**MEETINGS:**

At the nursing staff meeting, the nursing staff members will report to the general nursing staff any outcomes of studies which may benefit or change any existing policies / protocols.

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**PROGRAM EVALUATION:**

The Director of Nursing shall review the entire Quality Assessment / Performance Improvement Program on an annual basis for effectiveness, assessment of critical indicators, effective checking to ensure problems are not lost or ignored and sustained elimination or reduction of problems. The use of findings from the QAPI program may be used in the individual clinical competence of its employees.