JNC 8 Hypertension Guideline Algorithm

Adult aged ≥ 18 years with HTN
Implement lifestyle modifications
Set BP goal, initiate BP-lowering medication based on algorithm

General Population
(no diabetes or CKD)

Diabetes or CKD present

Age ≥ 60 years
Age < 60 years

BP Goal < 150/90
BP Goal < 140/90

All Ages
Diabetes present
No CKD

BP Goal < 140/90

All Ages and Races
CKD present with or without diabetes

BP Goal < 140/90

Nonblack

BP Goal < 140/90

Black

BP Goal < 140/90

Initiate thiazide, ACEI, ARB, or CCB, alone or in combo

Initiate thiazide or CCB, alone or combo

Initiate ACEI or ARB, alone or combo with another class

At blood pressure goal?

Yes

No

Reinforce lifestyle and adherence
Titrate medications to maximum doses or consider adding another medication (ACEI, ARB, CCB, Thiazide)

At blood pressure goal?

Yes

No

Reinforce lifestyle and adherence
Add a medication class not already selected (i.e., beta blocker, aldosterone antagonist, others) and titrate above medications to max (see back of card)

At blood pressure goal?

Yes

No

Reinforce lifestyle and adherence
Titrate meds to maximum doses, add another med and/or refer to hypertension specialist

Card developed by Cole Glenn, Pharm.D. & James L Taylor, Pharm.D.

Initial Drugs of Choice for Hypertension
- ACE inhibitor (ACEI)
- Angiotensin receptor blocker (ARB)
- Thiazide diuretic
- Calcium channel blocker (CCB)

Strategy | Description
--- | ---
A | Start one drug, titrate to maximum dose, and then add a second drug.
B | Start one drug, then add a second drug before achieving max dose of first
C | Begin 2 drugs at same time, as separate pills or combination pill. Initial combination therapy is recommended if BP is greater than 20/10mm Hg above goal

Lifestyle changes:
- Smoking Cessation
- Control blood glucose and lipids
- Diet
  - Healthy (i.e., DASH diet)
  - Moderate alcohol consumption
  - Reduce sodium intake to no more than 2,400 mg/day
- Physical activity
  - Moderate-to-vigorous activity 3-4 days a week averaging 40 min per session.
## Hypertension Treatment

<table>
<thead>
<tr>
<th>Compelling Indications</th>
<th>Treatment Choice</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heart Failure</td>
<td>ACEI/ARB + BB + diuretic + spironolactone</td>
</tr>
<tr>
<td>Post-MI/Clinical CAD</td>
<td>ACEI/ARB AND BB</td>
</tr>
<tr>
<td>CAD</td>
<td>ACEI, BB, diuretic, CCB</td>
</tr>
<tr>
<td>Diabetes</td>
<td>ACEI/ARB, CCB, diuretic</td>
</tr>
<tr>
<td>CKD</td>
<td>ACEI/ARB</td>
</tr>
<tr>
<td>Recurrent stroke prevention</td>
<td>ACEI, diuretic</td>
</tr>
<tr>
<td>Pregnancy</td>
<td>labetolol (first line), nifedipine, methyldopa</td>
</tr>
</tbody>
</table>

### Beta-1 Selective Beta-blockers

- metoprolol
- bisoprolol
- betaxolol
- acebutolol

### Drug Class

#### Diuretics
- HCTZ 12.5-50mg, chlorthalidone 12.5-25mg, indapamide 1.25-2.5mg, triamterene 100mg
- *K+ sparing* – spironolactone 25-50mg, amiloride 5-10mg, triamterene 100mg
- furosemide 20-80mg twice daily, torsemide 10-40mg

#### ACEI/ARB
- **ACEI:** lisinopril, benazapril, fosinopril and quinapril 10-40mg, ramipril 5-10mg, trandolapril 2-8mg
- **ARB:** candesartan 8-32mg, valsartan 80-320mg, losartan 50-100mg, olmesartan 20-40mg, telmisartan 20-80mg

#### Beta-Blockers
- metoprolol succinate 50-100mg and tartrate 50-100mg twice daily, nebivolol 5-10mg, propranolol 40-120mg twice daily, carvedilol 6.25-25mg twice daily, bisoprolol 5-10mg, labetolol 100-300mg twice daily

#### Calcium channel blockers
- **Dihydropyridines:** amlodipine 5-10mg, nifedipine ER 30-90mg, **Non-dihydropyridines:** diltiazem ER 180-360 mg, verapamil 80-120mg 3 times daily or ER 240-480mg

#### Vasodilators
- hydralazine 25-100mg twice daily, minoxidil 5-10mg
- terazosin 1-5mg, doxazosin 1-4mg given at bedtime

#### Centrally-acting Agents
- clonidine 0.1-0.2mg twice daily, methyldopa 250-500mg twice daily, guanfacine 1-3mg

### Comments

- Monitor for hypokalemia
- Most SE are metabolic in nature
- ACEI: lisinopril, benazapril, fosinopril and quinapril
- ARB: candesartan
- Spironolactone - gynecomastia and hyperkalemia
- Loop diuretics may be needed when GFR <40mL/min
- SE: Cough (ACEI only), angioedema (more with ACEI), hyperkalemia
- Losartan lowers uric acid levels; candesartan may prevent migraine headaches
- Not first line agents – reserve for post-MI/CHF
- Cause fatigue and decreased heart rate
- Adversely affect glucose; mask hypoglycemic awareness
- Cause edema; dihydropyridines may be safely combined w/ B-blocker
- Non-dihydropyridines reduce heart rate and proteinuria
- Hydralazine and minoxidil may cause reflex tachycardia and fluid retention – usually require diuretic + B-blocker
- Alpha-blockers may cause orthostatic hypotension
- Clonidine available in weekly patch formulation for resistant hypertension