Effectiveness of lifestyle modifications for lowering BP

Modification	Recommendation	Approximate BP reduction
Weight loss	Maintain normal body weight (BMI 18.5-24.9)	5-20 mmHg per 20 lb weight loss
DASH diet	Diet rich in fruits, vegetables, and low-fat dairy products	8-14 mmHg
Physical activity	Aerobic exercise >30 min most days	4-9 mmHg
Low-salt diet	Reduce dietary sodium to max 2,400 mg/day (only if +HTN)	2-8 mmHg
Stress reduction	Practice a stress reduction modality such as meditation regularly	5 mmHg
Moderate alcohol consumption	Limit consumption to max 1 drink per day for women and 2 drinks per day for men	2-4 mmHg
Tobacco cessation	Incorporate cessation modality of choice	2-4 mmHg (1 week after cessation)

Pharmaceutical approach: JNC 8 or ACC/AHA First line: monotherapy

- Regardless of the guidelines avoid starting an older patient on two antihypertensive drug at the same time.
- Patient with no specific clinical reason/comorbidities
- 4 main class of drugs
    1. Thiazide diuretics (chlorthalidone preferred)
    2. Dihydropyridine Calcium channel Blockers (Example: Norvasc: Vasodilators, with minimal inotropic effect: No decrease heart rate)
    3. ACE inhibitors
    4. ARB if can't use ACE
- Monotherapy based upon age and race
    - FYI patient <50 yo: Ace inhibitor or ARB,
    - Patient > 60 yo: Thiazide or dihydropyridine CCBs.
    - Black patients any age: Thiazide or dihydropyridine CCBs

Sequential Drug therapy if does not respond to monotherapy

- Please do not follow strategy A. Too many issue and not beneficial in the long run, Usually followed for patient max on all drugs (resistant to all drugs.) So keep away.

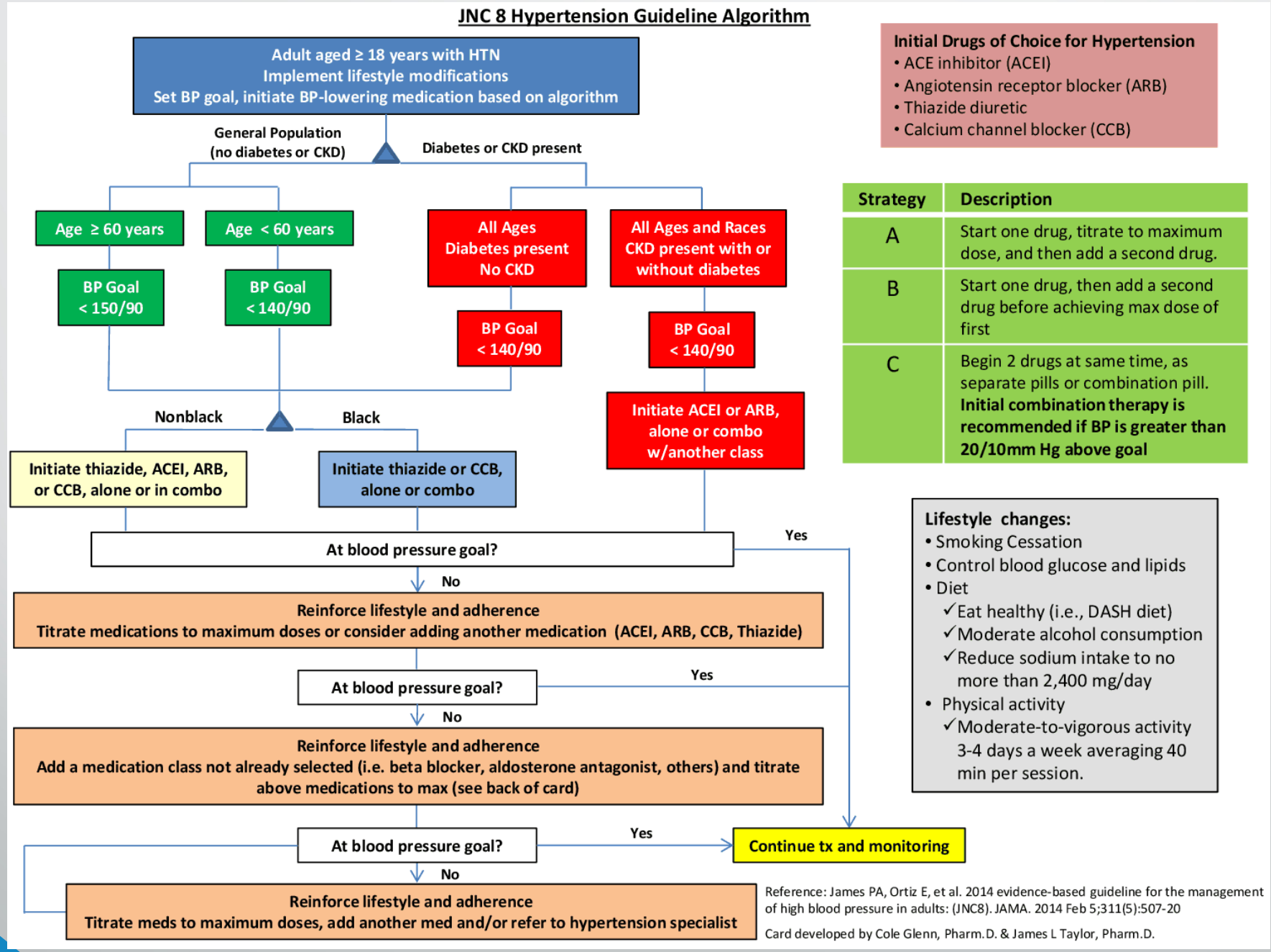
- **<u>For older patient: Follow strategy B.</u>**
  - For instance: patient not at goal and compliant with Norvasc 10 mg daily, do not increase to 20 mg daily, instead you can add thiazide 12.5 mg daily.

- For patient less than 50 yo or if robust less than 60 yo you may follow strategy C.

- Avoid Strategy C for patient older than 60 yo.

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**

JNC 8 Hypertension Guideline Algorithm



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
  - ✓Eat 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.

Reference: James PA, Ortiz E, et al. 2014 evidence-based guideline for the management of high blood pressure in adults: (JNC8). JAMA. 2014 Feb 5;311(5):507-20

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

According to the ACC/AHA:

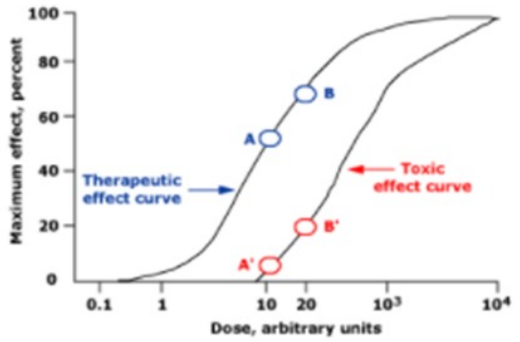
- The decision to initiate drug therapy should be individualized and involve shared decision-making between patient and provider. (CHART chart chart)

- **Patient with a diagnosed of HTN without comorbidities**
  - Patients with out-of-office daytime blood pressure ≥135 mmHg systolic or ≥85 mmHg diastolic
  - And/or an average office blood pressure ≥140 mmHg systolic or ≥90 mmHg diastolic

- **Patient with a diagnosed of HTN with comorbidities**
  - Patients with an out-of-office or in-office blood pressure (mean home or daytime ambulatory) ≥130 mmHg systolic or ≥80 mmHg diastolic and the following comorbidities
    - Established clinical cardiovascular disease (eg, chronic coronary syndrome [stable ischemic heart disease], heart failure, carotid disease, previous stroke, or peripheral arterial disease)
    - Type 2 diabetes mellitus
    - Chronic kidney disease
    - Age 65 years or older
    - An estimated 10-year risk of atherosclerotic cardiovascular disease of at least 10 percent

Titration for older patients

Dose relation between therapeutic effect and toxicity with antihypertensive drugs



The theoretical therapeutic and toxic effect curves of antihypertensive agents vary based upon the administered dose. The theoretical effects of a single drug given at two different doses (10 and 20 units) are shown. At a dose of 10 units, the antihypertensive agent has a minimal toxic effect (A') and a moderate therapeutic effect (A). Doubling the dose, however, is associated with substantial toxic effects (B') but little increase in therapeutic efficacy (B).

- Patient specific: Guidelines differ from one organization to the other
- Reasonable approach for older patients:
  - After monotherapy has been initiated, assess in 4 to 6 weeks
  - If inadequate response titrate up to mid range of the medication (ex: HCTZ 12.5 to 25 mg) then reassess in 4 to 6 weeks
  - Limit titration to one step with a given drug. Never max a drug (strategy B)
  - If one step titration fails, you can do the following:
    - Switch to a different more potent antihypertensive agent.
    - Divide current dose to twice daily (for instance instead of Norvasc 10 mg daily-> Norvasc 5 mg twice daily)
      - Not always the best: issue with compliance.
    - Add a second medications (lower end for instance for a older patient add Norvasc 5 mg daily to HTCZ 25 mg daily) and assess in 4 to 6 weeks.
      - If they can afford it and available, prescribe a combo med
      - Add a second med (dose specific to patient's B/p and tolerance: if less than b/p 20/10 : lowest dose, higher dose if above and can tolerate it)

Considerations for individualizing antihypertensive therapy

Indication or contraindication	Antihypertensive drugs
Compelling indications (major improvement in outcome independent of blood pressure)	
Heart failure with reduced ejection fraction	ACE inhibitor or ARB, beta blocker, diuretic, aldosterone antagonist*
Postmyocardial infarction	ACE inhibitor or ARB, beta blocker, aldosterone antagonist
Proteinuric chronic kidney disease	ACE inhibitor or ARB
Angina pectoris	Beta blocker, calcium channel blocker
Atrial fibrillation rate control	Beta blocker, nondihydropyridine calcium channel blocker
Atrial flutter rate control	Beta blocker, nondihydropyridine calcium channel blocker
Likely to have a favorable effect on symptoms in comorbid conditions	
Benign prostatic hyperplasia	Alpha blocker
Essential tremor	Beta blocker (noncardioselective)
Hyperthyroidism	Beta blocker
Migraine	Beta blocker, calcium channel blocker
Osteoporosis	Thiazide diuretic
Raynaud phenomenon	Dihydropyridine calcium channel blocker
Contraindications	
Angioedema	Do not use an ACE inhibitor
Bronchospastic disease	Do not use a non-selective beta blocker
Liver disease	Do not use methyldopa
Pregnancy (or at risk for)	Do not use an ACE inhibitor, ARB, or renin inhibitor (eg, aliskiren)
Second- or third-degree heart block	Do not use a beta blocker, nondihydropyridine calcium channel blocker unless a functioning ventricular pacemaker
Drug classes that may have adverse effects on comorbid conditions	
Depression	Generally avoid beta blocker, central alpha-2 agonist
Gout	Generally avoid loop or thiazide diuretic
Hyperkalemia	Generally avoid aldosterone antagonist, ACE inhibitor, ARB, renin inhibitor
Hyponatremia	Generally avoid thiazide diuretic
Renovascular disease	Generally avoid ACE inhibitor, ARB, or renin inhibitor

ACE: angiotensin-converting enzyme; ARB: angiotensin receptor blocker.
* A benefit from an aldosterone antagonist has been demonstrated in patients with NYHA class III-IV heart failure or decreased left ventricular ejection fraction after a myocardial infarction.

Adapted from: The Seventh Report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure. JAMA 2003; 289:2560.

Contraindications

- ▪ Diuretics may worsen gout.
- Avoid thiazide and loop diuretic in patient with sulfa allergy – Cross sensitivity
- ▪ *β*-Blockers (relative) in reactive airway disease, heart block, diabetes, and peripheral vascular disease; probably should be avoided in patients with metabolic syndrome or insulin-requiring diabetes.
- *β*-Blockers : Wean slowly after chronic use.
- Diltiazem or verapamil: Do not use with systolic dysfunction or heart block.
- Amlodipine may cause peripheral edema and GERD.
- CCB: don't prescribe to patients with heart block without a pacemaker.

Key Clinical Points

1. The prevalence of hypertension increases steadily with age.
2. Older people develop systolic hypertension due to the age-related increase in arterial stiffness. Systolic blood pressure and pulse pressure, both closely associated with arterial stiffness, confer the greatest significance as cardiovascular and cerebrovascular risk factors.
3. Age-related changes in systems that regulate blood pressure result in greater blood pressure variability. Therefore, careful attention is needed to accurately measure and diagnose hypertension, as well as monitoring for adverse drug events—especially postural hypotension—throughout treatment.
4. Older hypertensive individuals commonly have physiologic characteristics that respond effectively to lifestyle modifications.

Hypertension.

- Follow-up
  - Frequency based on level of hypertension:
    - Prehypertensive: 3 to 6 months
    - If systolic and/or diastolic B/P less than 20 mmHg from target four to 6 weeks
    - If systolic and/or diastolic B/P more than 20 mmHg from target within two to 4 weeks.
    - Best practice: one month to bring B/P to target. Usually not possible for the elderly as you have to go slow and start low.
    - Repeat electrolytes, BUN/creatinine about 3 to 6 weeks after initiating thiazide diuretics, ARB, or ACEi, to evaluate for drug-induced complications
    - When patient is stable: OK to follow up q 6 to 12 months.