HYPERTENSION

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SAVE
GAZA
PALESTINE

Objectives

- Know the definition of hypertension.
- Know the proper way to measure blood pressure.
- Be familiar with the complications and consequences of uncontrolled hypertension.
- Know the recommended follow up intervals for BP monitoring.
- Know the evidence based approach for controlling hypertension for both pharmacological and non-pharmacological treatments.

Why do we care ?

- Hypertension is present in **more than 30% of the general population** and, with the aging of the population and the increase in obesity, its prevalence is expected to increase.
- Hypertension is an **important risk factor** for many common diseases including:
  - Stroke.
  - End-stage renal disease.
  - Congestive heart failure, and myocardial infarction.
- It is the most common **modifiable cardiac risk factor**.
- Aggressive control of blood pressure (BP) results in a significant decline in morbidity and mortality.

Definition of Hypertension

- Hypertension is defined as a BP of **130/80 mm Hg or higher** (i.e., a systolic BP of ≥130 mm Hg, a diastolic BP of ≥80 mm Hg, or both).
- The classification of BP applies to patients **not taking antihypertensives** and **without acute illness** (which may raise or lower BP).
- patients taking antihypertensive medication are considered to have hypertension.

Definition of Hypertension

Systolic BP	Diastolic BP	JNC-7 (2003)	JNC-8 (2013)	AHA (2017)	ESH (2023)
<120	<80	Normal BP	Normal BP	Normal BP	Optimal BP
120-129	<80	Prehypertension	Prehypertension	Elevated BP	Normal BP
130-139	80-89	Prehypertension	Prehypertension	Stage 1	High Normal BP
140-159	90-99	Stage 1	Stage 1	Stage 2	Stage 1
≥160	≥100	Stage 2	Stage 2	Stage 2	Stage 2

JNC: Joint National Committee, AHA: American Heart Association, ESH: European society of hypertension

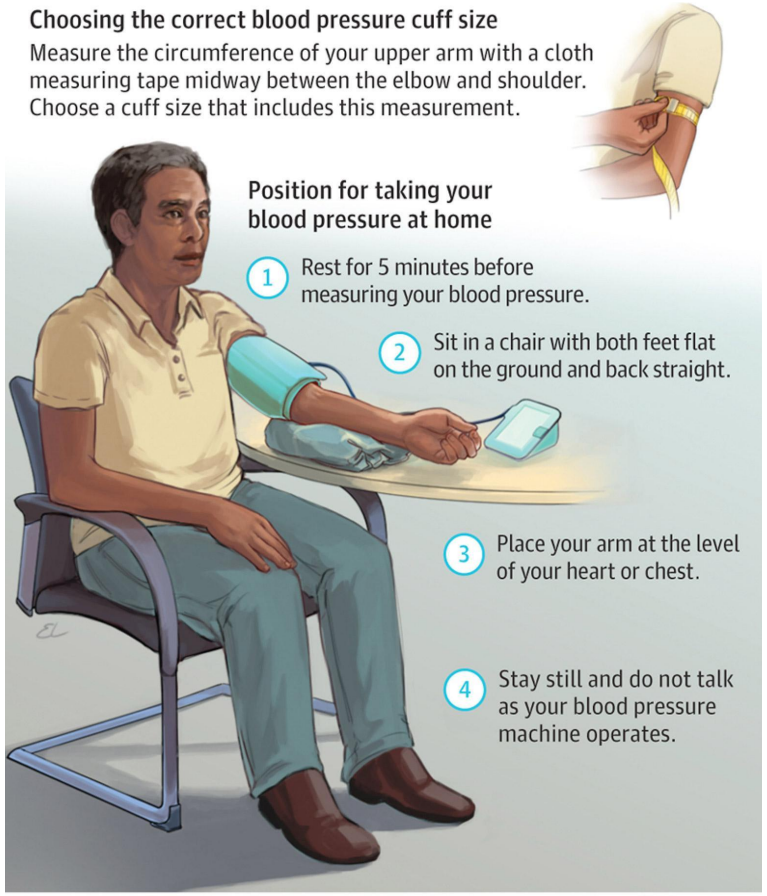
Definition of Hypertension

- **Prehypertension** is a risk category, not a disease, patients in this category are at high risk of progressing to actual hypertension and should be targeted for lifestyle modification
- **Hypertensive urgency** refers to severe hypertension without acute end-organ dysfunction There is no agreed-upon BP that defines hypertensive urgency, although some sources use **180/110 mm Hg**.
- **Hypertensive emergency** implies elevated BP with **acute end-organ dysfunction**, most patients have BPs greater than or equal to **160/110 mmHg**.
- **White coat Hypertension** is a condition in which blood pressure is high at your healthcare provider's office, but you get a normal reading at home.

How to measure Blood pressure

Patient Factors

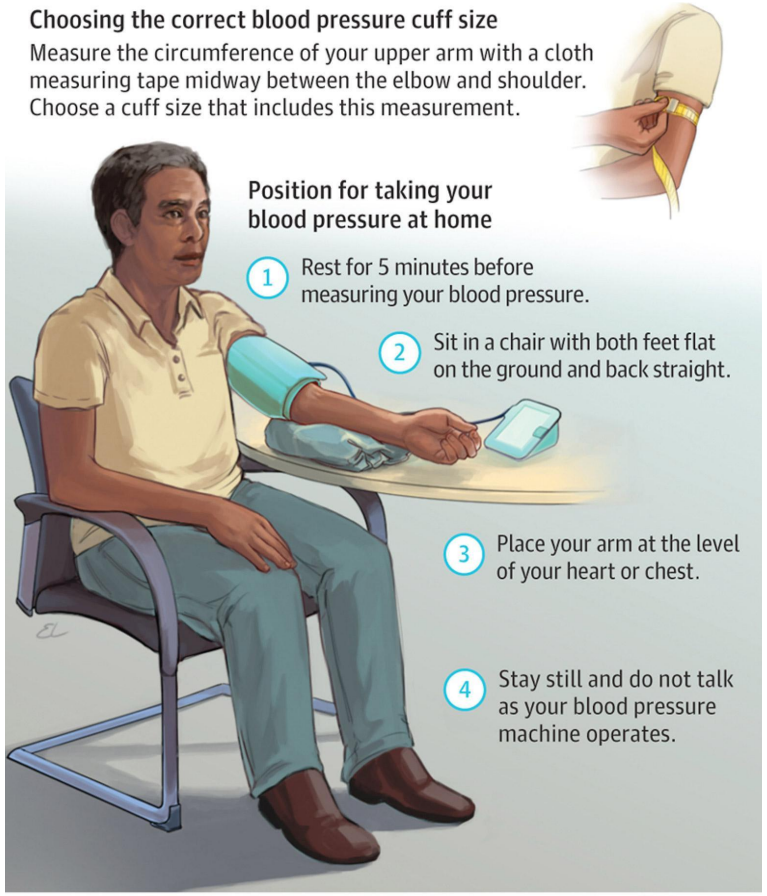
- **Caffeine (1 hour)**, **Cigarettes (15 min)**, **Rest (5 min)** before the BP measurement.
- Patient **not talking** and **seated comfortably**, **back and arm supported**, and **legs uncrossed**.
- The urinary bladder should be empty.
- BP should also be checked in both, **the arm with the higher reading is used**.
- If sequential BP readings are taken in the same position, at least 30 seconds should elapse between BP readings.
- To establish a diagnosis of hypertension, obtain **BP readings on two different occasions, at least 1 week apart**.



How to measure Blood pressure

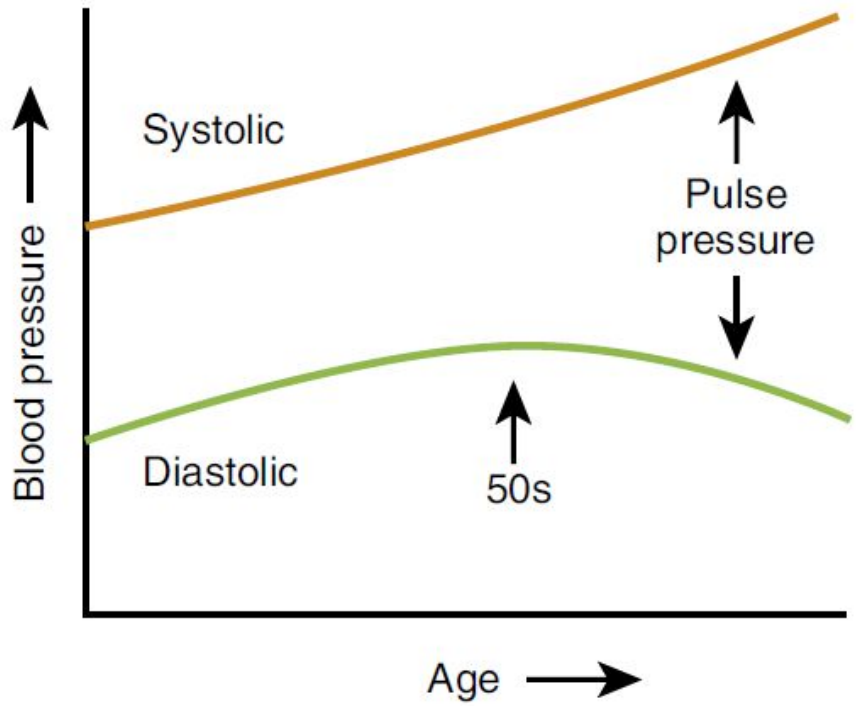
Equipment

- The **width of the cuff** should be equal **to two-thirds** of the distance from the antecubital space to the axilla and should be **40% of the arm circumference**.
- The cuff must be **at the level of the heart**, and the arm should be bare.
- The best cuff for most adults is the 15-cm-wide cuff with a bladder of 33 to 35 cm in length.
- The distal edge of the cuff should be 2.5 cm (1 inch) above the antecubital fossa.



Epidemiology

- Hypertension affects **34% of adult males and 29% of adult females** in Jordan.
- There is a graded relationship between the level of BP and the incidence of stroke, end-stage renal disease, congestive heart failure, and ischemic heart disease Under age 50.
- **Diastolic BP** is the most important predictor of cardiovascular outcomes.
- Above age 50, **Systolic BP** is the most important predictor BP and the prevalence of hypertension rise with age.



Pathophysiology

- Most patients **(>90%) do not have an identifiable cause of hypertension**; this is commonly referred to as **essential hypertension**.
- BP is the product of **cardiac output** and **peripheral vascular resistance**; although increased cardiac output may play a role in the initiation of hypertension, most patients with long-standing hypertension have increased peripheral resistance with normal or diminished cardiac output.
- Certain persons respond more strongly to changes in **sodium intake and extracellular fluid status** and are described as salt sensitive; salt sensitivity occurs more commonly among African Americans and the elderly.
- End-organ damage from hypertension affects the kidneys, heart, vasculature, brain, and eyes.

Clinical Presentation

- Most patients are **asymptomatic**.
- Some may already have **evidence of target organ damage** at first presentation.
- Occasionally, patients may present with hypertensive urgencies or emergencies.

Clinical Presentation

Clinical Manifestations of Chronic Target Organ Damage in Hypertension	
Heart	Left ventricular hypertrophy Left ventricular dysfunction Signs/symptoms of CHF Coronary artery disease Angina
Brain	Cerebrovascular disease History of stroke Carotid bruit
Eyes	Retinovascular disease Arteriolar narrowing Arteriovenous nicking Hemorrhage Exudates
Vasculature	Atherosclerosis Claudication Diminished or absent pulses Renal or femoral bruits
Kidneys	Hypertensive nephrosclerosis, ESRD Proteinuria or microalbuminuria Elevated serum creatinine

Clinical Presentation

Manifestations of Acute End-Organ Damage in Hypertensive Emergency	
Hypertensive encephalopathy	Headache ,Altered mental status Seizures, Nausea, vomiting Papilledema Abnormalities on brain MRI
Intracranial hemorrhage	Headache, Altered mental status Focal neurologic abnormalities Hemorrhage on brain CT
Unstable angina	Chest pain, ECG abnormalities
Acute myocardial infarction	Chest pain, ECG abnormalities Cardiac enzyme elevation
LV failure with pulmonary edema	Dyspnea Hypoxia Pulmonary congestion on chest radiograph
Acute aortic dissection	Chest pain Syncope End-organ ischemia
Eclampsia	Proteinuria Seizures

Initial Evaluation

- Goals in initial evaluation of the hypertensive patient **Assessment of target organ damage .**
- Identification of comorbidities:
  - Diabetes mellitus (DM)
  - Chronic kidney disease (CKD)
  - Ischemic heart disease and cardiomyopathy
  - Identification of identifiable (secondary) causes of hypertension
  - Other cardiac risk factors: cigarette smoking, dyslipidemia, older age, obesity, physical inactivity, family history

Initial Evaluation

- Recommended laboratory tests for initial evaluation
  - Serum creatinine, sodium, potassium, fasting glucose
  - Urinalysis with microscopic examination
  - Electrocardiogram (or echocardiogram)
  - Fasting lipid profile
  - Optional: serum calcium, thyroid-stimulating hormone

When to consider secondary hypertension?

- **Sudden onset of hypertension** in a previously normotensive patient
- **Age, history, physical examination**, severity of hypertension, or initial laboratory findings **suggestive** of a specific cause
- **Recurrence of hypertension** in a previously well-controlled patient (nonadherence should also be considered)
- **Hypertension that is resistant to three or more drugs**, including a diuretic

Causes of Secondary Hypertension?

- **Substances that may cause or worsen hypertension:**
  - **Alcohol** (use or withdrawal), **Amphetamines**, **cocaine** .
  - **Over-the-counter medications** (decongestants, diet pills, nonsteroidal anti-inflammatory drugs)
  - **Prescription medications** (nonsteroidal anti-inflammatory drugs, oral contraceptives, cyclosporine, erythropoietin)
  - **Supplements** (ephedra), Licorice (inhibits metabolism of endogenous cortisol to cortisone)

Causes of secondary Hypertension

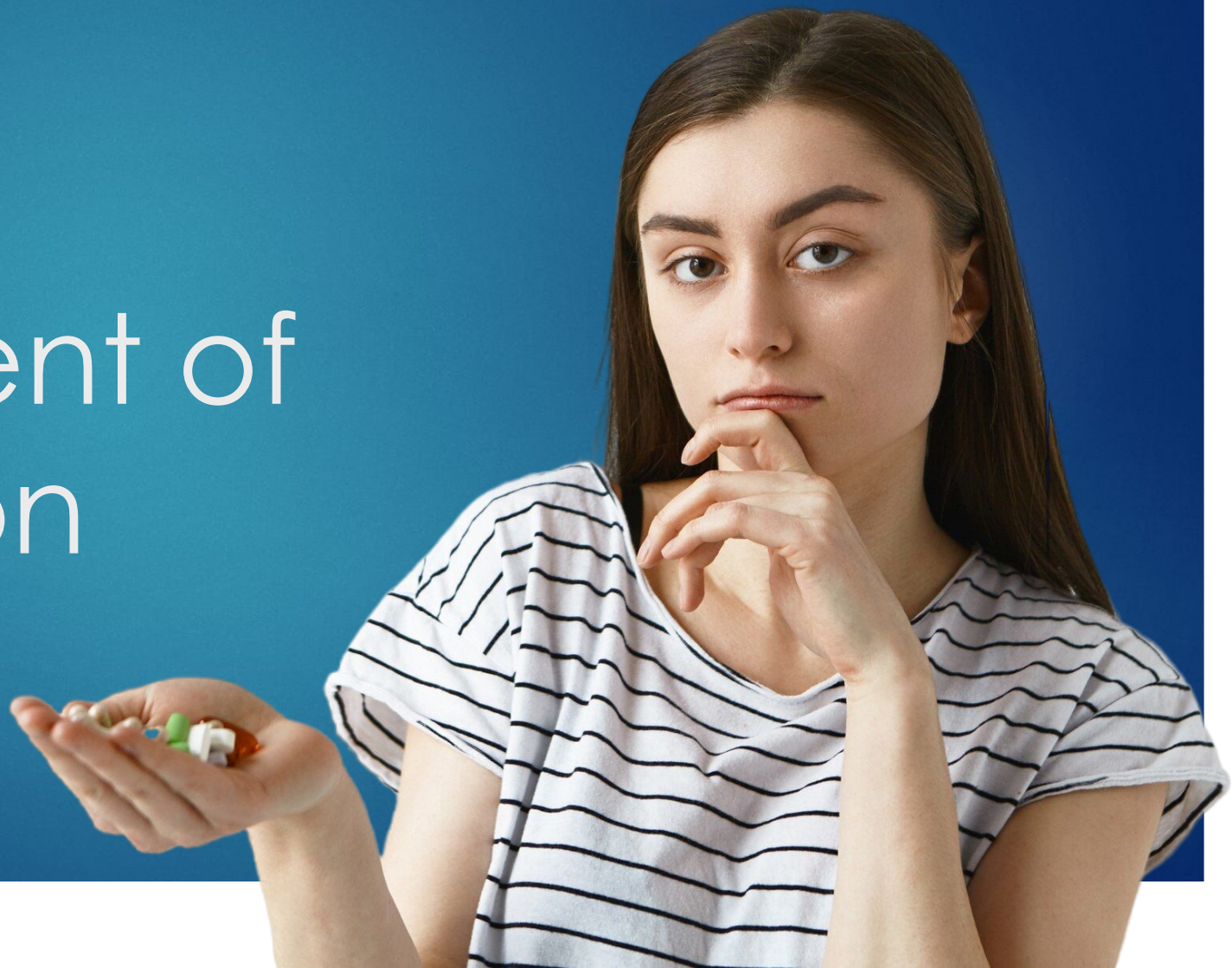
- Other correctable causes of hypertension **acute pain** or **stress** in hospitalized or institutionalized patients
- **Obstructive sleep apnea**
- **Hyperthyroidism or hypothyroidism**
- **Chronic kidney disease** (due to renin over secretion and impaired sodium excretion)
- **Coarctation of the aorta**

Causes of secondary Hypertension

Cause	Presentation
Renal Artery Stenosis	Abdominal bruit Consider FMD in young females
Pheochromocytoma	Headache Sweating Palpitations Pallor Anxiety Weight loss Hypertension may be episodic

Cause	Presentation
Hypercortisolism	Truncal obesity, Moon facies, Purple striae Hirsutism Hyperglycemia Osteoporosis
Hyperaldosteronism	Spontaneous hypokalemia Severe hypokalemia induced by diuretics Mild metabolic alkalosis

Management of Hypertension



Recommended Blood Pressure Follow-up Intervals

Recommended Blood Pressure Follow-up Intervals	
Normal BP	Recheck every 1 years
Elevated BP	Recheck in 3-6 months + Recommend lifestyle modifications
First Hypertensive BP Reading	Rescreen BP within a minimum of > 1 day and < 4 weeks + Recommend Lifestyle Modifications
Second Hypertensive BP Reading	Recommend Lifestyle Modifications + Referral to Primary Care Provider

BLOOD PRESSURE THRESHOLDS AND RECOMMENDATIONS FOR TREATMENT AND FOLLOW-UP

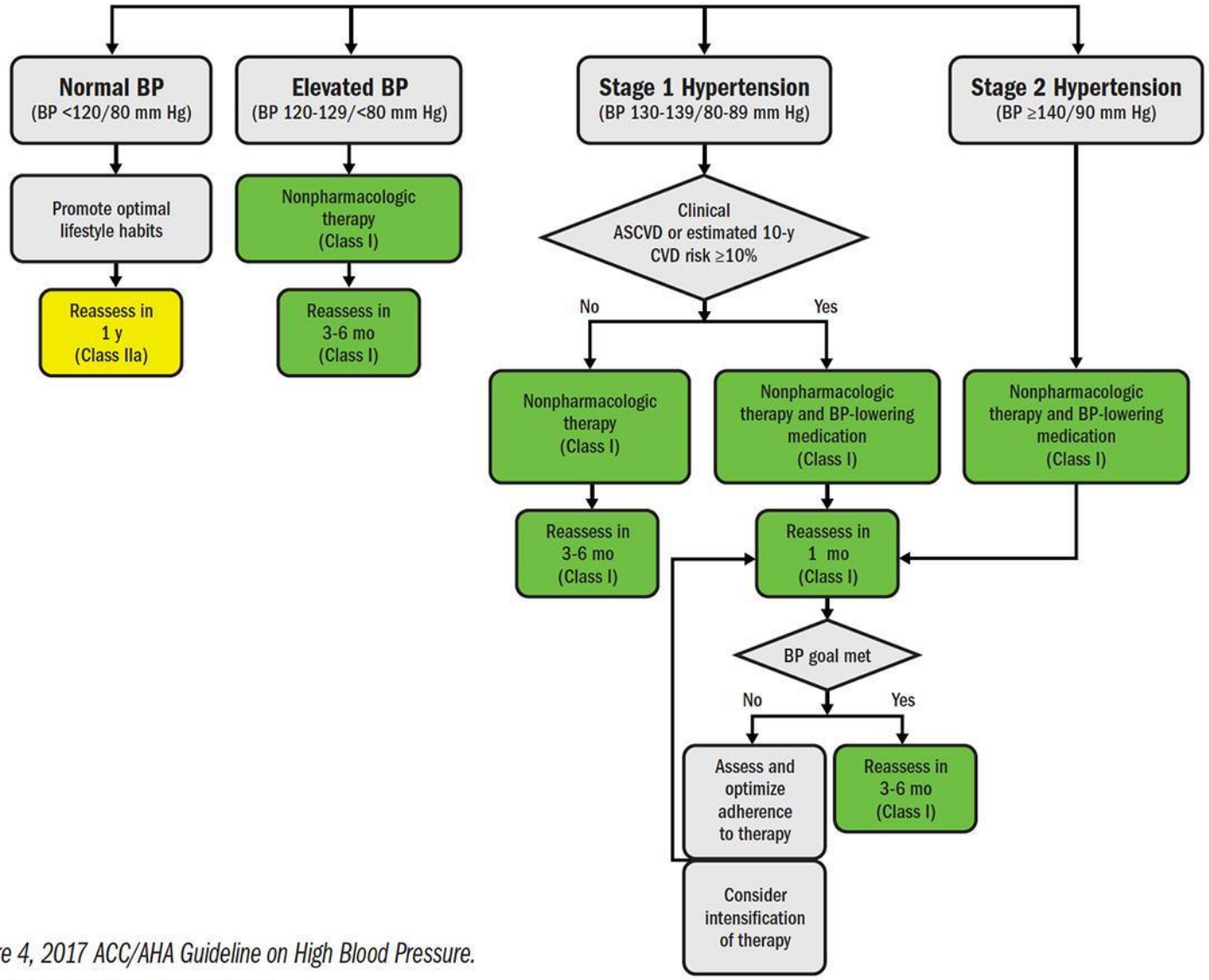


Figure 4, 2017 ACC/AHA Guideline on High Blood Pressure.
See figure in guideline for full details.

- Initial follow-up of BP The timing of follow-up for elevated BP depends on the degree of elevation
- The suggested follow-up intervals may need to be shortened if important risk factors (e.g., diabetes) or target organ damage is present Risk stratification, goal BP, and therapy
- Choice of therapy depends on the stage of hypertension and the presence of risk factors or target organ damage

Recommended BP Goals

Patient group	JNC-7 (2003)	JNC-8 (2013)	AHA (2017)	ESH (2023)
General	<140/90	<140/90	<130/80	<130/80
Older patients	<140/90	<150/90	<130/80	<140/80
Diabetes	<130/80	<130/80	<130/80	130/80
Chronic kidney disease	<130/80	<130/80	<130/80	130/80

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Lifestyle Modification

ALWAYS START WITH LIFESTYLE MODIFICATION EVEN IF DRUG THERAPY IS ALSO NEEDED

Lifestyle Modification

- Weight reduction.
- Physical Exercise.
- Salt restriction (100 mmol/day, i.e., 6 g NaCl or 2.4 g Na+, or less).
- Healthy Diet (DASH Diet).
- High Potassium diet.
- Smoking Cessation.

Salt restriction

- **Low sodium intake** (100 mmol/day, i.e., 6 g NaCl or 2.4 g Na+, or less)
- **decreases BP by 5 to 6 mmHg**

Healthy Diet

- Adoption of diet high in fruits, vegetables, and low-fat dairy products: **Dietary Approaches to Stop Hypertension (DASH)** eating plan **decreases BP by 10 to 11 mmHg**

High Potassium diet

- For patients **without Chronic Kidney disease or hyperkalemia** consuming **diet with high potassium** content **decreases BP by 4 mmHg**

Smoking Cessation

- Effect of Smoking cessation starts after 1 day of quitting

Drug therapy

GENERAL PRINCIPLES

Drug therapy - General principles

- If possible, choose **agents with 24-hour duration of action** and **once-daily dosing**
- Use of two or more drugs is often necessary to attain goal BP
- Certain comorbidities mandate the use of particular agents
- If there is a partial but inadequate response to the first drug, **either increase the dose of the first drug** or **add a second agent** from a different class

Drug therapy - General principles

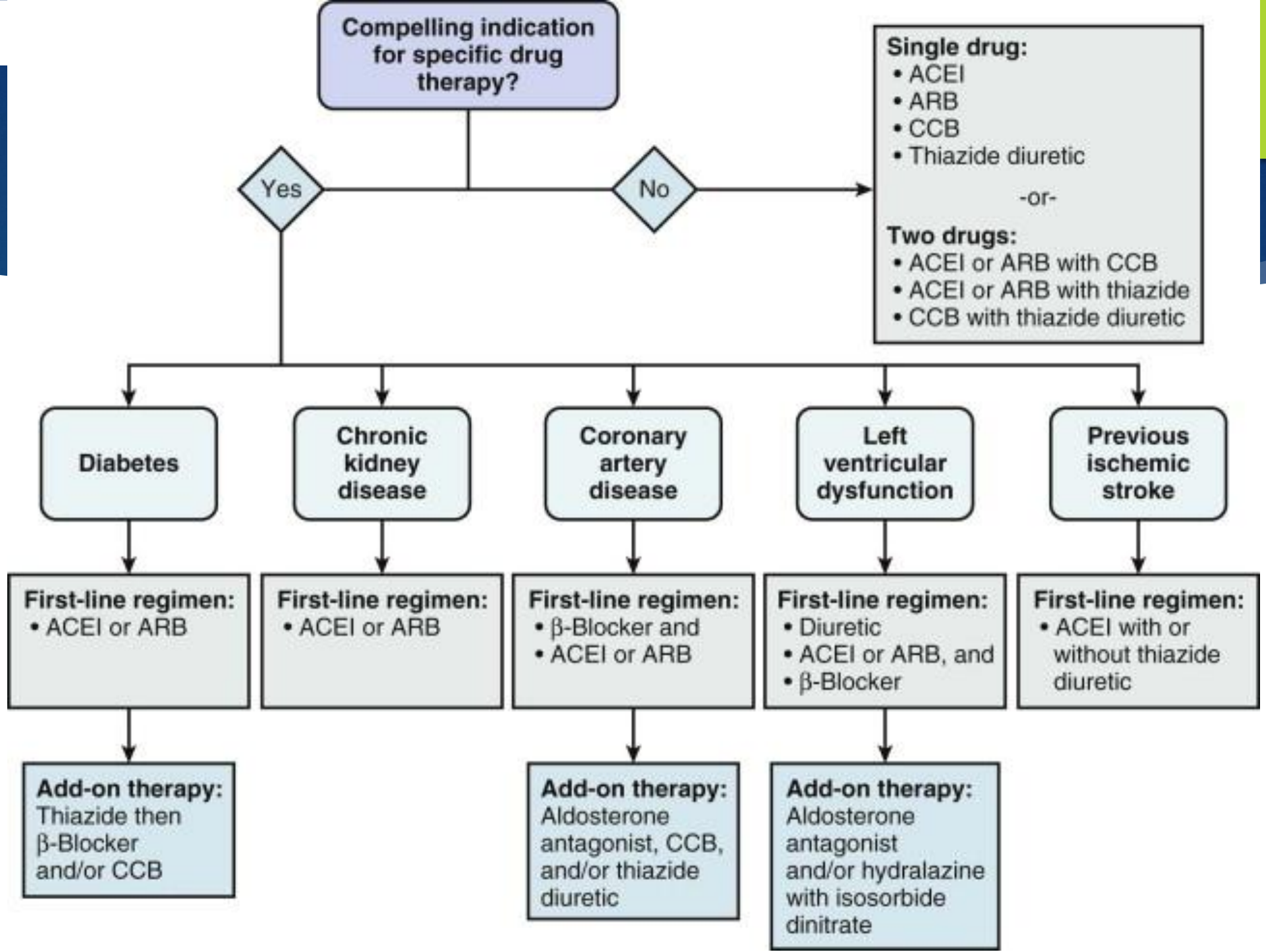
- **Low-dose combination therapy may be preferable** to higher doses of a single agent, because dose-dependent side effects are minimized
- **Formulations combining two drugs** may offer improved convenience or lower cost
- If there is no response to the first drug or if the drug is not tolerated, substitute a drug from a different class
- A diuretic should be part of any regimen containing three or more drugs
- Short-acting loop diuretics (furosemide, bumetanide) should be dosed twice daily, or replaced with a long acting diuretic (e.g., torsemide)

Drug therapy - General principles

- Compelling indications for selection of initial antihypertensive agent
  - **Chronic renal disease:** ACE inhibitor, ARB
  - **CHF:** ACE inhibitor, ARB, diuretic, β-blocker, aldosterone antagonist
  - **Myocardial infarction (MI):** β-blocker, ACE inhibitor, aldosterone antagonist
  - **Migraines:** β-blockers, calcium channel antagonists
  - **Benign prostatic hypertrophy:** a-blockers
  - **Essential tremor:** β-blockers
  - **Hyperthyroidism:** β-blockers

Drug therapy - General principles

- Contraindications to certain antihypertensives
  - **Pregnancy:** Avoid ACE inhibitors and ARBs (absolute contraindication)
  - **Asthma, chronic obstructive pulmonary disease (COPD), peripheral vascular disease:** caution with β-blockers
  - **Gout:** avoid or minimize dose of diuretics
  - **First or second degree heart block:** avoid β-blockers, verapamil, or diltiazem


Compelling indication for specific drug therapy?
Yes
No
Single drug:
• ACEI
• ARB
• CCB
• Thiazide diuretic
-or-
Two drugs:
• ACEI or ARB with CCB
• ACEI or ARB with thiazide
• CCB with thiazide diuretic
Diabetes
Chronic kidney disease
Coronary artery disease
Left ventricular dysfunction
Previous ischemic stroke
First-line regimen:
• ACEI or ARB
First-line regimen:
• ACEI or ARB
First-line regimen:
• β-Blocker and
• ACEI or ARB
First-line regimen:
• Diuretic
• ACEI or ARB, and
• β-Blocker
First-line regimen:
• ACEI with or without thiazide diuretic
Add-on therapy:
Thiazide then β-Blocker and/or CCB
Add-on therapy:
Aldosterone antagonist, CCB, and/or thiazide diuretic
Add-on therapy:
Aldosterone antagonist and/or hydralazine with isosorbide dinitrate

THANKS !

QUESTIONS ?