PRIMARY CARE

MED437

HYPERTENSION

Objectives:

- Definition and classification of hypertension.
- Diagnosis of hypertension, and recent guidelines
- Describe the epidemiology of hypertension in Saudi Arabia.
- Discuss the reasons to control hypertension and the measures of prevention.
- Outline the diagnosis of hypertension based on recent guidelines.
- Distinguish the different methods for diagnosis of hypertension such as measurement, role of "Ambulatory BP Monitoring" ABPM, Home monitoring).
- Clinical evaluation, provide a comprehensive approach for hypertensive patient in clinic.
- List the risk factors of hypertension.
- List the essential Investigations (Routine and Optional, especially for young)
- Recognize the target organs damage (TOD)
- Discuss the goals of treatment and management of hypertension, non-pharmacological and pharmacological and focus on certain chronic illnesses like Diabetes, IHD, Stroke, heart failure,
- Compare the choices of antihypertensive medication and its indications
- Discuss when you should consider referral to specialist.

Done by:

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References

- Dr.Norah Alrowais slides.
- Saudi hypertension guidelines 2018.

Important *Notes* *Extra* *Golden*

Editing file link

Epidemiology of hypertension in Saudi Arabia:

Table 1: National cross-sectional studies estimating the prevalence of hypertension in Saudi Arabia.

Year of publication	Author (reference)	Prevalence	Sample size	Age group
1997	Al-Nozha MM et al	SBP: 9.1% DBP: 8.7%	13700	0–75+
2007	Al-Nozha MM et al	Total: 26.1% Males: 28.6% Females: 23.9%	17230	30–70
2011	Saeed AA et al	Total: 25.5 % Males: 27.1% Females: 23.9%	4758	15–64
2013	Saudi Health Interview Survey- MoH	Total:15.2% Males: 17.8% Females:12.5%	10735	15–65+

National health survey 2013 had showed:

Among all hypertensive individuals:

- 57.8% undiagnosed
- 20.2% treated uncontrolled
- 16.6% treated controlled
- 5.4% untreated

Risk factors for HTN:

- Unhealthy diet and physical inactivity
- Obesity, smoking and family H/O
- Age, sex and race

Hypertension prevention

In view of the continuing epidemic of hypertension and its complications, efforts should be directed toward primary prevention through advocating a healthy lifestyle and controlling other cardiovascular risk factors. And secondary prevention by screening (opportunistic screening).

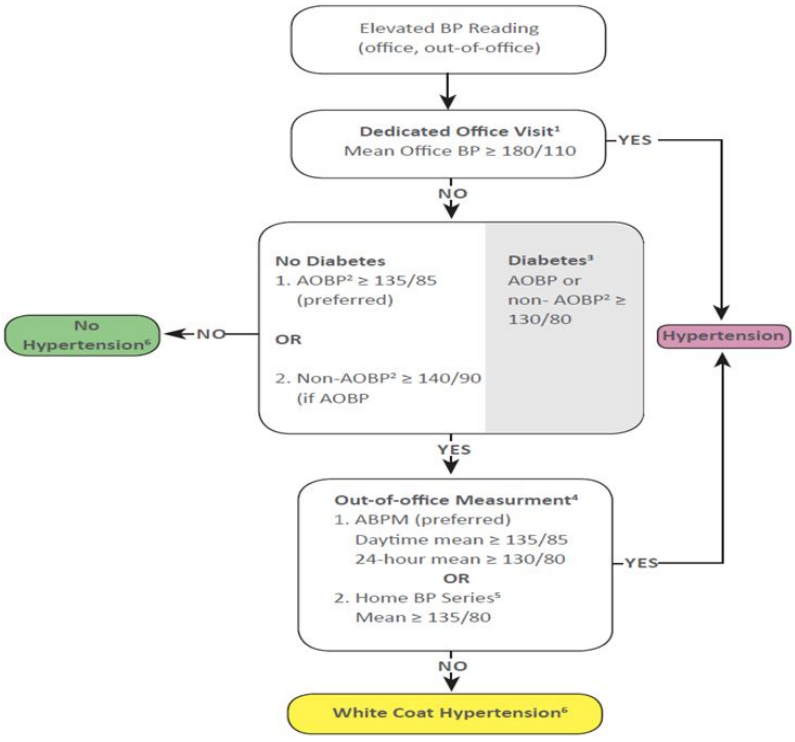
Screening recommendation

1. Measure blood pressure in each visit for all adults aged 18 years and older.
2. Children aged 3 years and older should have their BP measured during every healthcare visit, especially with the growing prevalence of obesity in children.
3. Screening is recommended annually for adults aged 40 years or older and for those who are at increased risk of high blood pressure including those who have high-normal blood pressure (130–139/85–89 mm Hg) and those who are overweight or obese. Adults aged 18–39 years with normal blood pressure (<130/85 mm Hg) who do not have other risk factors should be re-screened every 3–5 years.

Table 9: Recommended lifestyle to prevent cardiovascular risk factors including HTN.

RECOMMONDED LIFE STYLE	COUNSELING TIPS/Evidence of recommendations	Level of evidence
Be more active[3]	Physical activity for 50–60 minutes, 3-4 times/week	A
Maintain ideal body weight	- Weight loss should be encouraged for all overweight patients; even moderate weight loss. - This can be achieved by increasing physical activity and reducing daily caloric intake.	Ib
Stop smoking	Use the 5 As approach for smoking cessation counseling*	IIb
Reduce sodium[3] **intake**	- Reduction of daily salt intake to less than 5g/day (about one tea spoon; 2g of sodium).	A**
Adequate K intake	- Foods rich in potassium are vegetables, fruit, dairy products, nuts, and so forth. Natural source of potassium is preferable. - Pharmacological potassium supplementation is not recommended.	
Consume diet rich in fruit and vegetables, low-fat dairy products and reduced in saturated and total fat[3]	- The DASH diet is a diet rich in fruits and vegetables (4–5 servings/day) and low-fat dairy products (2-3 servings/day) and includes whole grains, poultry, fish, and nuts. - This diet is rich in potassium, magnesium, calcium, dietary fiber, and proteins and has reduced fat (total and saturated) and cholesterol (<25%), red meat, sweets, and sugar-containing beverages[4].	A

Definition and classification of hypertension



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Classification of HTN

Category	SBP (mm Hg)		DBP (mm Hg)
Normal	<120	and	<80
Pre-HTN	120–139	and/or	80–89
HTN Grade I	140–159	and/or	90–99
HTN Grade II	160–179	and/or	100–109
HTN Grade III	≥180	and/or	≥110

Isolated systolic hypertension:
Persistent high office SBP ≥ 140 mmHg and office DBP < 90 mmHg.
(mostly with atherosclrotic eledry, diuretics are useful in this case).

White-coat hypertension (isolated office HTN, isolated clinic HTN):

- White-coat hypertension is defined as an elevated BP in the office at repeated visits, while it is normal out of the office, using either ABPM or HBPM.
- Prevalence of white-coat hypertension averages 13% .
- Target organ damage and cardiovascular events are less prevalent than those in sustained HTN. However, follow up is required.

Masked (isolated ambulatory) hypertension:

- Masked hypertension is defined as normal BP in the office at repeated visits and elevated out of the office, either on ABPM or HBPM.
- Possible causes: anxiety and stress.
- Prevalence of masked hypertension averages about 13% .
- CV events are 2 times higher than those in true normotension.

Clinical evaluation

Clinical evaluation aims to:

- Establish the diagnosis of HTN
- Identify secondary HTN
- Detect additional RFs of CVDs
- Determine TOD

Clinical evaluation includes:

- History
- Physical examination
- BP measurement
- Basic investigations

History:

1. Presence of CV-RFs (DM, dyslipidemia, obesity, etc.) and other concomitant diseases
2. History or current symptoms suggestive of CVDs (CHD, MI, stroke, CHF, renal disease, and PAD)
3. Symptoms suggestive of secondary HTN
4. Lifestyle: smoking, physical inactivity, alcohol intake, sodium intake, and psychosocial stress
5. Past experience with antihypertensive drugs
6. Medication history: oral contraceptives, NSAIDs, steroids, etc.
7. Family history of HTN and associated diseases (DM, dyslipidemia, CAD, stroke, or renal disease).

Physical examination:

Physical examination must be thorough enough to detect signs of comorbidity, organ damage, and secondary causes. It must include:

1. Weight, height, BMI, and waist circumference
2. Chest exam for rales
3. Abdominal exam for organomegaly and bruit
4. Central nervous system: motor or sensory defects
5. Cardiac: arrhythmia, murmur, rales, peripheral edema
6. Retina examination for hypertensive changes. However, a dilated fundoscopic examination by an ophthalmologist is recommended afterwards.
7. Vascular: absent arterial pulses, carotid bruit, radio-femoral delay

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Signs suggesting secondary HTN:

- Age of HTN diagnosis < 20 -30 or > 55- 60 years
- Family history of premature CV disease (<55 years).
- Early target organ damage TOD.

Basic investigations: IMP

1. Urinalysis (protein, glucose, blood, casts)
2. Blood chemistry: potassium, sodium, creatinine with e-GFR, fasting blood glucose, and serum uric acid
3. Complete fasting lipid profile
4. Hemoglobin and hematocrit
5. Electrocardiography (ECG)

Additional optional investigations, if needed:

1. TSH, free T4
2. Chest X-ray
3. Abdominal sonography
4. Echocardiography

Automated devices may not measure blood pressure accurately in case of **pulse irregularity**. Thus, palpation of the pulse before measuring blood pressure is required. In that case, the **auscultatory** method is recommended.

Blood pressure measurement

Methods of BP measurement:

A. Auscultatory: (using the stethoscope)

1- **Mercury sphygmomanometer:** it is the classical measurement instrument for BP. however, it has been increasingly removed from clinical areas because of safety concerns and potential toxic effects associated with mercury.

2- **Other types:** but not commonly used like: Aneroid sphygmomanometer and Hybrid sphygmomanometer.

B. Oscillometric: (automated)

1- **Automated arm sphygmomanometers:** They are good alternative, for both office-based and home-based measurements. However, they must be validated and approved per the international standard test protocols, http://www.dableducational.org .

2- **Automated wrist sphygmomanometers** are widely used by patients, but they are less reliable. Minimal position changes can result in variable readings. Measurement of BP at the upper arm is preferred.

3- **Automated unattended office sphygmomanometers** is automated office BP (AOBP), taken without patient-health provider interaction using a fully-automated device.

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Out-of-office blood pressure monitoring:

- Proper Out-of-office BPM has a better prognostic value than Office Blood Pressure Monitoring (OBPM). It provides many BP measurements away from the medical environment.
- It helps to rule out white coat hypertension (WCH) and identifies Masked HTN.
- **There are two forms of out-of-office BP monitoring:**

1. **Home blood pressure monitoring (HBPM):**
   - HBP may be used for both diagnosis and monitoring of BP.
   - Home SBP values ≥135 mmHg or DBP values ≥85 mmHg should be considered as elevated.
   - Home BPM should be based on duplicate measurements (one minute apart), morning and evening, for an initial 7-day period. First-day home BP values should not be considered (the patient can be nervous and the readings can be abnormally high).
   - SHMS strongly supports the use of HBPM as adjunctive in hypertension follow-up. It is cost effective and improves adherence and control.

2. **Ambulatory BP monitoring (ABPM):**
   - It is performed by a validated automated device over a period of 24 hours.
   - BP is measured at repeated intervals (every 15–30 mins while awake, and every 30–60 mins during sleep).
   - The patient is instructed to engage in normal activities but to refrain from strenuous exercise and, at the time of cuff inflation, to stop moving and talking and keep the arm still with the cuff at heart level.
   - At least 70% of BPs during daytime and nighttime periods should be satisfactory.
   - ABPM is a more sensitive risk predictor of CV outcome than is office BPM.
   - The incidence of CV events is higher in non-dippers (dipping is reduction in BP while sleeping).
   - Normal average daytime BP is <135/85 mm Hg.
   - Nocturnal BP is 10%–20% less than the average daytime BP (<120/75 mm Hg).
   - A 24-hour average value of 130/80 mmHg corresponds to a 140/90 mm Hg of office value.
   - Possible reasons for the absence of dipping are: sleep disturbance, obstructive sleep apnea (OSA), CKD, and obesity.
   - It is more expensive than self-monitoring.

Automated office blood pressure (AOBP) is the preferred method of performing in-office BP measurement.

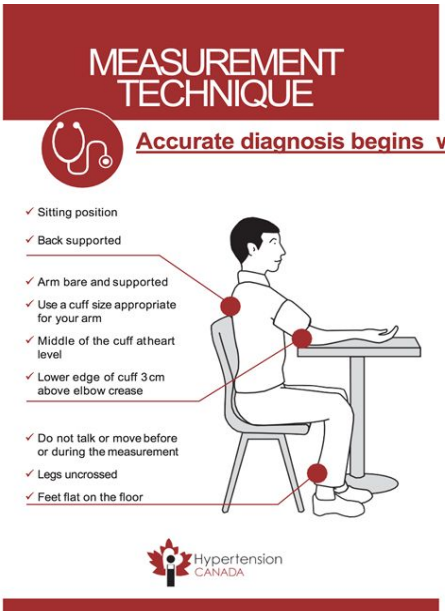
Equipment -related standards:

- **Appropriate cuff size:**

The cuff bladder should encircle 80% of the arm, and the cuff width should be 40% of the arm circumference.

- **Correct cuff position:**

A distance of 2.5 cm (2-3) (2 fingers) should be maintained between the lower end of the cuff and the antecubital fossa (shouldn't cover the cubital fossa).



Goals of treatment

1. Reducing blood pressure to the target level
2. Controlling all other reversible cardiovascular risk factors, which include but not limited to:

- Diabetes
- Smoking
- Dyslipidemia
- Obesity
- Alcoholism
- Physical inactivity
- Stressful lifestyle
- Unhealthy diet

All 140/90 except age >80 and CKD with proteinuria

Table 7: BP Targets Based on Associated Co-Morbidities. IMP

Co-Morbidity	*Target BP (less than)*
Age <80 years	140/90
Age >80 years	150/90
Diabetes	140/90 (130/80 may be warranted)
CKD without Protienuria*	140/90
CKD with Protienuria**	130/80
IHD	140/90
CHF	140/90
Old Stroke	140/90

* Patients <18 years target is below 95th percentile.
** Patients <18 years target is below 90th percentile.

Hypertension management

- **Non-pharmacological**

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Stop smoking	Use the 5 As approach for smoking cessation counseling*	IIb
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Adequate K intake	- Foods rich in potassium are vegetables, fruit, dairy products, nuts, and so forth. Natural source of potassium is preferable. - Pharmacological potassium supplementation is not recommended.	
Consume diet rich in fruit and vegetables, low-fat dairy products and reduced in saturated and total fat[3]	- The DASH diet is a diet rich in fruits and vegetables (4–5 servings/day) and low-fat dairy products (2-3 servings/day) and includes whole grains, poultry, fish, and nuts. - This diet is rich in potassium, magnesium, calcium, dietary fiber, and proteins and has reduced fat (total and saturated) and cholesterol (<25%), red meat, sweets, and sugar-containing beverages[4].	A

- **Pharmacological**

❖ Current evidence from randomized controlled trials indicates that several classes of drugs, including low- dose thiazides (Level Ia), ACEI (Level Ia), long-acting dihydropyridine CCBs (Level Ia), and ARBs (Level Ia) will lower BP and reduce the complications of HTN.

❖ Low-dose thiazide/thiazide-like agents are still considered among the first-line agents for the treatment of most patients with HTN. In addition, diuretics enhance the efficacy of other antihypertensive drugs and are affordable and widely available.

❖ Beta blockers (BBs) are no longer recommended as first-line agents in patients over 60 years of age with uncomplicated HTN. (usually used with patients with cardiovascular diseases).

Table 15: Antihypertensive Medications: Indications and Contraindications

Drug Class	Conditions Favoring Use	Contraindications	
		Compelling	Possible
Thiazide diuretics	CHF; Elderly Hypertensives; Isolated S/D hypertension; Osteoporosis; Hypertensive patients of African origin	Gout; Hyponatremia	Dyslipidemia; Sexually Active Males; Pregnancy; Glucose intolerance
Loop Diuretics	Renal Insufficiency; CHF		
Aldosterone antagonist diuretics	CHF; Post-MI	Renal Failure; Hyperkalemia	
BBs	Angina Pectoris; Post- MI; CHF; Pregnancy; Migraine; Essential Tremors; Tachyarrhythmias; Thyrotoxicosis	Asthma; COPD, AV Block (Grade 2 or 3)	Peripheral artery disease, Glucose Intolerance; Athletes and Physically Active Patients; Dyslipidemia
Long-acting dihydropyridine CCBs	Elderly Patients; Angina; PAD; Pregnancy		AV Block (Grade 2 or 3); CHF; Tachyarrhythmias
Non-dihydropyridine CCBs	Angina Pectoris; Supraventricular Tachycardia	CHF; Patients Taking BBs	
ACEIs	CHF; LV Dysfunction; Post- MI; DM; CKD	Pregnancy; Hyperkalemia; Bilateral Renal Artery Stenosis Angioedema	
ARBs	CHF; LV Dysfunction; Post- MI; DM; CKD	Pregnancy; Hyperkalemia; Bilateral Renal Artery Stenosis	
Alpha-blockers	Benign Prostatic Hypertrophy; Dyslipidemia	Orthostatic Hypotension	CHF

Hypertension without any compelling indications (Target BP <140/90 mm Hg):

- Thiazide diuretics, ACEI, ARBS, or long-acting dihydropyridine CCBs are considered first-line antihypertensive agents.
- Combination of first line agents (2-3 agents) should be considered if SBP ≥20 mm Hg or DBP ≥10 mm Hg above target or in patients at high CV-R.

Isolated systolic hypertension without other compelling indications (target BP for age <80 is <140/90 mm Hg; for age ≥80 the target systolic BP is <150 mm Hg):

- Thiazide/thiazide-like diuretics, ARBs, or long-acting dihydropyridine CCBs.

Past stroke or TIA:

- ACEI and a thiazide /thiazide-like diuretic combination.

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Diabetes Mellitus (Target BP <140/90; however, <130/80 may be warranted)

A- Diabetes mellitus with microalbuminuria*, renal disease, cardiovascular disease, or additional cardiovascular risk factors:

ACE inhibitors or ARBs. Addition of long-acting dihydropyridine CCBs is preferred over thiazide/thiazide-like diuretics. A loop diuretic could be considered in hypertensive CKD patients with extracellular fluid overload.

B- Diabetes mellitus without microalbuminuria or other comorbidities: ACE inhibitors, ARBs, long-acting dihydropyridine CCBs or thiazide/thiazide-like diuretics. Combination of ACEI with CCB is preferred over combination with thiazide/thiazide-like diuretic.

Cardiovascular Disease (Target <140/90 mm Hg):

A- Coronary artery disease:

- ACE inhibitors or ARBs; ßBs and LA-DHP-CCBs for patients with stable angina.
- When combination therapy is being used for high risk patients, an ACE inhibitor with dihydropyridine CCB is preferred.
- Avoid short-acting nifedipine (is a short acting CCB, can cause abrupt lowering of the BP > ischemic attack).
- Combination of an ACEI with an ARB is contraindicated.
- Exercise caution when lowering SBP to target if DBP is ≤60 mm Hg.

B- Recent myocardial infarction:

- ßBs and ACE inhibitors (ARBs if ACE inhibitor intolerant).
- Long-acting CCBs if ßB contraindicated or not effective.
- Non-dihydropyridine CCBs should not be used with concomitant heart failure.

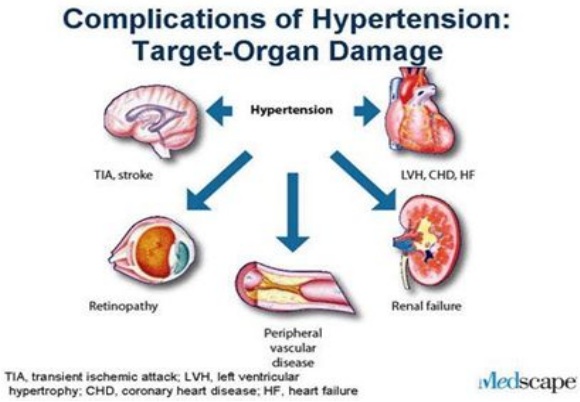
C- Heart failure:

- ACE inhibitors (ARBs if ACE inhibitor intolerant) and BBs.
- Aldosterone antagonists may be added for patients with recent cardiovascular hospitalization, acute myocardial infarction, elevated Brain natriuretic peptide (BNP), or N-terminal pro BNP level or NYHA Class II to IV symptoms.
- Second-line agents may include hydralazine/isosorbide dinitrate combination if ACE inhibitor and ARB contraindicated or not tolerated.
- Thiazide/thiazide-like or loop diuretics are recommended as additive therapy.
- Dihydropyridine CCB can also be used.

Target organ damage

Cardiovascular disease

- Coronary artery disease
  - Acute coronary syndromes
  - Angina pectoris
  - Myocardial infarction
- Heart failure
- Left ventricular dysfunction
- Left ventricular hypertrophy



Cerebrovascular disease

- Aneurysmal sub-arachnoid hemorrhage
- Dementia
- Intracerebral hemorrhage
- Ischemic stroke or transient ischemic attack
  - Vascular dementia

Hypertensive retinopathy

Peripheral arterial disease

- Intermittent claudication

Renal disease

- Albuminuria
- Chronic kidney disease (GFR< 60 ml/min/1.73 m^2)

Referral to specialist:

Referral to specialist should be considered in the following situations:

1. Resistant HTN
2. Suspicion of secondary HTN
3. Sudden onset of HTN
4. HTN diagnosed at young age (30 years old)
5. Worsening of HTN
6. Malignant HTN

Dr. Norah's cases

Case1:

A 59-year-old man with type 2 diabetes presents with concerns about high blood pressure (BP). At a recent visit to his dentist he was told his BP was high. He was reclining in the dentist's chair when his BP was taken, but he doesn't remember the exact reading. He has no symptoms. He has never taken medications for high BP. He takes metformin for type 2 diabetes.
His BP is measured once at 146/95 mm Hg in the left arm while sitting.
Physical exam is unremarkable except for obesity. EKG is unremarkable.

Q: How would you measure his blood pressure?

A: His BP should be measured with the correct technique, position and timing. Before the first reading, the patient should avoid smoking, caffeine, and exercise for at least 30 minutes and should sit quietly in a chair for at least 5 minutes with back supported and feet flat on the floor. An **appropriately sized cuff** should be placed on the bare upper arm and with the arm **supported at heart level**.

Case2:

A 62 year old woman with prediabetes presents for her annual physical. She has no complaints. The average of 2 BP readings in her right arm is BP 143/88. Her physical exam is unremarkable except for obesity. She has no history of myocardial infarction, stroke, kidney disease, or heart failure. After the visit, she measures her BP at home and returns 1 month later. The average BP from multiple clinic and home readings is 138/86.
Her total cholesterol is 260 mg/dL, HDL 42 mg/dL, and LDL 165 mg/dL. She does not smoke.

Q: Is BP readings normal ?

A: No, she has grade 1 hypertension (HTN). Her home reading is 138/86 (Note that a clinic BP of 140/90 corresponds to home BP values of 135/85), she's prediabetic with risk factors (elevated total cholesterol and LDL(the most important one, should be less than 130), low HDL). So, in her case the average home reading should be < 130/80.

Q: how would you classify hypertension? Go back to slide 4.

Q: what investigations will you do for hypertensive patients in the initial visit? Go back to slide 6 (basic and additional investigations).

Case3:

A 63 year old man with type 2 diabetes has an average BP of 151/92 over the span of several weeks of measuring at home and in the clinic. He also has albuminuria.

Q: What is your treatment goal for his BP?

A: He has grade 2 hypertension. Because he's diabetic with albuminuria, the treatment goal is less than 130/80.

Case4:

You are seeing a 60-year-old man for the first time. He has untreated hypertension (168/106 mm Hg and blood pressure has been elevated on at least 3 occasions). There is currently no evidence of target organ dysfunction (heart, neurological, or eyegrounds).

Q: From a therapeutic perspective, what is the best initial approach?

A. Initiate treatment with 25 mg of hydrochlorothiazide.
B. Consider initiating treatment with a 2-agent combination pill.
C. Delay pharmacologic intervention and treat with salt restriction.

Answer: B. The patient qualifies for a diagnosis of grade 2 hypertension. A single agent will not suffice to lower the patient's blood pressure to target level. Many studies have also demonstrated that combination therapy reduces the risk of cardiac events, is more efficacious, with better compliance, blood pressure control, and time-to-target blood pressure. Combination therapy with appropriately chosen agents augments effects of either agent taken alone.

Q: What are the first line treatments for hypertension?

A: Thiazide diuretics, ACE inhibitors, ARBs and long-acting dihydropyridine CCBs.

Case5:

You evaluate a woman with chronic hypertension whose blood pressure remains above target despite a daily regimen of benazepril 20 mg, chlorthalidone 25 mg, and amlodipine 10 mg. (Benazepril is an ACEI, chlorthalidone is a diuretic, amlodipine is CCBs).

Q: Your next step should be:

A. Add an agent from another class, such as hydralazine (vasodilator) or clonidine (centrally acting alpha-2 adrenergic agonist hypotensive agent).
B. Characterize the patient as having resistant hypertension and initiate therapy with 25 mg of spironolactone (potassium levels permitting).
C. Add an ARB.
D. Switch from amlodipine to verapamil.

Answer: B. Resistant Hypertension (RH) can be defined as office BP above goal of 140/90 mm Hg despite implementing lifestyle modification and three drug therapy, one of them is a diuretic in optimal doses. Spironolactone has become a "go-to" agent for treating resistant hypertension with careful monitoring of potassium levels and kidney function. It is a pharmaceutical backbone for resistant hypertension treatment. Not C, bc u can't give ARB with ACEI. Not D, bc both are CCBs with different duration of action but switching wouldn't make a difference.

Case6:

You see a patient whose previous physician has retired. The patient's blood pressure is not controlled on a regimen of hydralazine 20 mg three times a day, atenolol 50 mg daily, and 12.5 mg of hydrochlorothiazide daily. The patient has stage 3 chronic kidney disease (GFR 38 mL/min).

Q: You should (choose all that apply):

A. Switch the diuretic to chlorthalidone.
B. Consider other medications in lieu of hydralazine and atenolol.
C. Add clonidine
D. Increase hydrochlorothiazide to 25 mg.

Answer: A&B. A, bc hydrochlorothiazide is a short-acting diuretic. So, we should switch to chlorthalidone (long-acting). B, bc hydralazine and b-blockers aren't first-line treatment according to the Saudi guidelines. So, we can add ACEI, ARBs or CCBs. note that his physician retired (old management methods).

Case7:

A 58 year old gentleman was found to have elevated blood pressure, with an average clinic blood pressure reading of 180/112 mmHg. Being reluctant to wear an ambulatory blood pressure monitor.

Q: How would you confirm his high readings?

A: When a patient presents with such a high reading, you should consider his general condition and presence of symptoms, chest pain, palpitations, sweating, tremor or vomiting (serious symptoms, refer to EM). But if the patient is relaxed without risks, we can assess him in the clinic. Examine him, take his vital signs, look for target organ damage, examine his fundus (changes indicate long standing HTN) and offer him ambulatory BP monitoring to confirm, if he refuses we recommend Home blood pressure monitoring (HBPM) with proper instructions on how to measure. Home BPM should be based on duplicate measurements (one minute apart), morning and evening, for an initial 7-day period, total 28 readings. First-day home BP values should not be considered. Arm readings are more accurate than the wrists or fingers.

Q: What are the clinical indication for home blood pressure monitoring or ambulatory BP monitoring ?

1. Suspected white-coat HTN
2. Confirm diagnosis
3. Suspected masked HTN
4. Resistance to drug therapy
5. Suspicion of nocturnal HTN
6. Obstructive sleep apnea
7. Assessing hypertension in children and adolescents
8. Assessing hypertension in pregnancy
9. Assessing hypertension in high-risk patients
10. Suspected drug induced hypotension
11. Assessment of BP variability
12. Assessing hypertension in the elderly

Case8:

Having had type 2 diabetes for three years, a 74 year old lady attended her GP practice for her annual diabetes review. During her review, she had her blood pressure taken and was found to have an average clinic blood pressure of 127/78 mmHg. However, with a history of stroke in the family and her sister having suffered a recent heart attack, the patient was still very anxious that her blood pressure was too high despite reassurance from the practice nurse.

Q: What to do to relieve patient anxiety?

A: Home blood pressure monitoring (HBPM). She can record it by herself for a week and that can reassure her.

Case9:

A 65-year-old Caucasian male is referred for management of uncontrolled hypertension.. He does not have known coronary artery disease or stroke. His seated office blood pressure is 168/94 mm Hg (with similar readings in both arms), his heart rate is 50 beats/ minute. He has a BMI of 32. his blood pressures in other physician office visits have ranged between 165-175/ 92-95 mm Hg over the last year. His current anti-hypertensive medications include: hydrochlorothiazide 25 mg daily, valsartan 320 mg daily, amlodipine 10 mg daily, clonidine 0.2 mg twice daily, and long-acting metoprolol 100 mg daily. He reports compliance with his medication regimen.

Q: What is the goal blood pressure in this patient, based on current recommendations?

A. Less than 130/80 mm Hg
B. Less than 150/90 mm Hg
C. Less than 140/90 mm Hg
D. Less than 125/85 mm Hg

Answer: C.

Generally, the target BP should be <140/90 mm Hg for most patients with HTN. Except, patients with renal diseases with proteinuria or some cases with diabetes.

Case10:

Mr. MK, a 55-year-old man. T2DM and hypertension for 10 years. Medications: Metformin 1 g bd, Gliclazide 160 mg bd and Amlodipine 10 mg daily. Referred for further management of poorly controlled diabetes and hypertension.

Q: What are the possible causes for his poorly controlled diabetes and hypertension?

A: Poor compliance, insufficient medications, diet and lifestyle.

Social history:

Salesman, frequent travelling, on and off missed his medications Diet not controlled.

Family history:

Mother – diabetic, on dialysis. Father – stroke (residual left hemiparesis).

On examination:

- **Obese**
- **Weight 98 kg, BMI 35 kg/m2**
- **BP 160/90 mmHg**
- **PR 88 beats/minute**
- **Bilateral proliferative retinopathy**
- **Minimal bilateral leg oedema**
- **Other systemic examination: unremarkable**

Investigation results:

A1c: 9.2 % FBS: 11.8 mmol/L Creatinine: 106 µmol/L

e-GFR: 88 ml/min/1.73 m2 , 200 mg/24 h urinary protein ECG: LVH

Q: What are the issues that need to be addressed? His uncontrolled diabetes and hypertension, his diet, weight and lifestyle, proliferative retinopathy.

Q: what do we mean by wide pulse pressure?

A: large or wide difference between the systolic and diastolic pressure. Generally, greater than 40 mm Hg is considered wide.

Q: What would be the A1c and BP target? A1c between 6.5 and 7, BP <130/80

Q: How would you manage him? Control his diabetes and reduce his A1c add GLP receptor agonist or SGLT2 inhibitor , refer him to ophthalmologist for follow-up and control his high BP so that he doesn't develop heart failure. Also, control his diet and lifestyle.

Q: What would be the choices of antihypertensives or anti- diabetic agents?

We can start with ACEI or ARBs as first line bc he's diabetic.

Quiz questions

Fill the boxes:

Question 1:

Measure blood pressure in each visit for all adult aged 18 Years and older.

Question 2:

Adults aged 18-39 years with normal blood pressure (<130/85 mmHg) who do not have other risk factors should be re-screened every 3 - 5 Years.

Question 3:

HTN Grade I 140 - 159 / 90 - 99

HTN Grade II 160 - 179 / 100 - 109

HTN Grade III ≥ 180 / 110

Question 4:

Define white coat hypertension:

A Elevated blood pressure in the office at repeated visits, while it is normal out of the office, using either ABPM or HBPM.

Question 5:

Define masked hypertension:

A Normal blood pressure in the office at repeated visits and elevated out of the office, either on ABPM or HBPM.

Question 6:

Mention 3 classes first-line anti-hypertensive agents:

A Thiazide diuretics, ACE inhibitors, ARBs and long-acting dihydropyridine CCBs.

Question 7:

Mention 3 basic investigations for a hypertensive patient:

A 1. Urinalysis (protein, glucose, blood, casts).

2. Complete fasting lipid profile.
3. Hemoglobin and hematocrit.
4. Electrocardiography (ECG).
5. Blood chemistry: potassium, sodium, creatinine with e-GFR, fasting blood glucose and serum uric acid.

437A Cases

Case 1:

A 49 year old lady, a known case of OA of knees, incidentally discovered to have high Bp in two visits, 156 / 106 and 164 / 100 respectively.

What is the target of Bp for this lady? 140/90

What additional history you need from this lady? Assess lifestyle and identify other cardiovascular risk factors for concomitant disorders, Reveal identifiable causes of high BP, Assess the presence or absence of target organ damage and CVD

What investigations are you going to request? Routine investigations

Mention one medication are you going to start with? ACEi what if she's a black african? CCB

Case 2:

Mohammed a 53-year old man presents to your clinic to control his blood pressure. He is regular on Atenolol 50 mg OD for the last 3 years. PMH is unremarkable. FH: his father is hypertensive. BP:162/98 P. 62/m BMI 31 O/E: nothing is significant apart from A-V nipping on retinal examination.

What is your comment on his medication based on guidelines? Stop B-blocker and give ACEi (you shouldn't stop B blocker abruptly because it can lead to MI)

What action plan are you going to take?

Non-pharmacological management:

Low salt diet, exercise, DASH diet and most importantly weight reduction because it can reduce BP up to 20 mmHg

Case 3:

Saleh a 64-year old man who is a known case of hypertension, came for follow up. He is regular on Hydrochlorothiazide 25mg daily. BP is 176 / 82.On reviewing his file the BP is ranging from 162 / 76 to 180 / 88 , U and E: within normal

FBS: 6.4 mmol/L 2hpp: 9.56 mmol/L ECG: LVH

What is/are the diagnosis of Saleh?

Based on evidence, which medication of choice are you going to choose?