

PHC

432 Team

TBL

Hypertension



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COLOR GUID : Doctor's Notes Team Notes slides Not important Important 431 team work

Objectives

1. Epidemiology in Saudi Arabia
2. Diagnosis of hypertension, recent guidelines
3. Why we have to control hypertension, measures of prevention
4. How to approach hypertensive patient in clinic?
5. Risk factors
6. Diagnosis of hypertension (measurement, role of “Ambulatory BP Monitoring” ABPM, Home monitoring)
7. Important aspects of clinical examination
8. Essential Investigations (Routine and Optional, especially for young)
9. Focus on target organs damage (TOD)
10. Update in management, non-pharmacological and pharmacological and focus on certain chronic illnesses like Diabetes, IHD, Stroke, heart failure, ..
11. Follow up to prevent complications especially Stroke and IHD
12. Highlight on HTN in pregnancy (Diagnosis and treatment)
13. When to decide the start of medication and what to choose to start with?
14. Antihypertensives (ACEi, ARB, CCB, Thiazides, BB) and its indications
- 15. Practical: Examination of CV system, How to do?**



<https://www.youtube.com/watch?v=SJ3UwKkLyy0>

Hypertension

Epidemiology in Saudi Arabia:

1. Developed and developing countries are alike; Essential Hypertension affects **25-35%** of the adult population.
2. The prevalence of hypertension among attendants of primary health care centers in Al-Qassim region Saudi Arabia was **30%**.
3. It was more among obese patients than non-obese.

Risk factors

1. Smoking.
2. Dyslipidemia.
3. Diabetes Mellitus.
4. Obesity.
5. Age older than 60 years.
6. Sex (men or postmenopausal women).
7. Family history of cardiovascular disease.

In the Framingham Heart Study:

1. Those below Age of 55 diastolic BP are the strongest predictor of cardiovascular risk.
2. Above 55 years, diastolic BP was negatively related to the risk of coronary events, so the pulse pressure became superior predictor to the systolic Bp.

What happens to blood pressure with aging?

- 1-) Systolic pressure increases with age.
- 2-) Diastolic pressure increases with age but peaks between 55 and 60 years then starts to decrease.
- 3-) Arterial stiffness: cause of elevated systolic and lower diastolic pressure with aging.



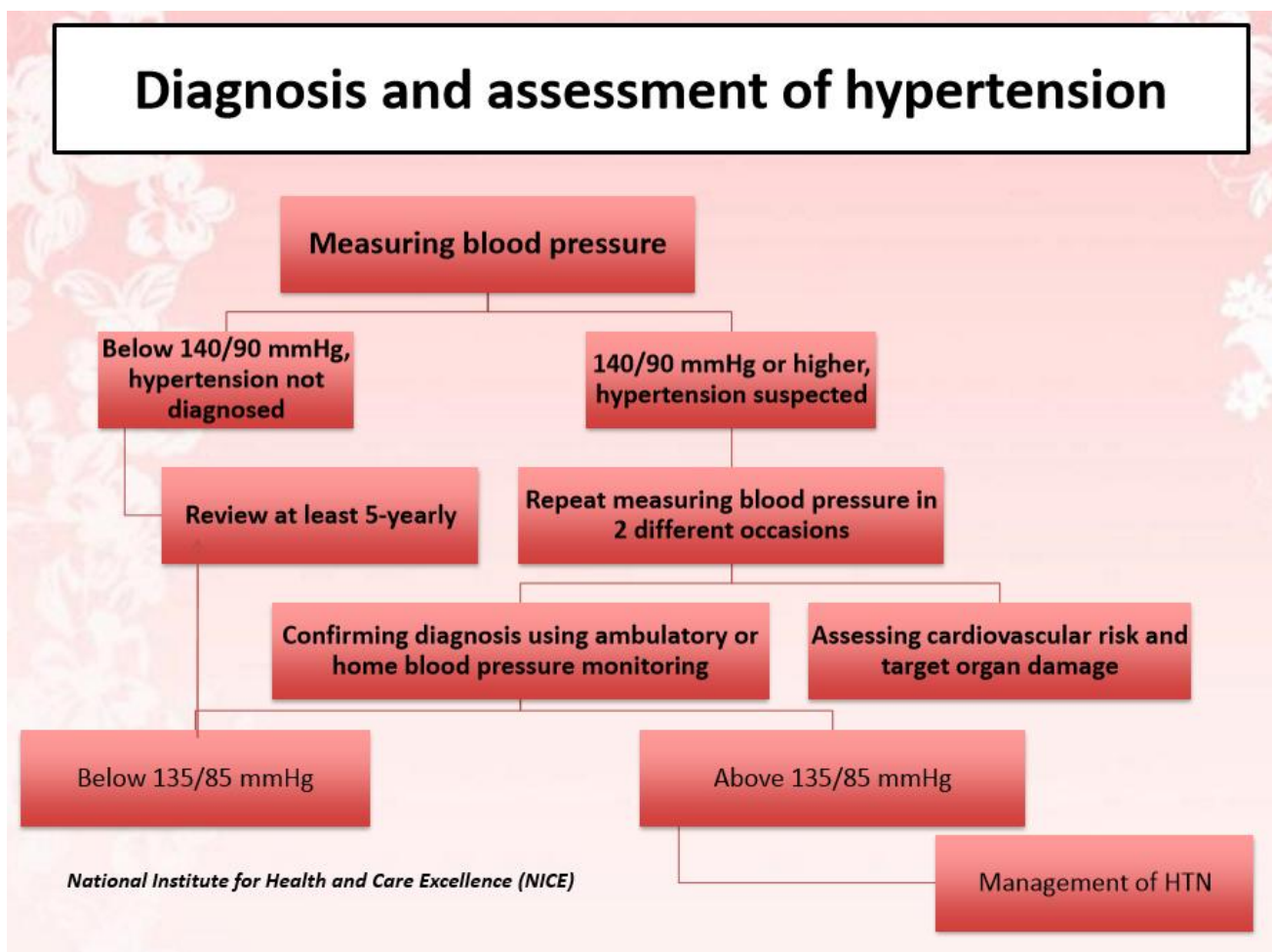
Diagnosis of hypertension

Two or more elevated readings are obtained on **at least two visits over a period of one to several weeks**. If the clinic blood pressure is 140/90 mmHg or higher, offer ambulatory blood pressure monitoring (ABPM) to confirm the diagnosis.

When using the following to confirm diagnosis, ensure:

- 1. ABPM:** At least two measurements per hour during the person's usual waking hours, average of at least 14 measurements to confirm diagnosis.
- 2. HBPM:** Two consecutive seated measurements, at least 1 minute apart.

Blood pressure is recorded twice a day for at least 4 days and preferably for a week. Measurements on the first day are discarded average value of all remaining is used.



Stages of hypertension (Update in NICE 2011)

1. Stage 1 hypertension: Clinic blood pressure (BP) is **140/90 mmHg or higher** and ABPM or HBPM average is 135/85 mmHg or higher.
2. Stage 2 hypertension: Clinic blood pressure (BP) is **160/100 mmHg or higher** and ABPM or HBPM daytime average is 150/95 mmHg or higher.
3. Severe hypertension: Clinic BP is **180 mmHg or higher** or Clinic diastolic BP is **110 mmHg or higher**.

Category	Systolic blood pressure (mmHg)	Diastolic blood pressure (mmHg)
Optimal blood pressure	<120	<80
Normal blood pressure	<130	<85
Pre-hypertension	130-139	85-89
Grade 1 hypertension (mild)	140-159	90-99
Grade 2 hypertension (moderate)	160-179	100-109
Grade 3 hypertension (severe)	≥ 180	≥ 110
Isolated systolic hypertension Grade 1	140-159	<90
Isolated systolic hypertension Grade 2	160-179	<90
Isolated systolic hypertension Grade 3	≥180	<90

White-Coat Hypertension: the risk of cardiovascular disease is lower in patients with white-coat hypertension.

Raised clinic blood pressure in the presence of a normal daytime ambulatory blood pressure.

Why we have to control hypertension:

1. Increased blood pressure is the leading risk for death and disability globally according to the Global Burden of Disease.
2. Hypertension is a major risk factor for CHD and CVA.
3. Increase blood pressure is symptomless until it causes organ damage.
4. The benefits of lowering blood pressure are as follow: reduction in STROKE by (35 – 40 %), MI by (20 – 25 %), and HEART FAILURE by > 50%

Measures of prevention:

Lifestyle modifications to prevent and manage hypertension	Approximate SBP Reduction
Weight reduction Maintain normal body weight (body mass index 18.5–24.9 kg/m ²).	5–20 mmHg/10kg
Adopt DASH eating plan Consume a diet rich in fruits, vegetables, and low fat dairy products with a reduced content of saturated and total fat.	8–14 mmHg
Dietary sodium reduction Reduce dietary sodium intake to no more than 100 mmol per day (2.4 g sodium or 6 g sodium chloride).	2–8 mmHg
Physical activity Engage in regular aerobic physical activity such as brisk walking (at least 30 min per day, most days of the week).	4–9 mmHg
DASH, Dietary Approaches to Stop Hypertension; SBP, systolic blood pressure For overall cardiovascular risk reduction, stop smoking.	

How to approach a patient with Hypertension?

Medical History, Physical Examination, Routine Laboratory Tests, Optional Tests, Non-Pharmacological Treatment, Drug Treatment.

Each increment of 20 mm Hg in systolic blood pressure or 10 mm Hg in diastolic blood pressure doubles the risk of cardiovascular disease events independent of other factors.

Patient Evaluation:

Evaluation of patients with documented HTN has three objectives:

1. Assess lifestyle and identify other CV risk factors or concomitant disorders that affects prognosis and guides treatment.
2. Reveal identifiable causes of high BP.
3. Assess the presence or absence of Target Organ Damage and CVD.

MEDICAL HISTORY:

- Patient History of Cardiovascular Disease
- Current and Previous Medications
- Smoking
- Lifestyle Factors
- Family History

PHYSICAL EXAMINATION:

- Blood Pressure (2 Readings)
- Height, Weight and Pulse
- Exam. Of Neck, Heart, Lungs, Abdomen and Extremities
- Funduscopic Examination (Arterial narrowing "copper wiring", A-V nipping, Flame shaped hemorrhages, Soft

Investigations:

Routine

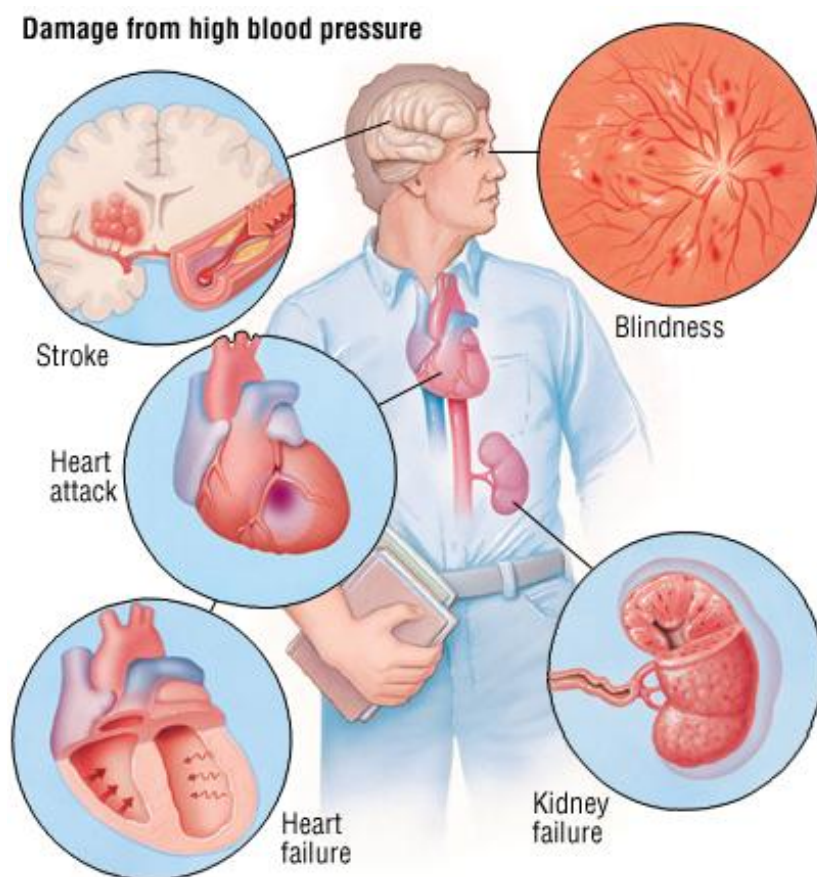
1. CBC
2. Urine Analysis and Microalbuminurea
3. Urea, Creatinine, Electrolytes, Uric Acid and Calcium
4. Fasting Plasma Glucose
5. Lipid Profile (T.ch, Trig, LDL and HDL)
6. ECG
7. Chest X-ray

Optional (to exclude secondary causes)

1. 24-hour Urinary Protein
2. Creatinine Clearance
3. Echocardiography
4. Ultrasonography
5. Thyroid Stimulating Hormone
6. 24-hour Urinary Vanyl Mandelic Acid
7. 24-hour Urinary Catechleamines
8. 24-hour Urinary Free Hydrocortisol

Target Organ Damage:

- **Heart:** LVH, Angina or prior myocardial infarction, Heart failure.
- **Brain:** Stroke or transient ischemic attack.
- Chronic **kidney** disease.
- **Peripheral arterial** disease.
- **Retinopathy.**



Management of HTN:

What is the goal of management of hypertension?

1. Treating (Non-Diabetic) SBP and DBP to targets that are $< 140 / 90$ is associated with decrease in CVD Complications.
2. $< 140/80$ mmHg for people with diabetes.
3. For diabetic patients with proteinuria systolic blood pressure < 130 mmHg.

*Limited data suggest possible worsening of both renal and CVD outcomes if systolic blood pressure is lowered to < 110 mmHg.

Non-pharmacological:

Offer to all hypertensive and those with family history of increased BP

1. See table above "Measures of prevention"
2. Offer smoking cessation.
3. Don't offer Ca^{2+} , Mg^{2+} , or K^{+} supplements as a method to reduce BP.

Pharmacological:

1. Offer antihypertensive drug treatment to people aged less than 80 years with stage 1 hypertension who have one or more of the following:

- a. Target **organ** damage
- b. Established **cardiovascular** disease
- c. **Renal** disease
- d. **Diabetes**
- e. A 10-year **cardiovascular risk** equivalent to 20% or greater.

2. Offer antihypertensive drug treatment to people of any age with stage 2 hypertension.

Drug name	
β BLOCKERS	Atenolol, Bisoprolol, Carvedilol
ACE Inhibitors	Captopril, Lisinopril, and Enalapril
Angiotensin II Receptor Blocker	Losartan, Candesartan, Valsartan, Irbesartan
Ca+ Blockers (Long Acting)	Nifedipine Retard, Amlodipine, Felodipine
Diuretics	Thiazides, Indapamide SR
Vasodilators	Hydralazine (for gestational hypertension)

Box .2

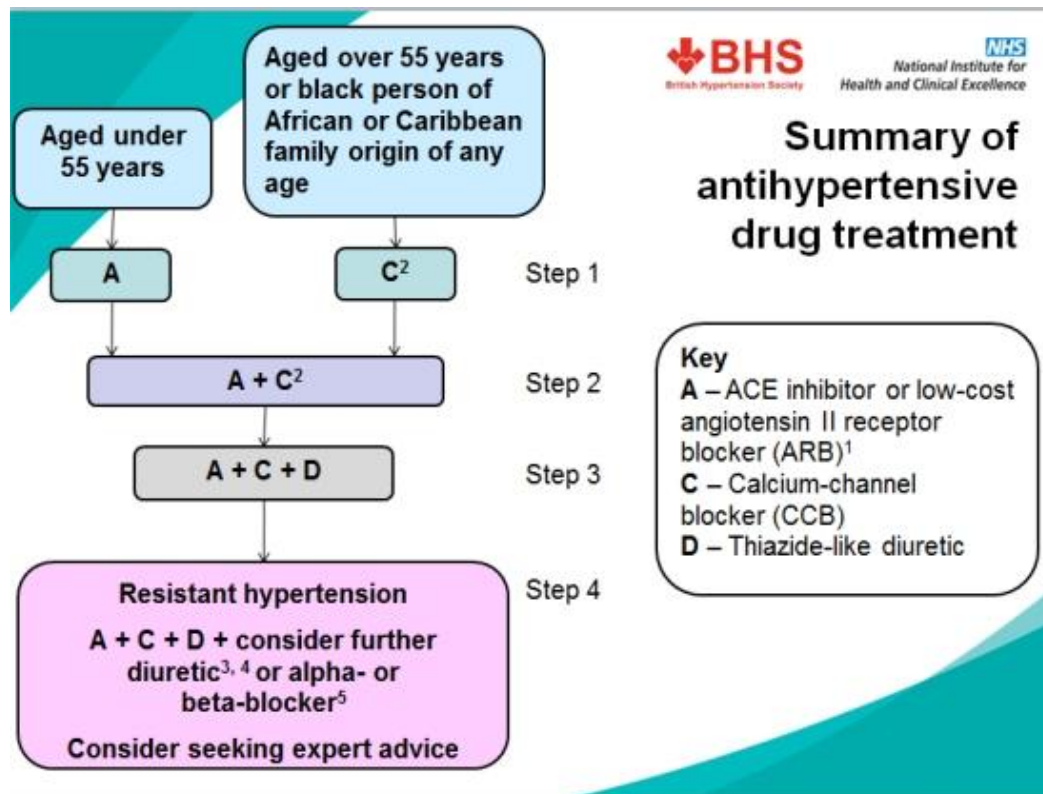
Angiotensin-receptor blocker:

ARB therapy may cut the risk of Alzheimer's disease (AD) by reducing amyloid deposition in the brain. (*Archives of Neurology*, September 13, 2012)
 890 hypertensive patients with available brain autopsy data.
 The risk for AD was 24% lower in those prescribed ACE inhibitor.



Drug Class	Conditions Favoring the Use	Contraindications	
		Compelling	Possible
THZ-Ds	CHF; Elderly Hypertensives; IS-HTN; Osteoporosis; Hypertensive patients of African origin	Gout; Hyponatremia	Dyslipidemia; Sexually Active Males; Pregnancy ; Young Patient with Risk of Developing DM
DHP CCBs	Elderly Patients; Angina; PAD Pregnancy		Atrio-Ventricular Block (Grade 2 or 3); CHF; Tachyarrhythmias
ACE-Is	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	

For **pre** hypertensive patients give life style modification. No need for drugs.



More explanation for the above figure: very very very important!

1. In hypertensive patients **aged 55 or older or black patients** of any age:

The first choice for initial therapy should be either a **calcium-channel blocker** or a **Thiazide-type diuretic**. (C or D)

If a third drug is needed an **ACE inhibitor or ARB** is a choice. (C or D +/- A)

2. In hypertensive patients **younger than 55**:

The first choice for initial therapy should be: An **ACE inhibitor** (or an **ARB** if an ACE inhibitor is not tolerated). (A or ARB)

Adding an ACE inhibitor to a **calcium-channel blocker or a diuretic** (or vice versa are logical combinations). (A +/- C or D)

3. **Beta-blockers** may be considered in younger people, particularly: Those with an intolerance or contraindication to ACE inhibitors and ARB or Childbearing potential or People with evidence of increased sympathetic drive.

4. If therapy is initiated with a beta-blocker and a second drug is required, add a **calcium-channel blocker** rather than a Thiazide-type diuretic to reduce the patient's risk of developing Diabetes.

Beta-blockers and HTN:

They are **no longer recommended** as a first-line drug.

1. There is a paucity of data or an absence of evidence to support the use of beta-blockers as Monotherapy or as first- line agents in uncomplicated HTN.
2. There is strong evidence to use it in post MI patient or heart failure.

Exception: B-blockers may be considered as first line treatment for:

- a. Younger women of child-bearing potential
- b. Patients with HTN and evidence of increase sympathetic drive or
- c. Patients intolerant of/with contraindication to ACE inhibitors/ARBs.

DIURETICS:

Meta-analysis of all RCTs supports **diuretics as first line agent**.

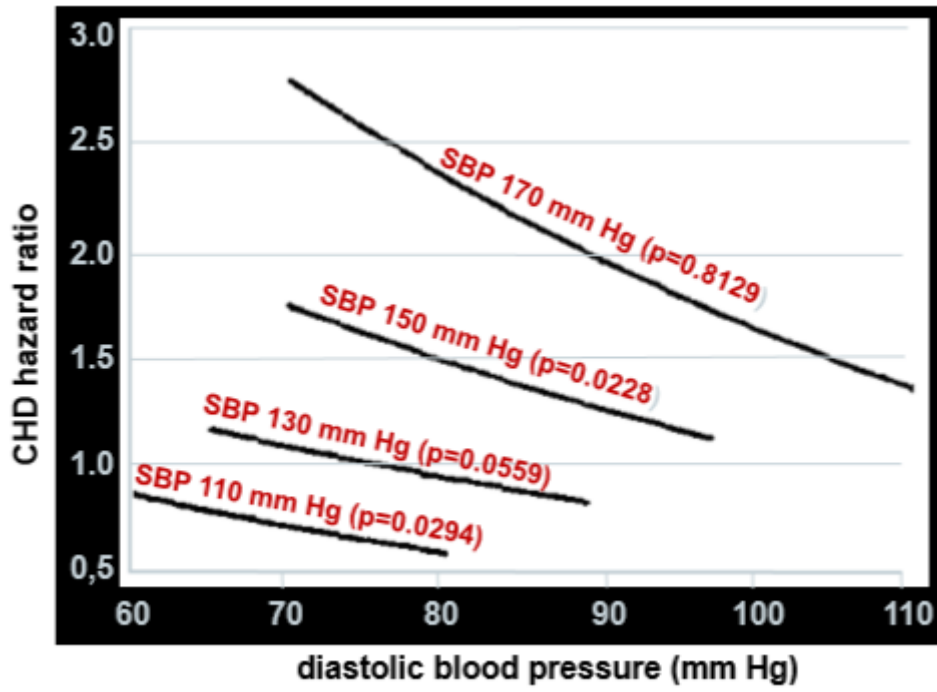
B blockers are associated with an increased risk for new-onset DM by 22%.

B.P. and DM:

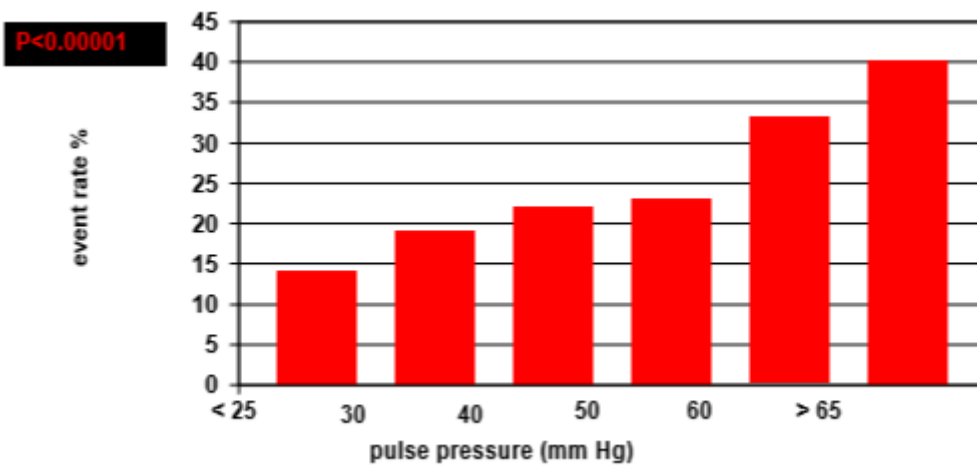
1. Diabetic patients with BP > 140/80 are candidate for antihypertensive treatment.
2. Patients should be checked to confirm the presence of hypertension.
3. Behavioral Approach / Lifestyle Modification
4. Drug Treatment:
 - a. ACE Inhibitors
 - b. Angiotensin II Receptor blockers
5. In Microalbuminuria and Nephropathy (Renal damage) lower BP to $\leq 130/80$

The following 2 figures were explained by the Doctor:

Pulse Pressure and Coronary Risk



Pulse Pressure and Total Mortality



Summary

- HTN is very common worldwide (30%) and it's the leading risk for death and disability globally.
- Risk factors of HTN include: smoking, dyslipidemia, diabetes mellitus, obesity, Age > 60 years, Sex (men or postmenopausal women), Family Hx of CVD.
- Diagnosis of hypertension: **See page 3**
- Stages of hypertension: ***(+20/+10)** / Stage 1 (> 140/90) Stage 2 (> 160/100) Stage 3 (> 180/110)
- Routine investigations include: CBC, Urine Analysis, Urea, Creatinine, Electrolytes, Uric Acid and Calcium, FBG and Lipid Profile, ECG and chest x-ray.
- Management of HTN: **See page 8**
- pharmacological treatment:
 1. In patients aged > **55 or black patients** of any age: start **CCB or TD**. (C or D) If needed; add **ACEI or ARB**. (C or D +/- A)
 2. In patients aged < **55** : Start **ACEI or ARB** (A or ARB). If needed; Add ACEI to **CCB or TD**. (A +/- C or D)

* B-blocker is not recommended as initial treatment except in limited situations.
In resistant cases it's added to CCB **and not with TD** (increase risk of DM)
- BP and DM: **See page 11**

Questions

1) The goal of BP for non-diabetic patients is:

- a. < 120/70
- b. < 130/80
- c. < 140/80

2) In management of HTN patient, according to NICE guidelines, A patient older than 55-year-old, the first choice if antihypertensive is:

- a. ACEI
- b. ARB
- c. B blocker
- d. CC blocker

3) What is the most appropriate combination of medication to treat a black hypertensive patient?

- a. ACE inhibitor + thiazide
- b. Alpha blocker + CC blocker
- c. B blocker + ARB
- d. CC blocker + thiazide

Ans: c-d-d

4) The routine investigations for newly diagnosed patient with HTN:

- a. CBC, TSH, urea & electrolytes and chest x-ray
- b. Urine analysis, FBG, US kidney and ECG
- c. Albumin/Creatinine ratio, lipid profile, urea & electrolytes and ECG
- d. FBS, LFT, CBC and Echocardiography

5) A 34-year-old woman, married and has 2 children, recently diagnosed with HTN. She is on no medication or any OCP.

What is the most appropriate antihypertensive drug to start with?

- a. ACE inhibitor
- b. ARB
- c. Alpha blocker
- d. CC blocker

6) A 46-year-old man, recently discovered to have HTN. You tried non-pharmacological management but still not controlled.

Which of the following medications is not considered as a first choice in management of this patient?

- a. ACEI
- b. ARB
- c. Beta blocker
- d. CC blocker

Ans: c-d-c

7) What is the most appropriate antihypertensive combination to control a hypertensive patient with history of stroke?

- a. ACEI and B blocker
- b. ACEI and thiazide
- c. ARB and B blocker
- d. CC blocker and thiazide

8) A 44-year-old man presents to clinic and your nurse informed you that he has high BP. The average BP after three readings came to be 156/97. You decided to get chart of home monitoring.

What is the most appropriate way of home BP monitoring for assessing his high BP?

- a. 6 readings over 3 days morning and evening.
- b. 10 readings over 5 days morning and evening.
- c. 14 readings over one week morning and evening.
- d. 20 readings over 10 days morning and evening.

9) A 23-year-old man presents with high BP of 174/102. You decided to do some investigations to reach a cause. Some of investigations came to be normal like CBC, Lipid profile and Urea & electrolytes.

What is the most appropriate investigation could help to reach a cause for his high BP:

- a. ECG
- b. LFT
- c. Doppler US for renal arteries
- d. TSH

10) A 32-year-old lady, pregnant of 24 weeks, presents to clinic for routine follow-up. BP came to be 156/98. Urine shows +1 protein. You decided to put her on medication.

What are the most appropriate two medications are safe to be given for this lady?

- a. B blocker and thiazide
- b. ACEI and CC blocker
- c. Methyldopa and ARB
- d. CC blocker and methyldopa

Ans: b-c-c-d

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