

Lecture 11

Editing file



PRIMARY HEALTHCARE TEAMWORK

HYPERTENSION

Objectives:

- ★ Epidemiology in Saudi Arabia
- ★ 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).
- ★ 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 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.

Color index:

Original text **Important** Doctor's notes **Golden notes** Extra

Hypertension

Hypertension

HTN is defined as persistent SBP and/or DBP (office or out-of-office) levels above which harm and significant increase in morbidity and mortality are observed **if left untreated**.

Epidemiology

- In developed and developing countries alike. Essential Hypertension affects **25-35%** of the adult population. Up to **60-70%** of those beyond the 7th decade of life.
- Each increase of **20 mmHg in systolic** blood pressure or **10 mmHg in diastolic** blood pressure doubles the risk of cardiovascular disease events independent of other factors.

• Prevalence of HTN in Obese and non-Obeses Saudis

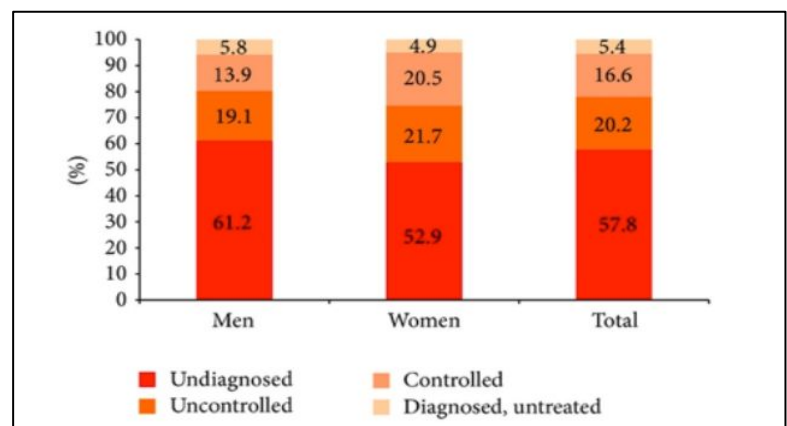
- The study group: 14.805
- Males: 6225 , females: 8580 , The age: 14–70 years
- Non-Obese prevalence: **4.8%** males, **2.8%** females
- Obese prevalence: **8%** males, **8%** females

Mohsen A El-Hazmi, Saudi Medical Journal 2001; vol 22 (1): 44-48

• Hypertension among attendants of primary health care centers in Al-Qassim region Saudi Arabia:

- The study sample: 1114 , The prevalence: **30%**
- Higher in: Age > 40 years ,Overweight & Obese people ,illiteracy
- Awareness: **20%** Of hypertensive women, **25%** of hypertensive men

Percent distribution of diagnosis and treatment status among hypertensive Saudis aged 15 years or older, 2013.



Hypertension

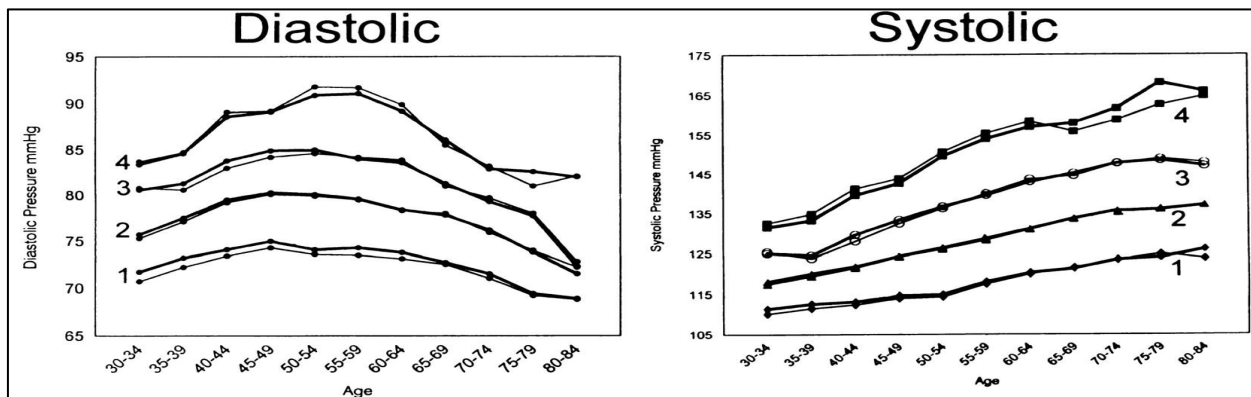
Epidemiology

In the Framingham Heart Study:

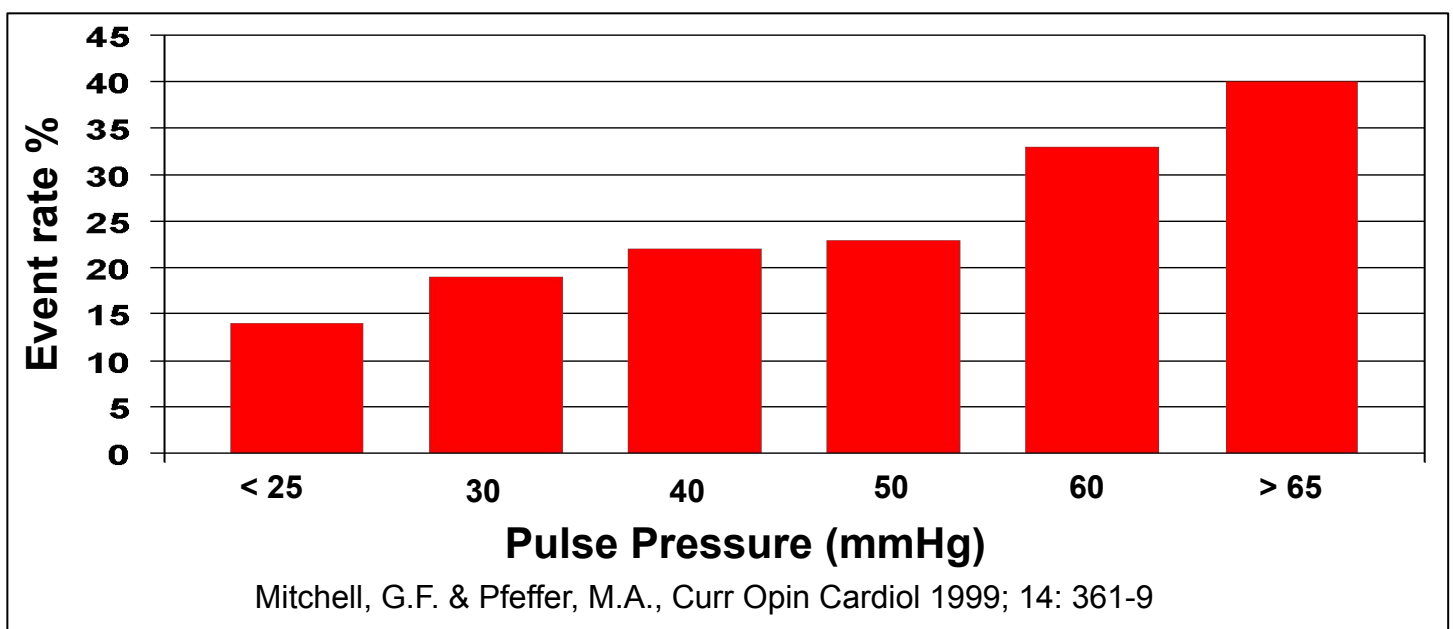
- Those **below Age of 55, diastolic Bp** is the strongest predictor of cardiovascular risk.
- **Above 55 years**, diastolic Bp was negatively related to the risk of coronary events, so the **pulse pressure** became superior predictor to the systolic Bp.

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 is the cause of elevated systolic and lower diastolic pressure with aging.
4. **Blood pressure screening should be done annually**



Pulse Pressure and Total Mortality:



Hypertension

Are we achieving adequate control?

- Up to **65%** of **Americans** with hypertension **do not achieve** adequate **blood pressure control**.
- The World Health Organization now projects that by 2030, ischemic heart disease and stroke will become the second and third leading causes of death worldwide.

Trends in awareness, Treatment, and Control of high BP in adults ages 18 -74

	II (1976-80)	III (Phase 1 1988-91)	III (Phase 2 1991-94)	1999-00
Awareness	51%	73%	68%	70%
Treatment	31%	55%	54%	59%
Control	10%	29%	27%	34%

Diagnosis of Hypertension

Methods of blood pressure measurement:

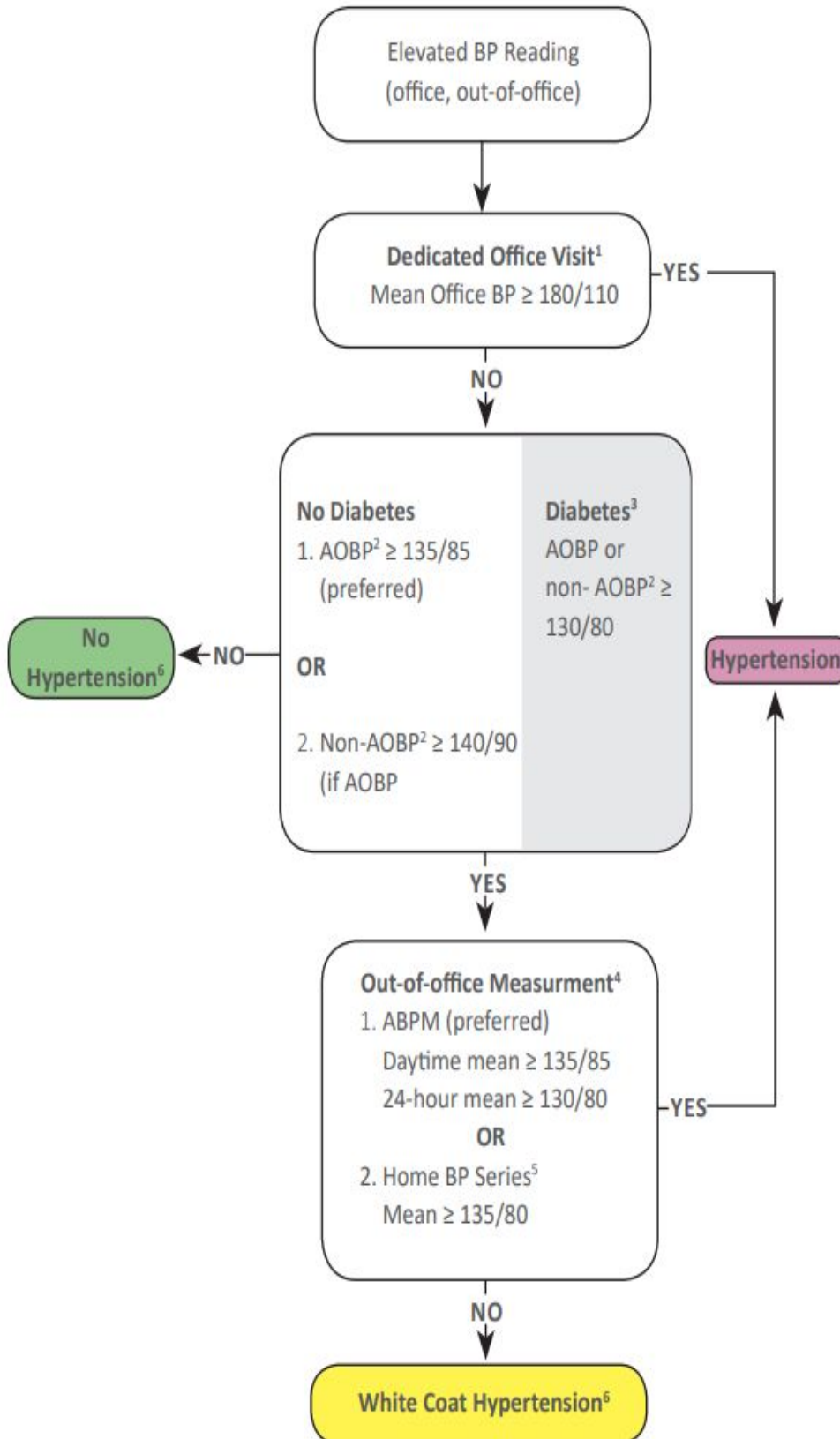
A. Auscultatory:

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:

1. **Automated arm sphygmomanometers:** They are **good alternative, for both office-based and home-based measurements**.
2. **Automated wrist sphygmomanometers:** Are widely used by patients, but they are **less reliable than upper arm**.
3. **Automated unattended office sphygmomanometers (AOBP):** Is automated office BP (AOBP), taken without patient-health provider interaction using a fully-automated device. **(This is the one that is used in clinics)**

Diagnosis of Hypertension



Notes:

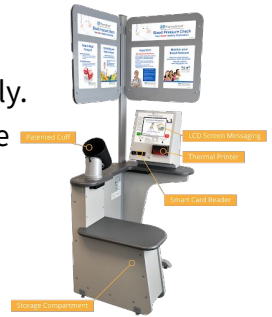
1. If AOBP is used, use the mean calculated and displayed by the device. If non-AOBP (see note 2) is used, take at least three readings, discard the first and calculate the mean of the remaining measurements. A history and physical exam should be performed and diagnostic tests ordered.
2. **AOBP** = Automated office BP. This is performed with the patient unattended in a private area. **Non-AOBP** = Non-automated measurement performed using an electronic upper arm device with the provider in the room.
3. Diagnostic thresholds for AOBP, ABPM and home BP in patients with diabetes have yet to be established (and may be lower than 130/80 mmHg).
4. Serial office measurements over 3-5 visits can be used if ABPM or home measurement not available.
5. Home BP Series: Two readings taken each morning and evening for 7 days (28 total). Discard first day readings and average the last 6 days.
6. Annual BP measurement is recommended to detect progression to hypertension.

This is the guideline you should know

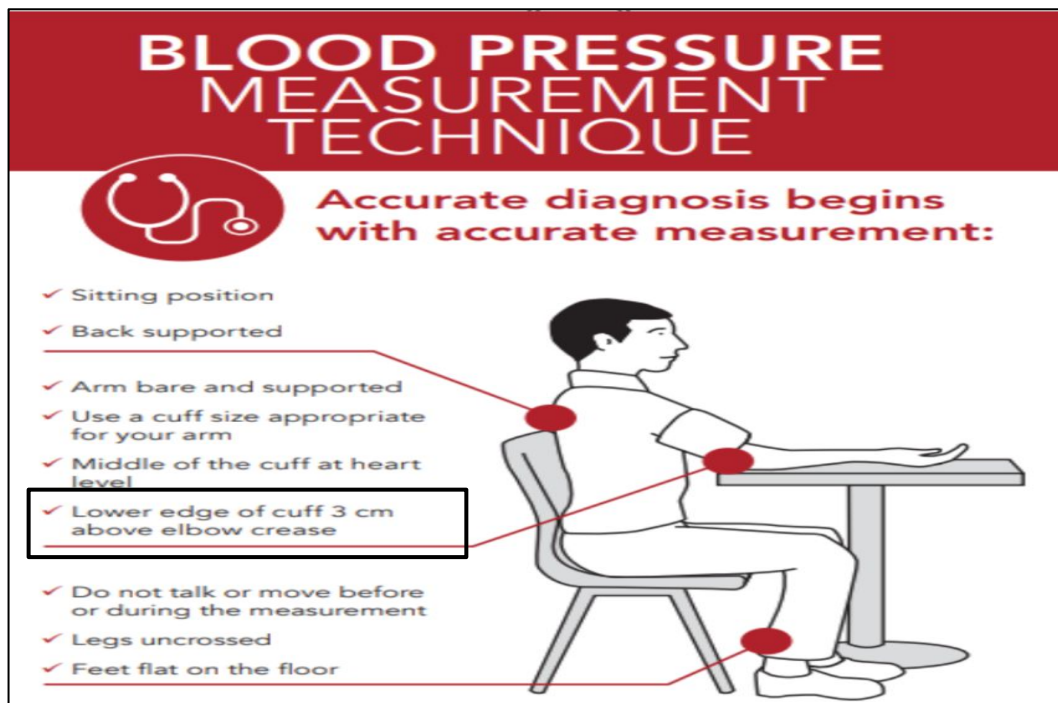
Diagnosis of Hypertension

Public Use of BP Kiosks: (Skipped by Dr)

- These refer to public stations where BP measurement is performed automatically. These stations are found in pharmacies and malls. Most of these devices use one cuff size in a non-sitting position and a non-quiet environment.
- These factors lead to inaccurate readings. In addition, most kiosks are not validated by international agencies for their accuracy.



Standards For BP Measurement:



Accurate Blood Pressure Measurement in the Office:

- Persons should be seated quietly for **at least 5 minutes** in a chair (rather than on an exam table), with feet on the floor, and arm supported at heart level.
- Caffeine, exercise, and smoking should be **avoided for at least 30 minutes** prior to measurement.
- Measurement of BP in the standing position is indicated periodically, especially in those at risk for postural hypotension, prior to necessary drug dose or adding a drug, and in those who report symptoms consistent with reduced BP upon standing.
- Upper arm should not be covered by clothing.
- Patients should avoid BPM while the urinary bladder is distended.

Diagnosis of Hypertension

Clinical Situations In Which Ambulatory Blood Pressure Monitoring May Be Helpful:

- It take Bp ever 1h for 24h. Expensive, used for specific indication only.
- Suspected white coat hypertension in patients with hypertension and no target organ damage
- Apparent drug resistance (office resistance)
- Hypotensive symptoms with antihypertensive medication
- Episodic hypertension
- Autonomic dysfunction



Definition of Hypertension (ABPM report)¹:

	Normotension	Hypertension
24 hr average BP	<130/80 mmHg	135/85 mmHg or more
Daytime (awake) BP	<135/85 mmHg	140/90 mmHg or more
Nighttime (asleep)BP	<120/70 mmHg	125/75 mmHg or more

❖ **Dipping:** The average nocturnal blood pressure is approximately 15 percent lower than daytime values in both normotensive and hypertensive patients. Failure of the blood pressure to fall by **at least 10 percent** during sleep is called **nondipping**^{2,3}.

Overall Summary						
Systolic:	AVG	STD	mmHg	MIN	MAX	Dipping 15.6% 17.9% 14.7%
Diastolic:	143	15.64	mmHg	109 (01:01 Sun)	175 (12:21 Sun)	
MAP:	98	12.94	mmHg	71 (04:01 Sun)	118 (08:21 Sun)	
Pulse Pressure:	115	12.15	mmHg	84	139	
Heart Rate:	46	11.38	mmHg	23	90	
	97	9.99	bpm	69	115	
Percent of Systolic above limits:				Reading(s)	Time	
Percent of Diastolic above limits:				77.8%	69.9 %	
				91.1%	93.0 %	
Wake Period(s) 06:00 - 22:00						
Systolic:	AVG	STD	mmHg	MIN	MAX	
Diastolic:	148	12.96	mmHg	119 (21:41 Sat)	175 (12:21 Sun)	
MAP:	101	11.00	mmHg	73 (21:41 Sat)	118 (08:21 Sun)	
Pulse Pressure:	116	10.44	mmHg	84	139	
Heart Rate:	47	11.87	mmHg	23	90	
	101	6.59	bpm	88	115	
Percent of Systolic reading > 135mmHg:				Reading(s)	Time	
Percent of Diastolic readings > 85mmHg:				83.3%	79.5 %	
				88.9%	87.9 %	
Number of Wake Period(s) readings: 36						
Sleep Period(s) 22:00 - 06:00						
Systolic:	AVG	STD	mmHg	MIN	MAX	
Diastolic:	125	12.22	mmHg	109 (01:01 Sun)	142 (05:01 Sun)	
MAP:	83	9.54	mmHg	71 (04:01 Sun)	101 (05:41 Sun)	
Pulse Pressure:	99	8.58	mmHg	90	117	
Heart Rate:	42	8.86	mmHg	32	56	
	84	10.58	bpm	69	101	
Percent of Systolic readings > 120mmHg:				Reading(s)	Time	
Percent of Diastolic readings > 70mmHg:				55.6%	40.0 %	
				100.0%	100.0 %	
Number of Sleep Period(s) readings: 0						

1. Numbers here are different from the Canadian guideline (Just memorise the one in page 5)
2. Non dipping is a risk factor of ischemic heart disease
3. Non dipping is a risk factor for IHD. All Antihypertensives are taken at night to prevent non dipping except diuretics which are taken in the morning

Diagnosis of Hypertension

Home Measurement:

- Morning and Evening, for an initial 7 day period.
- An average BP equal to or over 135/85 mmHg should be considered elevated.
- Used for which patient?
 1. For the diagnosis of hypertension.
 2. Suspected non adherence.
 3. White coat hypertension.
 4. Masked hypertension.
- When using (HBPM) to confirm a diagnosis of hypertension, ensure that: *(Skipped by doctor)*
 - For each blood pressure recording, two consecutive measurements are taken, at least 1 minute apart and with the person seated.
 - Blood pressure is recorded twice daily, ideally in the morning and evening.
 - Blood pressure recording continues for at least 4 days, ideally for 7 days.
 - Discard the measurements taken on the first day and use the average value of all the remaining measurements to confirm a diagnosis of hypertension.

White Coat Hypertension:

- White coat hypertension is defined when a patient has a persistently elevated clinic **BP \geq 140/90** and a normal HBPM or ABPM day time average, i.e. **<135/85**
- White coat hypertension is present in as many as **25%** of patients, possibly leading to:
 - Incorrect diagnosis of hypertension.
 - Diagnosis of uncontrolled hypertension (receive inappropriate dose titrations or additional antihypertensive agents)
 - Resistant hypertension, with a reported prevalence of **37% to 44%** in some studies.

Stages of Hypertension (SHMS guideline) Memorise it

Category	SBP (mmHg)		DBP (mmHg)
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	\geq 180	And/Or	\geq 110

Hypertension

Patient Evaluation: *Very important for OSCE*

A. 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 CVD²**. (*By doing further investigations*)

B. Risk Factors:

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

C. How to approach a patient with Hypertension?

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

D. **MEDICAL HISTORY:** *Skipped by Doctor*

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

E. **PHYSICAL EXAMINATION:**

- Blood Pressure (Readings ?)
- Height, Weight and Pulse
- Exam. Of Neck, Heart, Lungs, Abdomen and Extremities
- Funduscopic Examination (Arterial narrowing “copper wiring”, A-V nipping, Flame shaped haemorrhages, Soft exudates, Papilloedema)

F. **ROUTINE LABORATORY TESTS:**

1. CBC
2. Urine Analysis and Microalbuminuria
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

Secondary Hypertension

Who should be screened for causes of Secondary Hypertension?

Primary Renal Disease	Elevated serum creatinine concentration
	Abnormal urinalysis
Oral Contraceptives	New elevation in blood pressure temporally related to use
Pheochromocytoma	Paroxysmal elevation in blood pressure
	Triad of headache (usually pounding), palpitations and sweating
Primary Aldosteronism	Unexplained hypokalemia with urinary potassium wasting: however, more than one half of patients are normokalemic
Cushing's Syndrome	Cushingoid facies, central obesity , proximal muscle weakness, and ecchymoses
	May have a history of glucocorticoid use
Sleep Apnea Syndrome	Primarily seen in obese men who snore loudly while asleep
	Daytime somnolence and fatigue and morning confusion

Target Organ Damage:

1. Heart
 - Left ventricular hypertrophy
 - Angina or prior myocardial infarction
 - Heart failure
2. Brain
 - Stroke or transient ischemic attack (HTN is the most important risk factor for stroke)
3. Chronic kidney disease
4. Peripheral arterial disease
5. Retinopathy

Hypertension

High/Very High Risk Subjects: EXTAR

- BP 180 mmHg systolic and/or 110 mmHg diastolic
- Systolic BP > 160 mmHg with low diastolic BP (<70 mmHg)
- Diabetes mellitus
- Metabolic syndrome
- ≥ 3 cardiovascular risk factors
- **One or more of the following subclinical organ damages:**
 - ECG with LVH and strain
 - Echo. of concentric LVH
 - U/S evidence of carotid artery wall thickening or plaque
 - Moderate increase in serum creatinine
 - Reduced creatinine clearance
 - Microalbuminuria or proteinuria
 - Established cardiovascular or renal disease

Optional Tests:

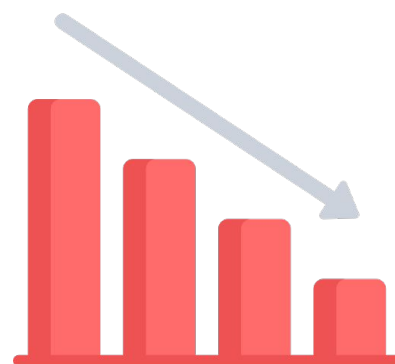
- 24-hour Urinary Protein
- Creatinine Clearance
- Echocardiography
- Ultrasonography
- Thyroid Stimulating Hormone
- 24-hour Urinary Vanil Mandelic Acid
- 24-hour Urinary Catecholamines
- 24-hour Urinary Free Hydrocortisol



Benefits Of Lowering Blood Pressure:

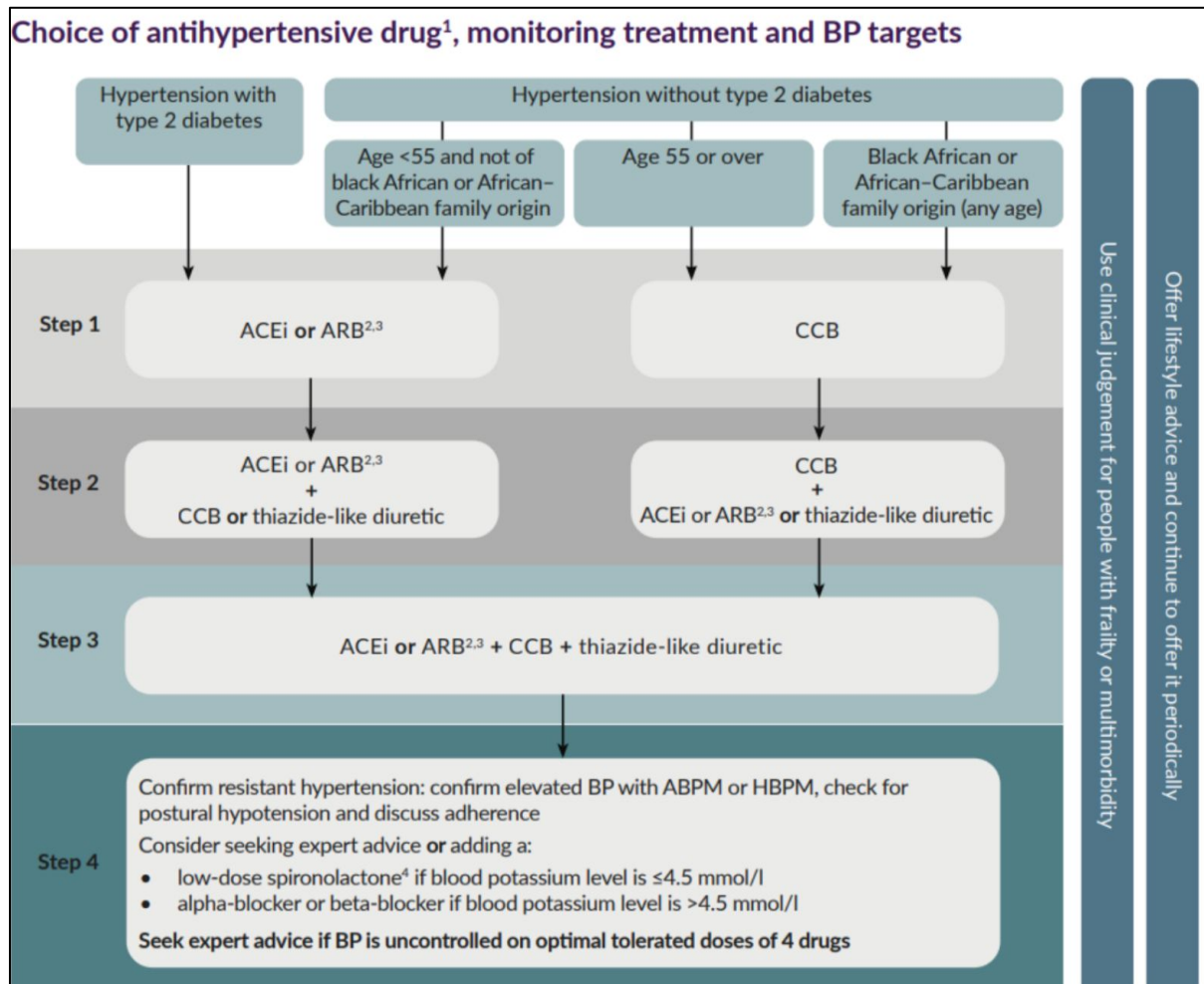
The Clinical Trials had shown Reduction in:

- **STROKE** **35 – 40 %**
- **MI** **20 – 25 %**
- **HEART FAILURE** **> 50%** (Especially in systolic reduction)



Hypertension Treatment

Nice Guideline For The Treatment Of Hypertension 2019 (Follow this one)



Lifestyle Modifications To Prevent And Manage Hypertension:

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 (2.4g 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 (5 days), 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.

- ❖ **The amount of blood pressure reduction is the major determinant of reduction in cardiovascular risk in both younger and older patients with hypertension, not the choice of antihypertensive drug.**

Hypertension Treatment

Classes Of Antihypertensive Drugs: (Just know the classes)

- **BETA BLOCKERS:** Atenolol - Bisoprolol - Carvedilol.
- **ACE Inhibitors:** Captopril - Lisinopril - Enalapril.
- **Angiotensin II Receptor Blockers:** Losartan - Candesartan - Valsartan - Irbesartan
- **Calcium Channel Blockers (Long Acting):** Nifedipine Retard - Amlodipine - Felodipine
- **Diuretics:** Thiazides - Indapamide SR
- **Vasodilators: (Hydralazine)**

Angiotensin-receptor Blocker (ARBs):

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

Beta Blockers:

- A Meta-Analysis of 94,492 patients with hypertension treated with beta blockers to determine the risk of new-onset diabetes mellitus.
 - B blockers are associated with an increased risk for **new-onset DM by 22%**.
 - No benefit for the end point of death or MI.
 - Increased risk for **stroke by 15%**. (In Comparison to other medications)
 - This risk was greater in patients with higher baseline **BMI** and higher baseline **FPG**.
 - **It is not recommended to start Beta blockers for hypertension treatment.**
- 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.
 - Given the risk of stroke.
 - Lack of cardiovascular morbidity and mortality benefit.
 - Numerous adverse effects.
 - Lack of regression of target end-organ effects of hypertension (e.g., left ventricular hypertrophy and endothelial dysfunction).

Evidence For The Use Of B Blockers:

Conditions	Weak to no evidence	Some evidence	Strong evidence
Hypertension	✓		
Heart failure			✓
Acute coronary syndrome		✓	
Post MI			✓
Stable Angina without MI		✓	
Perioperative (non cardiac)		✓	
HOCM		✓	

Hypertension Treatment

Indications For Specific Drugs:

Indications	Antihypertensive drugs
Compelling indications (major improvement in outcome independent of blood pressure)	
Systolic heart failure	ACEIs or ARBs, Beta blockers, Diuretics, Spironolactone
Postmyocardial infarction	ACEIs, Beta blockers, Diuretics, Spironolactone
Proteinuric chronic kidney disease	ACEIs or ARBs
Angina pectoris	Beta blockers, CCBs
Atrial fibrillation/flutter rate control	Beta blocker, non-dihydropyridine CCBs
Stroke	ACEIs and Thiazide diuretics
Likely To Have A Favorable Effect On Symptoms In Comorbid Conditions	
Benign prostatic hyperplasia	Alpha blocker
Essential tremor	Beta Blocker (non-cardioselective)
Hyperthyroidism	Beta blocker
Migraine	Beta blocker, CCBs
Osteoporosis	Thiazide diuretic
Raynaud's Syndrome	Dihydropyridine CCBs

EXTAR

Antihypertensive Medication	Initial Daily Dose, mg	Target Dose in RCTs Reviewed, mg	No. of Doses per Day
ACE inhibitors			
Captopril	50	150-200	2
Enalapril	5	20	1-2
Lisinopril	10	40	1
Angiotensin receptor blockers			
Eprosartan	400	600-800	1-2
Candesartan	4	12-32	1
Losartan	50	100	1-2
Valsartan	40-80	160-320	1
Irbesartan	75	300	1
β-Blockers			
Atenolol	25-50	100	1
Metoprolol	50	100-200	1-2
Calcium channel blockers			
Amlodipine	2.5	10	1
Diltiazem extended release	120-180	360	1
Nitrendipine	10	20	1-2
Thiazide-type diuretics			
Bendroflumethiazide	5	10	1
Chlorthalidone	12.5	12.5-25	1
Hydrochlorothiazide	12.5-25	25-100 ^a	1-2
Indapamide	1.25	1.25-2.5	1


BP Goals in different guidelines

SHMS guidelines for BP targets Based on Associated Co-Morbidities:

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 Proteinuria*	140/90
CKD with Proteinuria**	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	

Basically aim for less than 140/90 for everyone except, CKD w/Proteinuria (130/80) & Age >80 (150/90)

Other guidelines: EXTRA



Patient Population	BP threshold for initiation of antihypertensive therapy		BP treatment target	
	SBP mmHg	DBP mmHg	SBP mmHg	DBP mmHg
Hypertension Canada High-Risk Patient*	≥ 130	N/A	< 120	N/A
Diabetes mellitus**	≥ 130	≥ 80	< 130	< 80
Moderate-to-high Risk (TOD or CV risk factors)**	≥ 140	≥ 90	< 140	< 90
Low Risk (No TOD or CV risk factors)**	≥ 160	≥ 100	< 140	< 90

* BP treatment threshold and target based on AOBP measurements
**BP treatment thresholds and targets refer to non-AOBP measurements performed in office.

CENTRAL ILLUSTRATION: Comparison of American and European Society Definitions and Management of Hypertension

Guideline Differences	American College of Cardiology/American Heart Association (ACC/AHA)			European Society of Cardiology/European Society of Hypertension (ESC/ESH)		
	Systolic (mm Hg)	and/or	Diastolic (mm Hg)	Systolic (mm Hg)	and/or	Diastolic (mm Hg)
Level of blood pressure (BP) defining hypertension	≥ 130	and/or	≥ 80	≥ 140	and/or	≥ 90
Office/Clinic BP	≥ 130		≥ 80	≥ 140		≥ 90
Daytime mean	≥ 130		≥ 80	≥ 135		≥ 85
Nighttime mean	≥ 110		≥ 65	≥ 120		≥ 70
24-hour mean	≥ 125		≥ 75	≥ 130		≥ 80
Home BP mean	≥ 130		≥ 80	≥ 135		≥ 85
BP targets for treatment	< 130/80 mm Hg			Systolic targets < 140 mm Hg and close to 130 mm Hg		
Initial Combination Therapy	Initial single-pill combination therapy in patients > 20/10 mm Hg above BP goal			Initial single-pill combination therapy in patients ≥ 140/90 mm Hg		
Hypertensive requiring intervention	> 130/80 mm Hg			≥ 140/90 mm Hg		
Guideline Similarities	ACC/AHA			ESC/ESH		
Importance of home BP monitoring	<ul style="list-style-type: none"> Take BP at home, twice in the morning and twice in the evening, in the week before clinic Bring the BP machine in annually for validation 					
Therapy	<ul style="list-style-type: none"> Restrict beta blockers to patients with comorbidities or other indications Initial single pill combination as initial therapy 					
Follow-up	<ul style="list-style-type: none"> Detect poor adherence and focus on improvement BP telemonitoring and digital health solutions recommended 					

Bakris, G. et al. J Am Coll Cardiol. 2019;73(23):3018-26.

Case study 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 study 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 gradually 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 is an important aspect, Explain:** Low salt diet, exercise, DASH diet and most importantly weight reduction because it can reduce BP up to 20 mmHg

Case study 3:

- ❖ Saleh a 64-year old man who is a known case of hypertension, came for follow up. He is regular on Hydrochlorthiazide 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?** Prediabetes - Grade 2 HTN
- **Based on evidence, which medication of choice are you going to choose?** CCB & Thiazides.
- If the target systolic Bp above 20 we give two medications if less than 20 we give one medication.

THANKS!!

Obtained and edited from Team 437, by:

- Hashem Bassam

Original creators:

*Special thanks to..
437 team*



Team Leader:
Raed Alojairy

*Send us your feedback:
We are all ears!*