

Learning Objectives (1)

- At the end of this session participants are expected to be able to:
 - Explain factors affecting blood pressure (BP)
 - Recognize common symptoms and signs of hypertension
 - Diagnose and classify hypertension
 - Identify complications of hypertension
 - Perform appropriate investigations for hypertension
 - Provide treatment of hypertension
 - Manage hypertensive emergency, heart attack & heart failure
 - Implement referral pathway for hypertension
 - Conduct regular follow up of patients with hypertension

Activity: Brainstorming

- What is hypertension?



Factors Affecting Blood Pressure (1)

- Physiological factors include:
 - Age: tends to increase in elder people
 - Sex: before menopause women have lower BP than that of males of same age group, after menopause women have higher BP than that of males
 - Meals: after meals BP is higher
 - Emotion: range and panic may rise BP
 - Exposure to cold increases BP
 - Exercise increases BP: Sleep: cause fall of BP
 - Circadian rhythm: BP is highest in the morning and least in the night

Factor Affecting Blood Pressure (20)

- Pathological Factors Include:
 - Clinical conditions alter BP include renal artery stenosis, pheochromocytoma and pre-eclampsia
 - Drug induced: sympathetic stimulants like adrenaline, noradrenaline, and phenylephrine cause rise of BP, while vascular smooth muscle relaxants like hydralazine reduces BP

Types of Hypertension

- There are two types of high blood pressure
 - Primary (essential) hypertension
 - Secondary hypertension

Primary Hypertension (1)

Primary (essential) hypertension:

- Has no identifiable cause
- Tends to develop gradually over many years
- Accounts for 90–95% of all cases of hypertension

Primary Hypertension (2)

Non-Modifiable Risk factors include:

- Age: Systolic blood pressure increase with increasing age
- Gender: Hypertension more prevalent in males of young adulthood, after 55 years, more prevalent in women
- Family history of hypertension

Primary Hypertension (3)

Modifiable Risk Factors:

- Alcohol
- Cigarette smoking
- Excess dietary sodium
- Physical inactivity
- Obesity
- Stress
- Diabetes mellitus: hypertension is more common in people with diabetes
- Insulin resistance, which is common in obesity and is a component of the metabolic syndrome

Secondary Hypertension

Causes include:

- Renal disease is the most common cause
 - Chronic kidney disease
 - Renovascular disease
- Endocrine conditions
 - Cushing's syndrome, hyperaldosteronism
 - Pheochromocytoma
 - Hyperthyroidism
 - Hyperparathyroidism
 - Acromegaly
- Vascular: Coarctation of the aorta, Takayasu Arteritis
- Drug-induced or drug-related (e.g. Chronic steroid therapy)

Activity: Brainstorming

- How can you diagnose hypertension?



Diagnosis of Hypertension

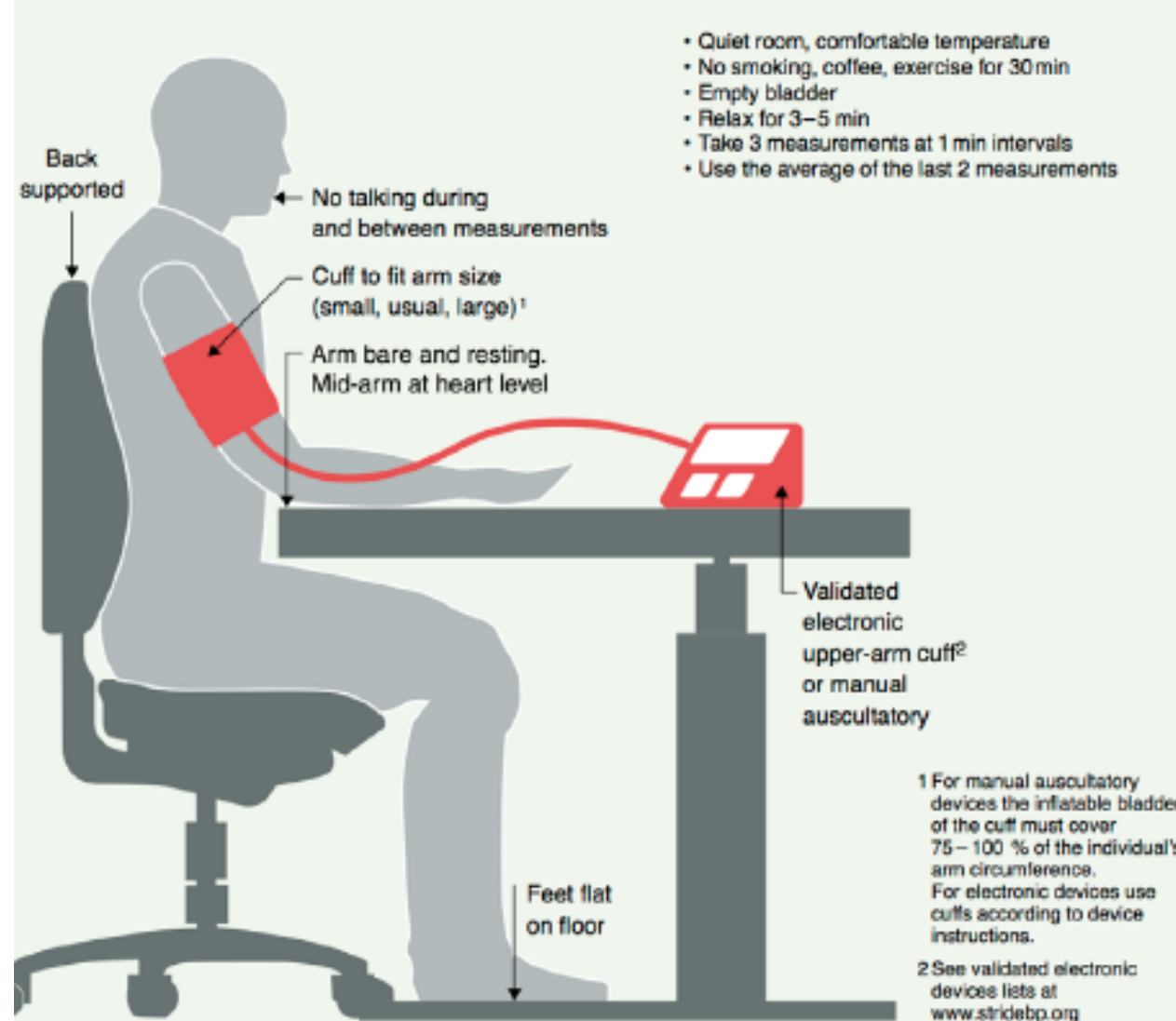
- Diagnosis of hypertension is made based:
 - Elevated systolic reading of ≥ 140 mmHg and/or diastolic reading ≥ 90 mmHg
 - Requires three BP measurements within a week

Classification of Hypertension

Classification of hypertension

Category	Systolic (mm Hg)		Diastolic (mm Hg)
Normal BP	<130	and	<85
High-normal BP	130–139	and/or	85–89
Grade 1 hypertension	140–159	and/or	90–99
Grade 2 hypertension	≥160	and/or	≥100

Correct Blood Pressure Measurement



Measuring Blood Pressure (1)

- Measuring blood pressure is the only way to diagnose hypertension, as most people with raised blood pressure have no symptoms
- Effective treatment algorithms for hypertension are dependent on accurate blood pressure measurement

Measuring Blood Pressure (2)

- The following advice should be followed for measuring blood pressure:
 - Use the appropriate cuff size, noting the lines on the cuff to ensure that it is positioned correctly on the arm
 - If the arm circumference is $> 32\text{cm}$, use large cuff
 - It is preferable to measure blood pressure in both arms and use the arm with the higher reading thereafter, this may not be practical in a busy primary care environment

Blood Pressure Levels in Children (1)

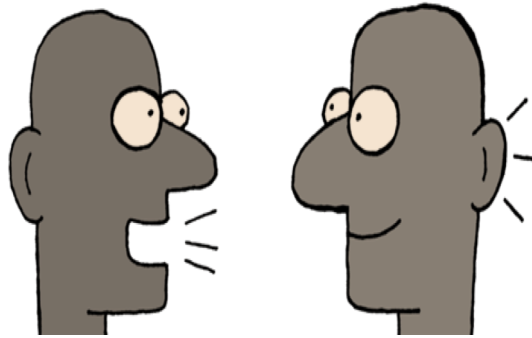
- These readings represent the lower limits for abnormal blood pressure readings according to age and gender
- Any reading greater to or equal to these readings require further evaluation by a physician

Blood Pressure Levels in Children (2)

Age in Years	Blood Pressure, mmHg			
	Male		Female	
	Systolic	Diastolic	Systolic	Diastolic
3	100	59	100	61
4	102	62	101	64
5	104	65	103	66
6	105	68	104	68
7	106	70	106	69
8	107	71	108	71
9	109	72	110	72
10	111	73	112	73
11	113	74	114	74
12	115	74	116	75
13	117	75	117	76
14	120	75	119	77
15	120	76	120	78
16	120	78	120	78
17	120	80	120	78
18	120	80	120	80

Activity: Buzzing

- What are the common symptoms and signs of hypertension?



Common Symptoms and Signs of Hypertension

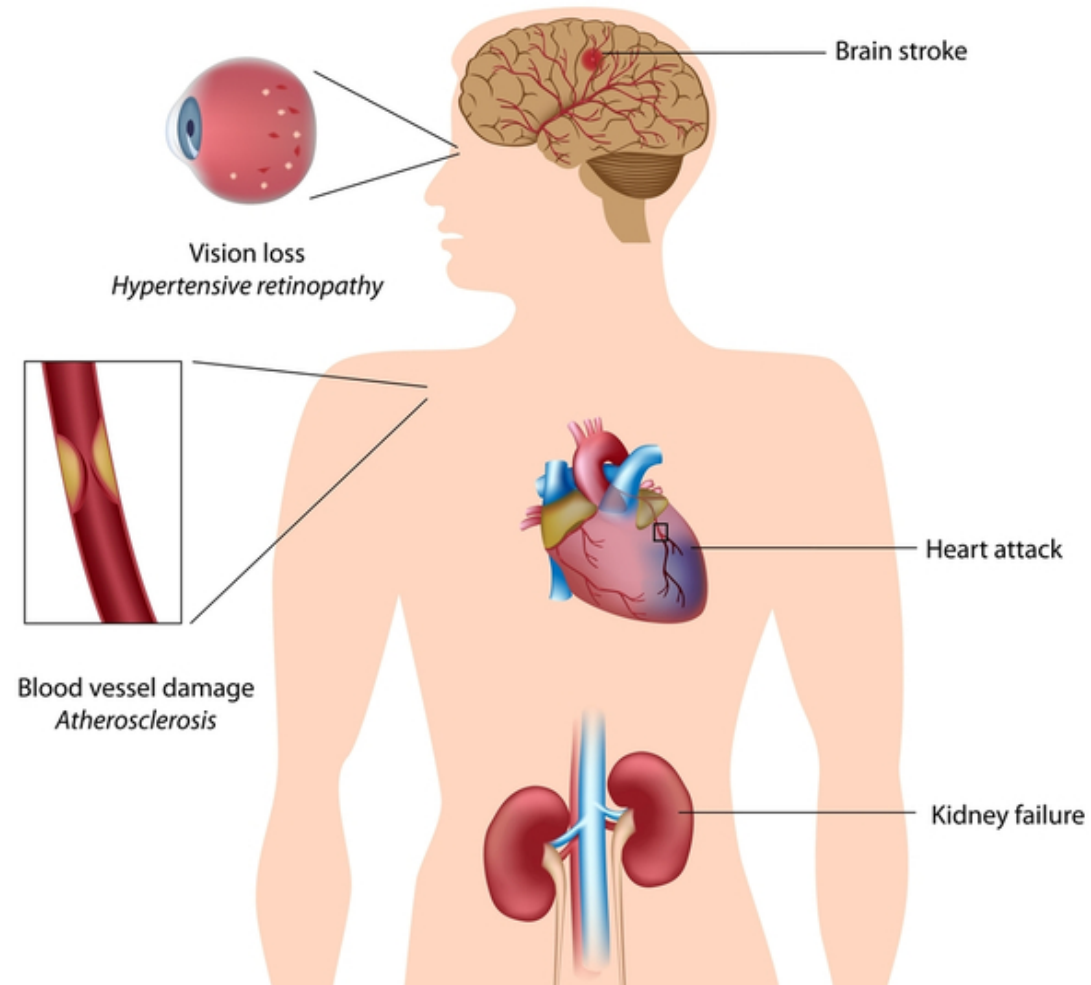
- Hypertension is usually symptomless. However, patients may present with symptoms of complications
 - Headaches
 - Dizziness
 - Heart pain
 - Palpitations
 - Nosebleeds
 - Difficulty in breathing
 - Tinnitus (ringing or buzzing in the ears)
 - Blurred Vision
 - Frequent urination

Complications of Hypertension

- Ischemic heart disease
- Strokes
- Peripheral vascular disease
- Heart failure, aortic aneurysms, diffuse atherosclerosis, and pulmonary embolism
- Cognitive impairment and dementia
- Chronic kidney disease
- Hypertensive retinopathy
- Hypertensive encephalopathy

Complications of Hypertension (2)

Main complications of hypertension



Hypertensive Emergency

- Hypertensive crisis (previously "malignant or accelerated hypertension") is diagnosed when there is evidence of direct damage to one or more organs as a result of the severely elevated blood pressure (systolic \Rightarrow 180 or diastolic \Rightarrow 110). This may include:
 - Hypertensive encephalopathy: headache, dizziness, altered level of consciousness
 - Retinal papilloedema: visual deterioration
 - Myocardial infarction, heart failure, aortic dissection: chest pain, breathlessness, signs of pulmonary edema
 - Deterioration of kidney function: general feeling of malaise

Resistant Hypertension

- Resistant hypertension is defined as hypertension that remains above goal blood pressure in spite of concurrent use of three antihypertensive agents belonging to different antihypertensive drug classes

Activity: Brainstorming

- How do you investigate for hypertension?

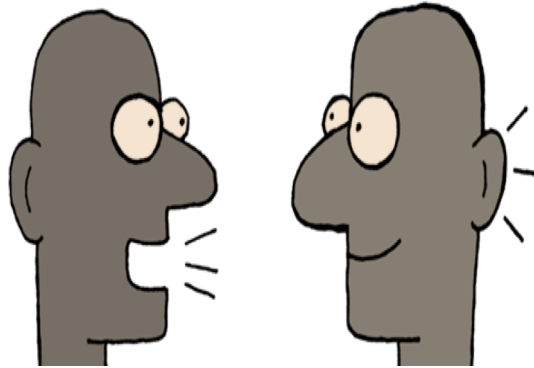


Investigations for Hypertension

- Renal
 - Microscopic urinalysis, proteinuria, BUN and/or creatinine
- Endocrine
 - Serum sodium, potassium, calcium, TSH
- Metabolic
 - Fasting blood glucose, HDL, LDL, and total cholesterol, triglycerides
- Others
 - Electrocardiogram
 - Echo cardiography

Activity: Buzzing

- What is the treatment of hypertension?



Management of Hypertension

- Lifelong lifestyle modifications and drug treatment: regular drug compliance is important
- Aim for most patients: SBP < 140 mmHg and DBP < 90 mmHg
- Aim for patients with diabetes or high risk of CVD: SBP < 130 mmHg and DBP < 80 mmHg

Non-Pharmacological Interventions

- Lifestyle counselling is a critical component of good hypertension management and is often recommended as a first step for patient with blood pressure of SBP 130–139 mmHg and /or DBP 80–89 mmHg who do not have other CVD risk factors

Non-Pharmacological Interventions (2)

- Effective lifestyle modification include:
 - Maintain normal body weight (for adults BMI 20=25 kg/m²)
 - Reduce dietary sodium intake to <2.4 g of sodium per day (<1 teaspoonful of salt per adult/day)
 - Engage in regular aerobic physical activity such as brisk walking (≥30 min per day, most days of the week)
 - Limit alcohol consumption to no more than 2 units/day for men and no more than 1 unit/day for women
 - Consume a diet rich in fruit and vegetables (at least five portions per day)
 - No tobacco

Pharmacological Interventions (1)

- There are four main classes of antihypertensive medications:
 - Angiotensin converting enzyme (ACE) inhibitors
 - Angiotensin receptor blockers (ARB)
 - Calcium channel blockers (CCB)
 - Thiazide and thiazide-like diuretics

Pharmacological Treatment of Hypertension (2)

NONE DIABETES			
Step 1	Step 2	Step 3	Step 4
Thiazide diuretics	Add CCB	Add ACEI/ARB	Referral
Bendroflumethazide 2.5mg od max 5mg od or Hydrochlorothiazide 12.5mg od max 25mg	Nifedipine retard 20mg bd max 80mg or Amlodipine 5/10mg od	Captopril 25mg td or Enalapril 5 od /bd max 40mg or Losartan 50mg od or Larsartan plus H 50/12.5mg	Check for target BP control <140/90 If target not met refer
		Check creatinine prior or 2-4wks after	

Pharmacological Treatment of Hypertension (3)

DIABETES			
Stage 1	2	3	Referral
ACEI/ARBS	Thiazide diuretics	Add CCB	Review every month Target BP 130/80 mmHg
Captopril 25mg tds or Enalapril 5mg od or bd Losartan 50mg od or Losartan plus hydrochlorothiazide 50/12.5mg	Bendroflumethazide (aprinex) 2.5 mg od maxim 5mg od	Nifedipine retard 20mg bd or Amlodipine 5/10mg od	If target not met, refer to high level
Creatinine should be checked prior and after 2-4 wks			

Pharmacological Treatment of Hypertension (4)

SPECIAL CIRCUMSTANCES			
If pregnancy	Previously heart attack and angina	Renal diseases	Acute heart failure
Methyldopa 250mg bd/tds max 3gm /day	ACEI or beta blockers (Atenolol 50mg od or Metoprolol 50mg od) or CCB	ACEI and thiazide or CCB	Furosemide 40mg bd max 80mg bd When symptoms free add ACEI and beta blocker Carvedilol 3.125mg bd to maximums 25mg bd

Activity: Brainstorming

- How do you manage hypertensive emergency?



Hypertensive Emergency (1)

- SBP 180 mmHg and or DBP 110 mmHg **PLUS** target end organ damage and symptoms such as headache, visual disturbances, shortness of breath, chest pain
 - I.V medications preferable such as
 - Esmolol and Labeterol
 - Nitroglycerine infusion
 - Emergency referral
 - In case of pregnancy I.V hydralazine
- SBP 180 mmHg and or DBP 110 mmHg **WITHOUT** features of target end organ damage
 - Commence oral medications

Acute Coronary Syndrome (ACS) (Heart Attack)

- Do resting 12 lead ECG if available
- Give ASA 300mg and clopidogrel 600mg
- Give Statins; atorvastatin 80 mg or Rosuvastatin 40mg
- Timely referral to PCI/THROMBOLYTIC CENTER (the role of ambulance)

Lipid Control

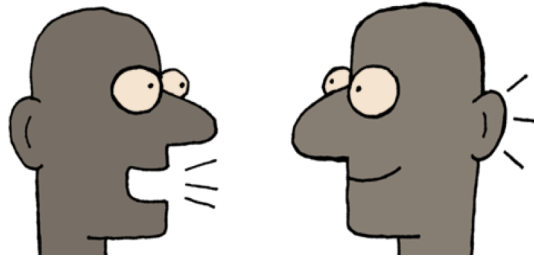
- Lipid lowering drugs
 - Statins Atorvastatin or Simvastatin 20mg daily (max 40mg)
 - If cholesterol (LDL) remain high after 3 months
 - Refer/treat
 - If fasting triglycerides $> 1.7\text{mmol/l}$,
 - Add fenofibrate or clofibrate. Or
 - If only triglyceride raised
 - Fibrate alone (without a statin)

Referral Pathway for Hypertension

- **Emergency referral**
 - Must be done when BP 180/110 mmHg PLUS symptoms
- **Normal Referral**
 - When BP > 160/100 mmHg after 6 months of treatment
 - Make sure:
 - Patient is adhering to treatment
 - BP is measured correctly when at rest and after having taken anti-HTN medication
 - Medication is in correct dosages and using at least 2 different medications

Activity: Buzzing

- How do you follow up patients with hypertension?



Follow up Patients with Hypertension (1)

At every visit, ASK:

- How are you feeling? (in general + specific symptoms)
- How have your BP measurements been since last visit (ask for patient's notebook)
- Lifestyle regarding tobacco, physical activity, diet (fruits/vegetables, salt, cooking oil)
- Do you take medication as prescribed, when last taken, side effects?
- Difficulty following advice given/you feel uncomfortable doing?
- Any questions about your condition or the treatment recommended?

Follow up Patients with Hypertension (2)

What to do at every visit

- If BP in general is $<140/90$ mmHg, continue treatment as usual
- If prescribed treatment is not followed
 - It is expected that BP may be high and you cannot evaluate the effect on medical treatment that was prescribed at previous visit
 - Investigate this instead of adding/continuing prescription
 - Address the underlying reasons for poor adherence
 - Educate the patient: not to stop medication and to do BP measurements regularly and record in notebook

Follow up Patients with Hypertension (3)

What to do at every visit

- If side-effects of drugs is disturbing, change to another drug.
- If BP is continually high despite following treatment, add anti-HTN drug/increase dosage.
 - Rather to add a second medicine than increase one to maximum dosage
- Remind patient to take medication every day, also on the morning of clinic appointment

Key Points (1)

- Factors affecting blood pressure are physiological and pathological
 - Physiological include age, sex, diet and exercises
 - Pathological include disease like kidney stenosis and eclampsia
- There is primary and secondary hypertension
- Treatment include non-pharmacological and pharmacological
- Follow up monitoring has to be done closely
- Refer clients for further management

Session Evaluation

- What are the common symptoms and signs of hypertension?
- What is the management of patient with hypertension?