Hypertension

Hypertension is a major modifiable health related risk factor in India, contributing to the top causes of death in the country .Detection and proper management of hypertension could lead to substantial decrease in the burden of coronary artery disease, heart failure, stroke, and renal failure.

Hypertension can be prevented by minimizing risk factors like obesity, physical inactivity, and high salt intake, moderate to high alcohol consumption at the population level.The early detection and treatment of hypertension has been shown to prevent cardiovascular diseases thereby extending and enhancing the quality of life.

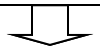
CLINICAL PATHWAY FOR HYPERTENSION CARE

1.Screening For Hypertension

Screening for hypertension in adults will involve opportunistic screening of people >18 years of age & targeted approach by health professionals at every level of health care using a standardized BP measurement procedure.

2.Confirm diagnosis of hypertension and classify it

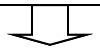
Diagnosis to be confirmed by the physician based on 2 measurement)if the 2 measurement varies by more than 5 mm Hg take a third reading (on at least 2 visits,which are within 1-4 weeks apart)excepts in the case of grade2 hypertension, hypertensive urgencies & hypertensive emergencies(



3.Educate &Counsel patient

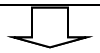
)Assess the lifestyle factors,target organ damage and clinical conditions(

Assess and evaluate patient for cardiovascular risk factors like smoking, obesity, diabetes .Educate about asymptomatic nature of disease and its serious complications .Emphasize on lifestyle modifications,long term therapy of drug and need for drug intake on a regular basis & importance too monitor efficacy of drugs through regular check ups.



4.Manage Hypertension)Lifestyle modification ± Medications therapy(

Lifestyle modifications should be used in all patients .Initiate medication therapy with first line medications and accordingly add the doses as per the standards and patient requirement .Manage comorbidities and also manage hypertension appropriately in special groups)elderly (and special situations)hypertensive urgencies & emergencies(



5.Follow up and maintain adherence

Preferably follow up at primary care level and maintain a continuum of care with a team based approach.
Review BP and advice n adherence .Reassess target organ damage and risk factors periodically.Review and advise n adherence to life style modifications .Refer in case of uncontrolled hypertension on 3drugs,suspected secondary hypertension and hypertensive emergencies.

Standarized BP measurement Procedure

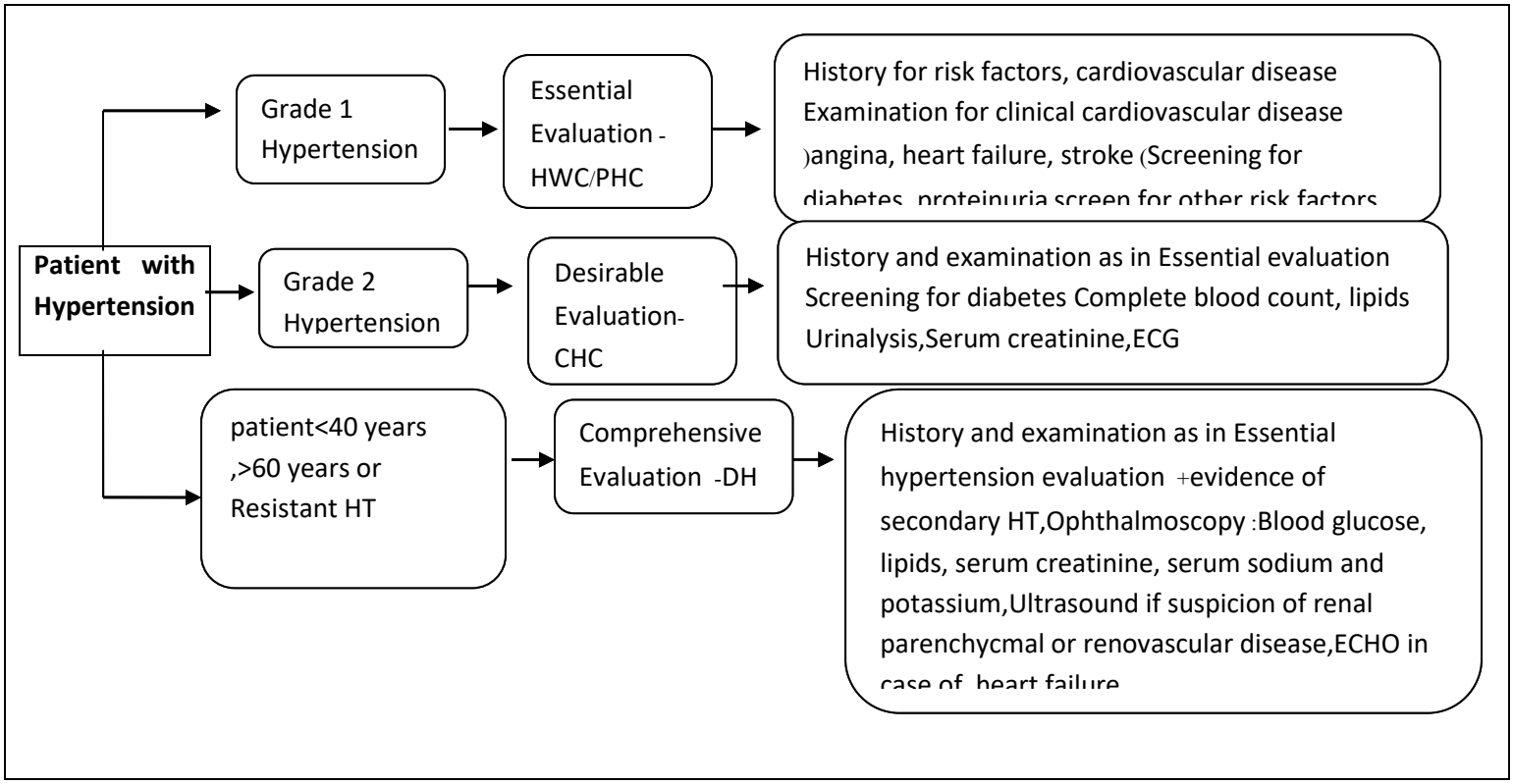
1. Patient Preparation and position	→Patient should be in a relaxed state for 5 minutes before measurement of BP . →Patient should be seated in a comfortable position with back supported,arm at heart level and legs in an uncrossed position. →Ensure that patient had not taken caffeine in the last 1 hour or smoked in the past 30 minutes.
2. Choice of BP device	Mercury sphygmomanometer or any other device)including electronic digital oscillometric devices (which has been validated and calibrated regularly
3. Cuff size and placement	→The cuff size should be appropriate for the patient .Length of bladder should be 80 %of arm circumference and width should be 40 %of arm circumference. →A large adult cuff should be used for an obese patient .Patient should not wear any constrictive clothing . →Place the midline of the cuff over the pulsations of the brachial artery, at a distance of 2-3 cm above the cubital fossa
4. Procedure to measure systolic and diastolic blood pressure)applicable in case of auscultation based BP measurement(	→Palpate the radial pulse and then inflate the cuff to 30 mm beyond the disappearance of the radial pulse .Deflate the cuff at 2-3 mm per second and record by auscultation with the stethoscope over the brachial artery, the first and the last sounds as the systolic and diastolic blood pressure respectively . →In oscillometric devices, follow the instructions of the manufacturer, the systolic and diastolic BP will be displayed automatically . →If the patient is diabetic or above 65 years measure the BP in supine position, and 2 minutes after assuming the standing position to check for postural hypotension.
5. Number of measurements and recording of the result	→At least 2 readings should be taken at an interval of 1 minute .If the readings differ by more than 5 mm Hg takes a third reading . →The lower of the readings should be taken as the representative SBP and DBP.

CLASSIFICATION OF HYPERTENSION

CATEGORY	SBP)mm Hg(	DBP)mm Hg(	Advise or Recommendations
Optimal	<120	and <80	Patient should be advised a recheck in 2 years.
Normal	120-129	and/or 80-84	
High Normal	130-139	and/or85-89	Patient should be advised a recheck in 1 year, or sooner if indicated of other risk factors or diseases.
Grade1 Hypertension	140-159	and/or90-99	Patient should be rechecked within next 1-2 weeks and then classified as hypertension or high normal.

Grade2 Hypertension	>160	and/or >100	Patient should be advised early referral to primary health center for confirmation of diagnosis, if measurement have been made at a periphery health facility below the level of PHC.
Isolated Systolic	>140	and <90	Patient should be advised a treatment after confirmation of the diagnosis.
Hypertensive Urgency	>180	and or >120 severe asymptomatic hypertension with no evidence of organ damage	Patient Should be referred to CHC or DH immediately for further investigation to exclude any organ damage and for initiation of treatment required on a immediate basis .Goal should be gradual reduction of BP over hours and days if there is no acute organ damage.
Hypertensive Emergency	>180	and/or>120 severe symptomatic hypertension accompanied by presence of end organ damage	Refer Urgently -Discuss with specialists whether to give anti hypertensive before referral as anti hypertensive can lead to severe drop on BP and stroke.
Target for blood pressure control	<140	<90	In less than 65 yrs of age
			in > 65yrs of age

Pathway for Investigations



Investigations avaialble at different level of Health care

SHC-HWC	PHC	CHC	DH
→Urine albumin	→Urine albumin	→Urine albumin → Blood urea, serum creatinine → ECG	→Urine albumin →Blood urea, serum creatinine, CPK-MB Lipid profile, Cholesterol, Electrolytes →ECG

4 .Management of Hypertension

Lifestyle modifications and initiation of drug therapy:

Overall aim :The overall aim of the management of hypertension is not only reduction of Blood pressure to target levels but also to lower the cardiovascular risk of the patient.

I. Lifestyle measures :

- Includes reduction of salt intake)5-6g/day(
- stopping tobacco intake.
- Low fat diet,regular exercise and reduction of body weight in those who are obese.
- Patients with grade1 hypertension may require only lifestyle modifications which may reduce the doses required for control of hypertension and will also reduce the cardiovascular risk in all grades of hypertension.
- Lifestyle measures should be monitored for 1-3 months following diagnosis of Grade 1 hypertension .The range of durations should be lowered depending on the presence of other risk factors like age, obesity, lipid levels, and smoking status

II. Initiation of drug therapy:

Classes of antihypertensive drugs and preferred choices in association with the Clinical Manifestations:

Clinical conditions	**First drug of choice**	**Second drug of choice if needed to achieve BP control**	**Third drug of choice if needed to achieve BP control**
Isolated systolic hypertension)elderly(	CCB/Thiazide diuretics	ACE Inhibitor	Thiazide diuretics+ ACE Inhibitor +CCB
Hypertension with diabetes	ACE Inhibitor	CCB/Thiazide diuretics	ACE Inhibitor +CCB + Thiazide diuretics
Hypertension and chronic kidney disease)defined as albuminuria or an eGFR <60ml/min/1.73m^2 for >3 months	ACE Inhibitor)where close clinical and biochemical monitoring is possible . Otherwise CCB is preferable	CCB or thiazide diuretics loop diuretic if GFR is below 30ml/min	ACE Inhibitor +CCB + Thiazide diuretics
Hypertension and previous myocardial infarction	BB, ACE Inhibitor	CCB or diuretic	
Hypertension associated with heart failure	Thiazide/loop diuretics+ACE Inhibitor +BB +Spironolactone		
Hypertension associated with previous stroke	ACE Inhibitor	Diuretic or CCB	ACE Inhibitor+CCB+ diuretic

Note :Angiotensin receptor blocks ARBs (may be used for this indication if there is intolerance to ACE inhibitor cough,angioedema

Examples of representative drugs under each category:

1. ACE Inhibitors :Enalapril
2. Calcium Channel blockers :Amlodipine
3. Thiazide diuretic :Hydrochlorothiazide
4. Beta-blocker :Atenolol

__In patient with heart failure the preferred Beta blocker are ,metoprolol,carvedilol,bisoprolol__

The treatment regimen and use of combination drugs:

Hypertension classification		**Drugs**
Grade1 Hypertension	Inadequate control after 3 months of lifestyle modification or more than 3 risk factors such as: -Age :men>55yrs;women;>65yrs -Smoking,obesity including abdominal obesity. -Dyslipidemia, impaired fasting glucose,family history of early coronary artery disease	Initiated with one drug: a(Amlodipine/Enalapril/Hydrochlorothiazide b(Add second drug if response not adequatewithin 2-4 weeks: →Enalapril+Amlodipine**or** Amlodipine +hydrochlorothiazide**or** Enalapril +hydrochlorothiazide C (Add third drug if response not adequate within 2-4 weeks: →Enalapril+Amlodipine+Hydrochlorothiazide
Grade2 Hypertension	)Systolic:>160 Diastolic:>100(	Initiated with one drug: a(Amlodipine/Enalapril/Hydrochlorothiazide b(Add second drug if response not adequatewithin 2-4 weeks: →Enalapril +Amlodipine **or** Amlodipine +hydrochlorothiazide**or** Enalapril +Hydrochlorothiazide C (Add third drug if response not adequate within 2-4 weeks: →Enalapril+Amlodipine+Hydrochlorothiazide
Hypertension associated with comorbidities		
Hypertension with Diabetes Mellitus	Patients with diabetes mellitus should be initiated on drug treatment when the SBP is greater than 140 mm Hg, and the target for control should be a SBP of less than 140 mm Hg, and a diastolic BP of less than 90 mm Hg.	Initiated with one drug: a(Enalapril Second drug of choice: →Amlodipine or Hydrochlorothiazide Third drug if needed: →Enalapril+Amlodipine+Hydrochlorothiazide
Hypertension with Previous Myocardial Infarction	----------	Initial drug: →Atenolol,Enalapril Second drug: → Amlodipine or Hydrochlorothiazide
Hypertension associated with	----------	Drug of choice: →Hydrochlorothiazide+Enalapril+Atenolol+Spironolactone

heart failure		and hospitalization
Hypertension associated with previous stroke	In patients with a history of stroke or TIA, initiation of drug treatment should be considered even with Grade 1 hypertension, and a systolic BP of less than 140 mm Hg should be targeted. In the first 72 hours of an ischemic stroke, do not administer antihypertensive treatment since excessive lowering of BP can exacerbate the existing ischemia	Initial drug: →Enalapril Second drug: →Hydrochlorothiazide or Amlodipine Third drug: →Enalapril+Amlodipine+Hydrochlorothiazide
Hypertension with Kidney disease)diabetic or non-diabetic(	→The target for BP reduction should be a SBP of less than 140 mm Hg, but a SBP of less than 130 mm Hg should be considered for these with overt proteinuria. →Monitoring serum creatinine and potassium in the first week of therapy is advisable after initiation of therapy or any increase in the dose of ACE inhibitors.	→ACE inhibitors/ARBs are effective in reducing albuminuria and should be used in patient with hypertension and overt proteinuria)or microalbuminuria(→ACE inhibitors and thiazide or thiazide like diuretics should be used as other antihypertensive agents → In the presence of volume overload, loop diuretics like furosemide may be used.

Drug doses:

Doses for Initiation of therapy:

1. Enalapril :5mg
2. Amlodipine :5mg, 2.5mg in elderly
3. Hydrochlorothiazide, 12.5mg
4. Atenolol: 50mg

Add on doses:

1. Enalapril :5mg, reduce in elderly or those on diuretics
2. Amlodipine :2.5mg
3. Hydrochlorothiazide :12.5mg

Maximal doses:

1. Enalapril :20-40mg
2. Amlodipine :10mg
3. Hydrochlorothiazide :25mg
4. Atenolol :100mg

Hypertensive Urgencies:

Hypertensive urgencies occurs in a patient with chronic hypertension in number of situations which includes non adherence to therapy, after sudden withdrawal of Beta blocker or clonidine therapy, after ingestion of large quantity of salt or due to anxiety.

Nursing the patient in a quiet room and relief of anxiety may reduce BP to a certain extent.

Do not attempt excessive, rapid and uncontrolled reduction of blood pressure in hypertensive urgencies, with intravenous drugs or oral or sublingual nifedipine as this may cause sudden fall of BP leading to serious cardiac and cerebral complications.

If BP reduction over few hours is required in view of imminent cardiovascular events, then oral furosemide, oral clonidine can be used .These can be followed by long term therapy with Calcium channel blockers, ACE inhibitors or diuretics.

Hypertensive Emergencies:

The magnitude and rate of reduction of BP varies according to the organ involvement in the hypertensive emergency .The goal should be gradual reduction of systolic BP to 160mm Hg and diastolic of 110-120 mm Hg over 2-6 hours and gradual normalization over a period of 24-48 hours is recommended.

Parenteral agents like I/V labetalol may be used initially with achange to oral drugs later.

In the case of acute left ventricular failure reduction of the elevated BP is indicated with a parenteral loop diuretic like furosemide in addition to vasodilators like nitroglycerine.

In patients with acute coronary syndrome with severe hypertension, intravenous nitroglycerine may be used in association with intravenous beta-blockers like labetalol.

Patients with a hypertensive emergency should be examined for any clinical clues to the presence of secondary hypertension and be evaluated for the same

Hypertension in the elderly

Postural Hypotension is more common in elderly.

Assess patients for postural hypotension at diagnosis and on follow up by checking BP in sitting and in standing position after 2 minutes.

The drug of choice for initiation of therapy in the elderly is a long acting calcium channel blocker, or a low dose thiazide diuretic in the absence of compelling indications.

In elderly patients less than 65years of age, the blood pressure target for control may be <130mm Hg systolic and <90mm Hg diastolic if the patient is fit and the treatment is well tolerated.

In elderly patients more than 65years)the very elderly(, the blood pressure target for control is <140mm Hg systolic and <90 mm Hg diastolic.

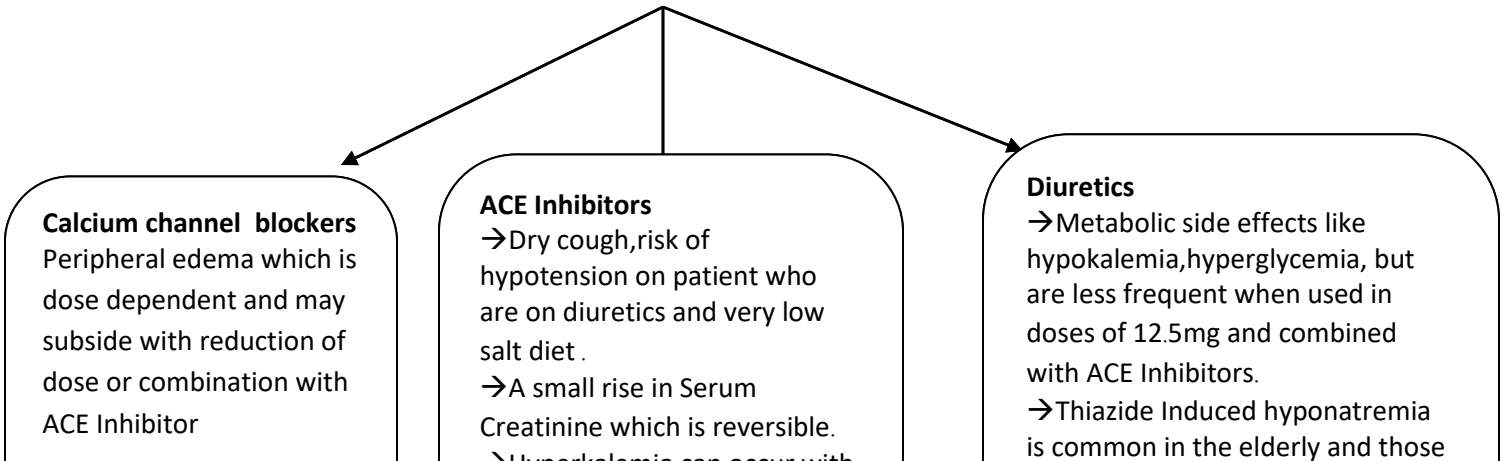
There is a higher likelihood of certain side effects in the elderly –e. g -Hyponatremia in case of thiazides, and hyperkalemia in case of ACE inhibitors.

Follow up and maintain adherence:

The patients should be monitored for efficacy of the regimen, both at the clinic and community level .In patients who are yet to achieve target BP, follow-up visits at 1-2 weeks can be scheduled till target BP is achieved .Thereafter the patient can be seen by a physician at a frequency determined by the severity of the hypertension, presence of comorbidities, target organ damage .

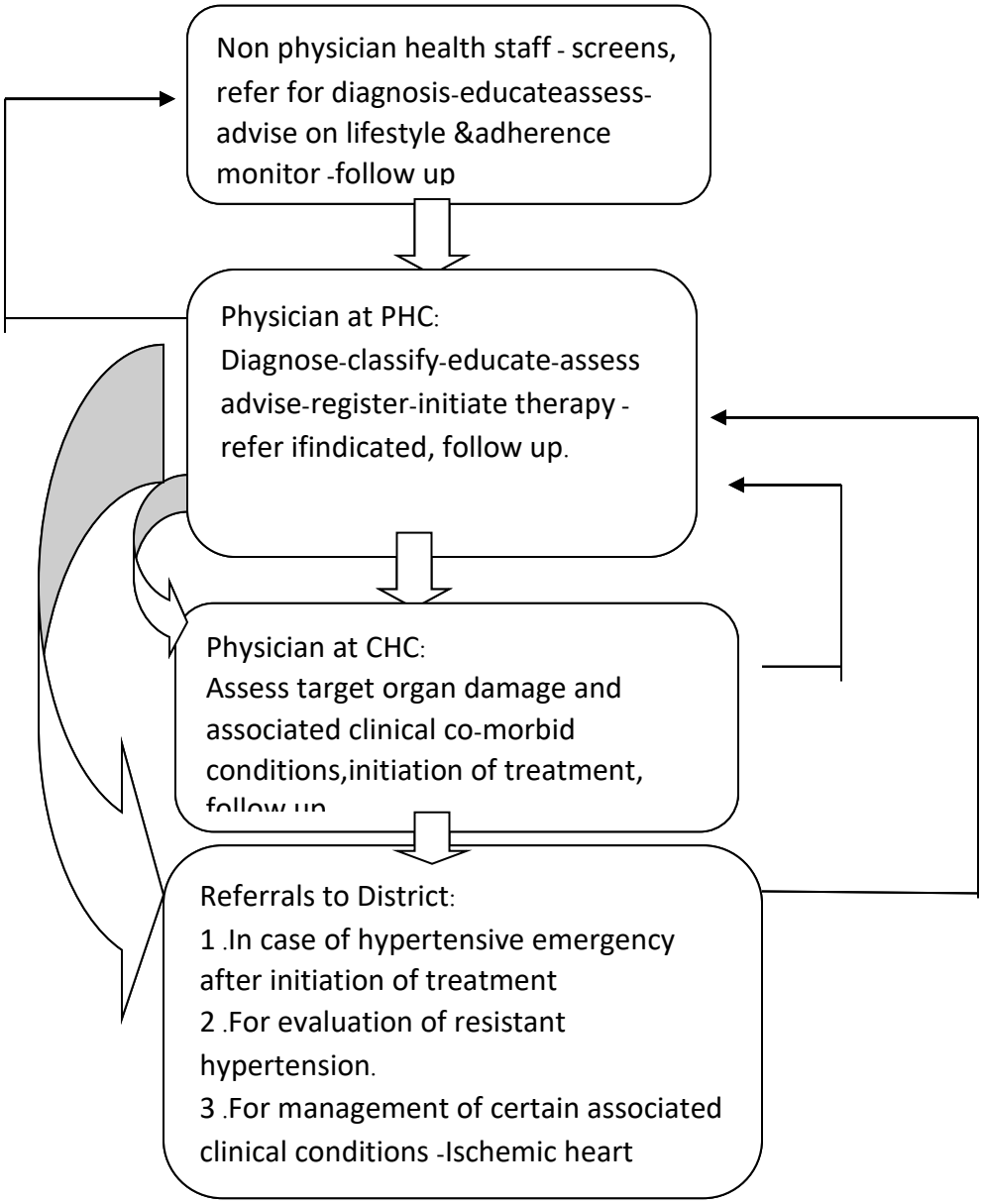
The patients should be monitored for side effects of medications

The common side effects of medications are ;



A continuum of care needs to be strengthened for management of hypertension which includes a team approach with involvement of Physician, allied health staff and community based health workers.

Continuum of care pathway



- Encourage participation of family member in supervision of drug intake,periodic counseling and provision of patient information leaflets to improve adherence and control. Also consider the use of home based automated blood pressure monitoring device which has been validated with a clinical based device) .only if its affordable for the patient & family.(
- Ensure the tracking of patient for follow up through use of follow up registry at all the levels of health care and create a strong system of follow up through involvement of community based health workers.
- All patients with hypertension, should undergo an annual review of control of BP, implementation of lifestyle modifications)e.g .maintenance of body weight(, target organ damage)proteinuria(, review of treatment including side effects of drugs .
- All patients with high normal BP should also be encouraged to undergo an annual review, and advised appropriate lifestyle modifications e.g .dietary changes, weight maintenance, and abstinence from tobacco

Patient Education:

- Patients should be counselled about the nature of the disease, and the management of hypertension, before being subjected to laboratory evaluation and drug treatment.
- Patients should be counselled about hypertension being an asymptomatic condition which can lead to disabling and life-threatening complications like stroke, heart attack and renal failure.
- Patient should be counselled about the need for long-term therapy, need for regularity of drug intake, informed about the targets for BP control, and encouraged to monitor efficacy of therapy through regular check-ups.
- Patient should be counselled about the importance of lifestyle modifications in reducing hypertension and reducing risks of cardiovascular disease.