

The Egyptian Hypertension Society

EGYPTIAN HYPERTENSION GUIDELINES

2020

From the President of EHS

The main objectives of this document are to provide the practitioners in Egypt with an up-to-date information regarding the management of hypertension in a poor resources' setting and help answering practical questions seen in daily practice. The development of guidelines took into consideration the low socioeconomic status of the majority of the Egyptian patients, the defective health care system in our country- majority of public pay out of their own pocket to cover the health costs, in addition to the limited medical education in the field. The target physician population for these guidelines is the general practitioners, family doctors, internists and those who are taking care of hypertensive patients.

Principal Editor
M. Mohsen Ibrahim, MD
President of the Egyptian Hypertension Society
Cairo 2020

Working Group Members

Principal Editor:
M. Mohsen Ibrahim

Cairo University

Members (*Alphabetically*):

Ahmed Abdel latief Ramadan

Al-Azhar University

Ahmed El-Hawary

Suez Canal University

Amir Abdel Wahab

Cairo University

Amr Hassan

Cairo University

Aziz Madkour

Al-Azhar University

Azza El-Eraky

Suez Canal University

Azza Farrag

Cairo University

Ezz El-Sawy

Al-Azhar University

Fathy Maklady

Suez Canal University

Ghada Sayed

Cairo University

Hany Ragy

National Heart Institute

Heba Gabr

Ministry of Health

Hossam Kandil

Cairo University

Hussien Heshmat

Cairo University

Hussien Rizk

Cairo University

Karim Said

Cairo University

Magdy Abdel Hamid

Cairo University

Maher Fouad Ramzy

Cairo University

Mahmoud Hassanien

Alexandria University

Mohamed Abdel Ghany

Cairo University

Mohamed Oraby

Suez Canal University

Nasser Taha

Menia University

Omar Awwad

Ain Shams University

Omar El-Khashab

Cairo University

Sameh Bakhoun

Cairo University

Sameh Shahien

Ain Shams University

Soliman Gharieb

Cairo University

Wafaa El-Aroussy

Cairo University

Wagdy Ayad

Alexandria University

Yasser Boghdady

Cairo University

DIAGNOSIS OF HYPERTENSION

1. Blood Pressure Measurement

- BP must be measured in a standardized fashion using a properly validated, well maintained and a recently calibrated device.
- Blood pressure is variable. The diagnosis of hypertension should be based on multiple BP measurements taken on several separate occasions.
- Cut-off point for defining hypertension during office measurement is 140/90 mmHg, while for average home readings and for daytime ambulatory blood pressure (ABP) is 135/85 mmHg.
- If all BP measurements are 140/90 mmHg or higher, to confirm the diagnosis of HTN, choose one or more of the following:
 1. Repeat office BP measurements 3-5 times over 2-3 months depending on BP level.
 2. Offer 24 hrs ABPM and the use of the average daytime BP.
 3. Home BP monitoring: take as many measurements as possible preferably more than 14 measurements over one week.
- End organ damage and CV event rates correlate more closely with ABPM than with clinic measurements.

Precautions to Obtain Correct BP Reading

1. Choose the correct cuff size.
2. Avoid placing the cuff over clothes.
3. Patient's arm must be at heart level.
4. Patient should rest quietly for 3-5 minutes before measurement in a quiet room with comfortable temperature.
5. Patient should avoid talking during measurement.
6. No caffeine or cigarette smoking at least 1 hour before measurement.
7. Patient's bladder should be evacuated.
8. Palpate radial pulse before auscultatory measurements (to avoid the auscultatory gap).
9. Do not deflate the cuff too quickly (2 mmHg/beat).
10. Do not re-inflate the cuff to repeat measurements before it is fully deflated.
11. Take more than one measurement.
12. If there is a difference of more than 10 mmHg between two measurements, take more measurements.

The diagnosis of hypertension should be based on at least 3 blood pressure measurements 30-60 seconds apart after resting for at least 5 minutes and on repeated office visits. If there is a difference of $\geq 10/5$ mmHg between readings, take more measurements, take the lowest reading of the last 2 measurements. If the initial readings are high ($>150/95$ mmHg), have the patient rest for 5 minutes and repeat measurement.

Home BP measurement

- Self-measurement of BP at home is better than office measurements as it correlates with target organ damage (TOD), it detects white-coat and masked hypertension, it improves patient's adherence to therapy, and it is cheaper than frequent office visits.
- Normal home BP measurement should be less than 135/85 mmHg. Measure blood pressure twice daily for 7 days and take average of the last 6 days.

Ambulatory BP measurement (ABPM)

- ABP is the best method to diagnose hypertension but is not used for long-term follow-up. The major limitations are the cost and the inconvenience to the patient.
- Advantages of ABPM over office measurement:
 1. Better correlation to end-organ damage.
 2. Better prediction of cardiovascular events.
 3. Better assessment of degree of BP reduction by antihypertensive medications.
 4. No white coat effect.

Sequential Automated office BP (SABP)

- Use fully automated, validated, electronic sphygmomanometer.
- Device should take multiple readings without requiring activation of measurements by the patient or the health professional.
- Linked with TOD.
- More consistent from visit to visit.
- Eliminates office-induced HTN.

Cut-off points for Diagnosing HTN

1. Routine clinical practice: at office 140/90 mmHg.
2. Daytime: ABPM: $\geq 135/85$ mmHg
3. Average home BP readings: $\geq 135/85$ mmHg.
4. Average SABP readings: $\geq 135/85$ mmHg.

Blood Pressure Variability

- Blood pressure is characterized by large spontaneous variations from time to time in a hypertensive patient during the day and between days, months and seasons. Therefore, the diagnosis of hypertension should be based on multiple blood pressure measurements, taken on separate occasions over a period of time.
- BP and heart rate should drop by 10-15% during sleep, a condition known as "dipping". Non dippers are at a higher risk of future cardiovascular events.

*Definition and classification of hypertension

Category	Systolic		Diastolic
Normal	< 140	And/or	< 90
Mild hypertension	140-159	And/or	90-99
Moderate hypertension	160-179	And/or	100-109
Severe hypertension	≥180	And/or	≥110
Isolated systolic hypertension	>160	And	<90

Frequency of BP measurement

Interval between repeated measurements (office visits)

- Mild HT (<160/100 mmHg): 2-3 months
- Moderate/severe (160/100-180/110 mmHg): 2-4 weeks
- TOD or high-risk patients: 2-4 weeks
- BP >180/110 mmHg: exclude panic attack or severe anxiety and repeat in 30 min

White Coat Hypertension

- In some patients, office blood pressure is persistently elevated while readings out of the office, ambulatory daytime or 24-hour ambulatory or home blood pressure, are within normal range. This condition is known as 'white coat hypertension' or isolated office hypertension.

Masked Hypertension or Isolated Ambulatory Hypertension

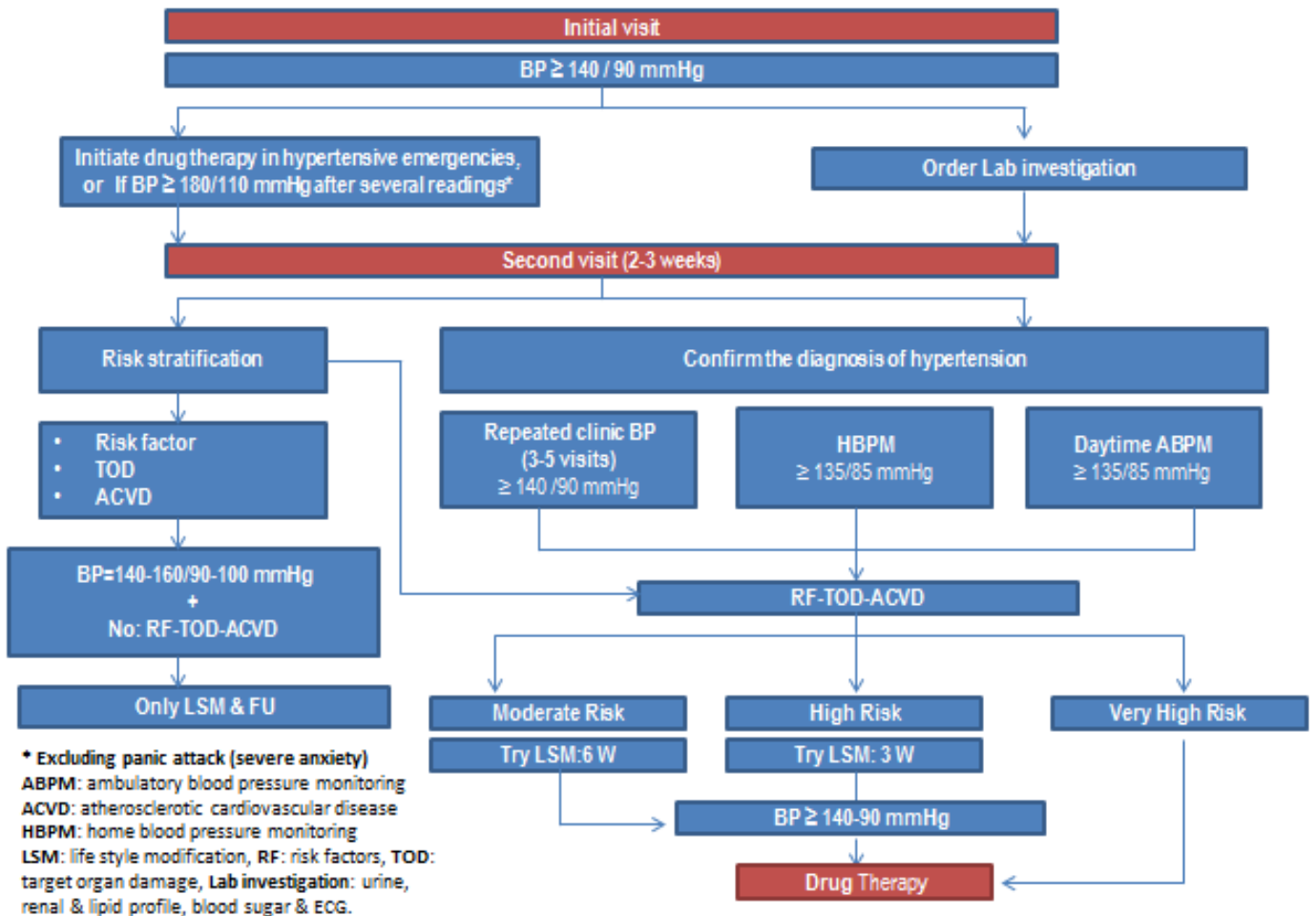
- Clinic BP is normal while out of office BP is high.
- Masked hypertension should be suspected if TOD progresses or does not resolve, despite BP control in the clinic.

Pseudo Hypertension

- Non compressibility artery syndrome causing falsely elevated blood pressure readings due to calcification of blood vessels which can not be compressed

Diagnosis & Management of hypertension

Algorithm (1): Hypertension Diagnosis and Management



2. CLINICAL AND LABORATORY EVALUATION

Objectives

- a. Identify high risk patients
 1. Detect other cardiovascular risk factors.
 2. Assess target organ damage.
 3. Diagnose associated cardiovascular or renal diseases.
- b. Identify secondary causes of hypertension and comorbid conditions.

Laboratory Tests

- Essential (for all patients):
 - a. Urine: dipstick for protein, blood and sugar.
 - b. Blood tests: sugar, creatinine.
- Recommended (if facilities are available):
 - a. Blood lipid profile: total cholesterol, LDL, HDL and triglycerides.
 - b. Uric acid.
 - c. Serum potassium.
 - d. Hemoglobin.
 - e. ECG.
 - f. Special investigations in resistant or suspected secondary forms of hypertension.
 - g. Optic fundus in patients with severe hypertension.

Assessment of Cardiovascular Risk Profile

The risk of cardiovascular disease in patients with hypertension is determined not only by the level of blood pressure but also by the presence or absence of target organ damage, other cardiovascular risk factors, associated clinical conditions and diabetes.

Cardiovascular Risk Factors

1. Diabetes mellitus: fasting plasma glucose >126 mg/dl, random plasma glucose >200 mg/dl or receiving treatment of diabetes or HbA1c >6.5 with symptoms of polyuria and polydipsia.
2. Males >55 or Females >65 years.
3. Total S- Cholesterol >240 mg/dl, HDL-C <40 mg/dl or LDL-C >160 mg/dl.
4. Cigarette smoking.
5. Obesity (BMI >30 kg/m²).
6. Serum creatinine >2 mg/dl.
7. Metabolic syndrome: combination of abdominal obesity (waist circumference >94 cm in men and >92 cm in women), impaired glucose tolerance (fasting blood sugar 110-126 mg/dl), increased plasma triglycerides (>200 mg/dl) and low HDL-C (<40 mg/dl).
8. Family history of atherosclerotic cardiovascular diseases in a first degree relative (parents, siblings or brothers) before the age of 40 years in males and 50 years in females.

Silent Target Organ Damage

- Left ventricular hypertrophy (LVH):
 - a. ECG criteria (Sokolow- Lyon SV_1+RV_5 or $V_6 > 35$ mm, tall R in AVL >11 mm).
 - b. Echo criteria (wall thickness ≥ 12 mm or LVMI in males ≥ 125 gm/m² or in females ≥ 110 gm/m²).
- Carotid bruits.
- Proteinuria*
- Increased serum creatinine >1.4 mg/dl in females and >1.5 mg/dl in males.
- Optic fundus changes: $>$ grade I retinopathy.
- * no proteinuria: < 30 mg/24 hrs
 >300 mg macroalbuminuria
 <300 mg microalbuminuria.

Cardiovascular Risk Categorization

Depending upon the global risk profiling, hypertensive patients can be categorized into four groups:

- *Low risk:*
 - o No additional CV risk factors.
 - o No TOD.
 - o No associated atherosclerotic CV.
- *Moderate risk:*
 - o 1-2 additional CV risk factors, no DM, no TOD and no atherosclerotic CVD.
- *High risk:*
 - o >2 additional RFs, or TOD or DM or renal failure.
 - o Very high level of a single risk factor.
- *Very high risk:*
 - o Symptomatic atherosclerotic CVD.
 - Coronary artery disease (angina, MI, CABG, PCI).
 - Cerebrovascular disease (stroke, TIA).
 - Peripheral arterial disease.
 - Heart failure.
 - Abdominal aortic aneurysm.
 - Renal failure: serum creatinine >3 mg/dl (GFR <15 or on dialysis).

3. TREATMENT

a) LIFESTYLE MODIFICATION

ADVICE IN ALL PATIENTS

- Reduce weight if overweight by 5 kg over 4-6 month or achieve healthy body weight.
- Regular physical exercise of brisk walking (30-60 minutes) at least 5 days per week.
- Reduce salt intake to less than 5 g of sodium chloride/day. Salt restriction is essential particularly in elderly, diabetics and CKD. List of food items rich in salt should be available in doctors' offices.
- Encourage intake of healthy diet rich in fresh fruits, vegetables, and low-fat dairy products with a reduced content of saturated and total fat.
- Stop smoking.
- Control stress with regular physical activity, behavior modification, change home and work environment conditions, if possible.

Dietary Approaches to Stop Hypertension (DASH) diet

Food group	Servings	Examples and notes
Grains	7–8/day	Whole wheat bread, oatmeal, popcorn
Vegetables	4–5/day	Tomatoes, potatoes, carrots, beans, peas, squash, spinach
Fruits	4–5/days	Apricots, bananas, grapes, oranges, grapefruit, melons
Low-fat or fat-free dairy foods	2–3/day	Fat-free (skimmed) or low-fat (1%) milk, fat-free or low-fat yogurt, fat-free or low-fat cheese
Meats, poultry, fish	≤2/day	Select only lean meats. Trim away fats. Broil, roast or boil. No frying. Remove skin from poultry
Nuts, seeds, dry beans	4–5/week	Almonds, peanuts, walnuts, sunflower seeds, soybeans, lentils
Fats and oils	2–3/day	Soft margarines, low-fat mayonnaise, vegetable oil (olive, corn, canola or safflower)
Sweets	5/week	Maple syrup, sugar, jelly, jam, hard candy, sorbet

Source: *The 2009 Canadian Hypertension Education Program recommendations for the management of hypertension: Part 2 – therapy. Can J Cardiol.* 2009 May; 25(5): 287–298.

Examples of single servings for each food group are listed below.

Grains

- 1 slice whole-wheat bread
- 1 ounce dry whole-grain cereal
- 1/2 cup cooked cereal, rice or pasta (preferably whole grain)

Vegetables

- 1 cup raw leafy green vegetable
- 1/2 cup cut-up raw or cooked vegetables
- 1/2 cup (4 fluid ounces) low-sodium vegetable juice

Fruits

- 1 medium fruit
- 1/4 cup dried fruit
- 1/2 cup fresh, frozen or canned fruit
- 1/2 cup (4 fluid ounces) 100% fruit juice

Milk and milk products

- 1 cup (8 fluid ounces) low-fat or fat-free milk
- 1 cup low-fat or fat-free yogurt
- 1 1/2 ounces low-fat or fat-free cheese

Meat, poultry and fish

- 1-ounce cooked lean meat, skinless poultry or fish
- 1 egg
- 2 egg whites

Nuts, seeds and legumes

- 1/3 cup (1 1/2 ounces) nuts
- 2 tablespoons peanut butter
- 2 tablespoons (1/2 ounce) seeds
- 1/2 cup cooked legumes (dried beans or peas)

Fats and oils

- 1 teaspoon soft margarine
- 1 teaspoon vegetable oil
- 1 tablespoon mayonnaise
- 2 tablespoons low-fat salad dressing (or 1 tablespoon regular dressing)

Sweets and added sugars

- 1 tablespoon sugar
- 1 tablespoon jelly or jam
- 1/2 cup sorbet
- 1 cup (8 fluid ounces) sugar-sweetened lemonade

Food Items to Be Avoided in Hypertensive Patients

- Table salt (sodium chloride)
- Baking powder
- Sodium bicarbonate
- Fried food
- Salt preserved foods
 - Pickles and canned foods
 - Ketchup and sauces
 - Ready to eat foods (fast foods)
- Highly salted foods
 - Potato chips, cheese, peanut butter
 - Salted butter, salted nuts, salted fish
- Bakery products
 - Biscuits, cakes, salted breads

b) PHARMACOLOGIC TREATMENT OF HYPERTENSION

- Antihypertensive drugs can be classified into 3 big categories:
 1. First line or drugs of first choice which include thiazides and thiazide-like diuretics (D), beta adrenergic blockers (BB), calcium channel blockers (CCB), angiotensin-converting-enzyme inhibitors (ACEIs) and angiotensin receptor blockers (ARBs). There is an evidence from clinical trials that drugs in this group can improve prognosis and prevent TOD and disease progression.
 2. Second line or accessory drugs which include: loop and potassium sparing diuretics, central sympatholytics (methyldopa and clonidine), peripheral sympatholytics, (reserpine, guanethidine), α 1 adrenergic blockers (prazosin and doxazosin) and direct arterial vasodilators (hydralazine and minoxidil).
 3. Drug combinations: combining 2 drugs from different pharmacologic groups in a single pill.
- Initiation of drug therapy depends upon the patient global cardiovascular risk profile, level of BP and its response to lifestyle modification.
- Drug therapy should be started immediately in case of hypertensive emergencies and urgencies, otherwise a trial of non-pharmacologic treatment (lifestyle modification) for a period of weeks to months is recommended while monitoring BP on frequent office visits or at home before initiating drug treatment.
- The selection of the drug for initial treatment depends upon the presence of any compelling indications for a specific pharmacologic group such as coronary disease, heart failure, diabetes or chronic kidney disease (CKD).
- In patients with more than mild hypertension ($\geq 160/100$ mmHg) and high risk patients, it is recommended to initiate therapy with a combination of two drugs.
- The BP target will vary from $<150/95$ mmHg in elderly patients to $<130/80$ mmHg in high risk patients.
- In patients with mild hypertension with low risk profile, drug therapy may not be needed. Lifestyle modification and regular BP monitoring is the recommended policy

When to Initiate Drug Therapy?

Blood pressure threshold and duration of initial monitoring

Population	LSM Duration	SBP	DBP
Low risk patients	3-6 m	160	100
Moderate and high risk (≥ 2 RFs, DM, TOD, CKD)	3-6 w	140	90
Very high risk patients*	1-2 w	130	80
Elderly	3-6 w	150	90

* Associated CV disease: CAD, cerebrovascular, HF, peripheral arterial disease and aortic aneurysm. CKD with proteinuria > 500 mg/24 hrs

• m: month, w: week, LSM: lifestyle modification

TIMING OF INITIATION OF DRUG THERAPY

1. Immediate: on the first office or hospital visit

- a. Hypertensive emergency.
- b. BP $>210/120$ mmHg on 3 consecutive measurements, 2-3 minutes apart after excluding a panic attack.
- c. BP $>180/110$ mmHg on 3 consecutive measurements (2-3 minutes apart) in the presence of:
 - TOD: LVH (ECG, clinical, echo), proteinuria, elevated serum creatinine (>1.5 mg/dl in males, >1.4 mg/dl in females), optic fundus $>$ grade I retinopathy, aortic aneurysm, carotid bruits.
 - Symptomatic CVD (CAD, HF), stroke, transient ischemic attack (TIA), peripheral arterial disease (PAD), chronic kidney disease (CKD).

2. Within days to months after 1st office visit

<i>Timing of Initiation (office visits)</i>	<i>BP Grade</i>	<i>Risk Category</i>
1-3 weeks (2 visits)	Severe	Moderate
	Moderate	High
	Mild	Very high
1-3 m (2-4 visits)	Moderate	Moderate
	Mild	High
3-6 m (2-3 visits)	Mild	Moderate
>6 m (2-3 visits)	Mild	Low

BP grades: mild (140-159/90-99), moderate (160-179/100-109), severe ($\geq 180/110$ mmHg)

Selection of Antihypertensive Drugs

Class of Drug	Indications	Contraindications	Caution or Limited Value
<i>Thiazide and Thiazide-Like Diuretics</i>	<ul style="list-style-type: none"> - Heart failure - Elderly patients - Black patients - Obese patients - Other low renin forms: diabetes, CKD 	Gout	<ul style="list-style-type: none"> - Pregnancy - Hypokalemia - Advanced RF
<i>B- Blockers</i>	<ul style="list-style-type: none"> - CAD - Tachyarrhythmias - Pregnancy - Increased adrenergic activity - Heart failure, hypertrophic cardiomyopathy - Associated: migraine, anxiety, tremors, hyperthyroidism 	<ul style="list-style-type: none"> - Heart block (>grade I) - Bronchial asthma requiring inhalation therapy - Symptomatic bradycardia (<50 beats/m) 	<ul style="list-style-type: none"> - Blacks - Elderly
<i>ACE inhibitors/ ARBs</i>	<ul style="list-style-type: none"> - Heart failure - After MI - Diabetes - Microalbuminuria - Proteinuric CKD - Target organ damage (LVH, CV disease, PAD) 	<ul style="list-style-type: none"> - Pregnancy - Bilateral renal artery stenosis - Sensitivity (angioneurotic edema) 	<ul style="list-style-type: none"> - S. creatinine elevation - Blacks - Hyperkalemia - Acute renal failure
<i>CCB</i>	<ul style="list-style-type: none"> - Angina - Peripheral vascular disease - Elderly patients - Systolic hypertension - Black patients - Excessive BP fluctuations 		
<i>α₁ Blockers: Prazosin (combined with diuretics.</i>	<ul style="list-style-type: none"> - Benign (senile) prostatic hypertrophy - Dyslipidemia 		<ul style="list-style-type: none"> - Postural hypotension

Blood Pressure Targets

- < 140/90 mmHg in low risk patients
- < 140/90 mmHg: ≥ 2 risk factors, diabetes, CKD, TOD
- < 130/80 mmHg: HF, CKD or diabetes when associated with proteinuria >1 gm/24 hrs.
- < 150/90 mmHg in the elderly (>65 years).

SELECTING FIRST-LINE THERAPY

In absence of compelling indications for a specific pharmacologic group:

- In mild-moderate hypertension without TOD or symptomatic CVD, initiate monotherapy from any of the 5 standard pharmacologic groups (diuretics, BB, CCB, ACEIs, ARBs) preferably a Thiazide diuretic. In elderly (age >65 years) or in blacks, it is preferable to start with diuretic or CCB. In young, particularly those with tachycardia start with BB.
- In moderate or high-risk patients or those with BP \geq 160/100 mmHg, start with combination therapy.
- ACEIs or ARBs are **not** recommended as monotherapy in black patients in absence of compelling indications.
- Aim at gradual BP reduction particularly in the elderly to achieve target BP in 2 months. In high-risk patients and in the presence of severe hypertension, aim to achieve target BP at 2-4 weeks through combination therapy.

Recommended Drug Selection in Absence of Compelling Indications

Escalating and modifying treatment at 4-week intervals according to BP response and patient's tolerance.

Step I: Any of the following groups;

1. HCT \pm amiloride or chlorthalidone or HCT + spironolactone in the smallest dose e.g. half tablet (HCT 12.5 mg) or indapamide in all patients particularly elderly, blacks and obese.
2. BB: cardio-selective with long activity e.g. bisoprolol 2.5-5.0 mg specially in the young (<65), females or those with rapid and hyperdynamic heart.
3. Amlodipine: 2.5- 5.0 mg specially in elderly patients.
4. ACEIs or ARBs.
5. Combine 1 + 2 or 1 + 3 or 2 + 3 or 1+4 if BP > 160/100 mmHg (A single pill combination is recommended).

Step II: Combine diuretic in step (1) + two other groups if inadequate response.

Step III: Increase dose of amlodipine to 10 mg, if used.

Step IV: Increase dose of ACEI or ARB, if used.

Step V: Use the four drug groups.

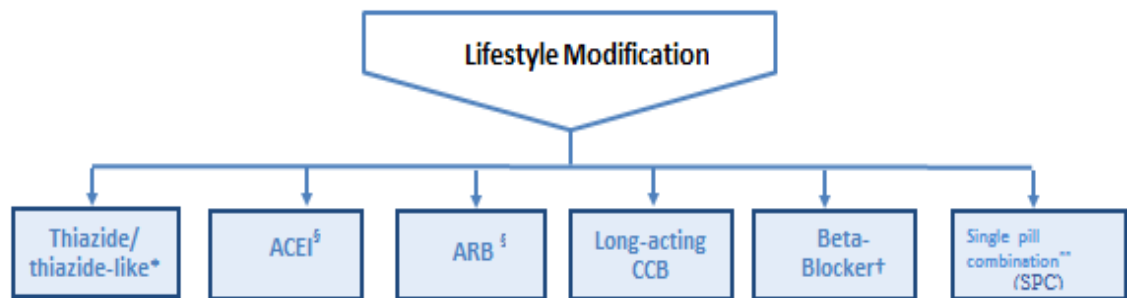
Step VI: Add loop diuretic preferably long acting e.g. torsemide (5-20 mg).

Step VII: Add spironolactone (12.5- 25 mg).

Algorithm (2): First line treatment of adults with systolic/diastolic hypertension without other compelling indications

TARGET <140 mmHg systolic and <90 mmHg diastolic

INITIAL TREATMENT



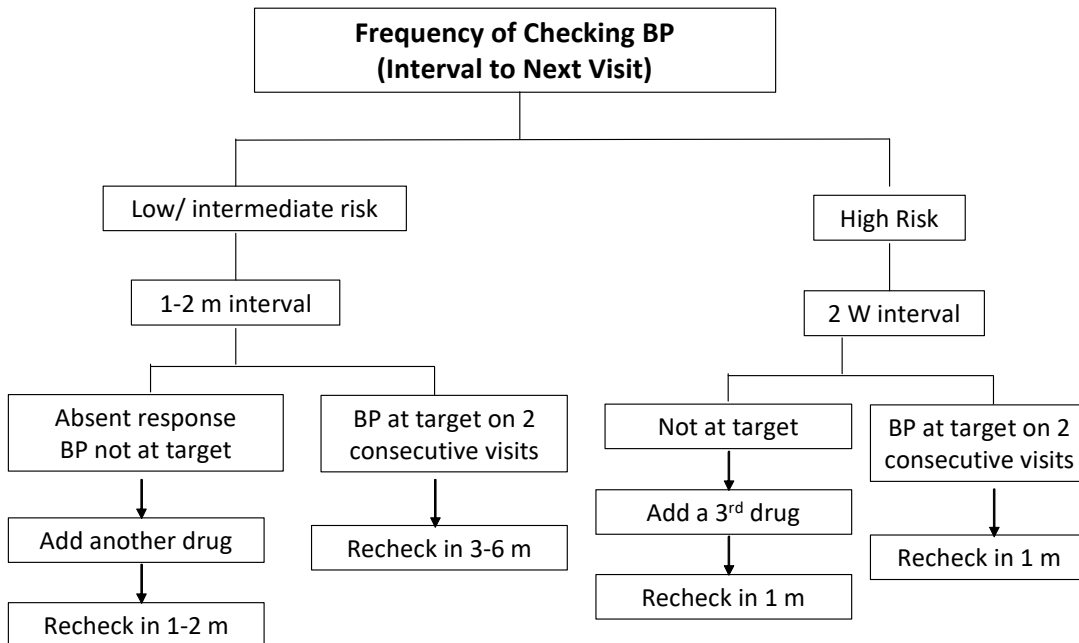
* Longer-acting (thiazide-like) diuretics are preferred over shorter-acting (thiazide) diuretics

† BBs are not indicated as first line therapy for age 60 and above

§ Renin angiotensin system (RAS) inhibitors are contraindicated in pregnancy and caution is required in prescribing to women of child-bearing potential

**Recommended SPC choices are those in which an ACE-I is combined with a CCB, an ARB with a CCB, or an ACE-I or ARB with a diuretic

Algorithm (3): Monitoring of Drug Therapy



What to Do If there is Inadequate BP Response?

- Ensure salt reduction , LSM & Stress control.
- Add thiazide if not given initially.
- Add another agent (different pharmacologic group).
- Substitute with another agent if the above measures fail.
- Seek specialist's opinion.

c) MEASURES TO IMPROVE PATIENT'S COMPLIANCE

1. Patient education:

Physician should spend few minutes with his/her patient during office visit to discuss the following facts:

- a. Hypertension is silent; one can not rely on symptoms to diagnose high blood pressure.
- b. Treatment of hypertension is lifelong and without interruption.
- c. Hypertension is not treated on demand i.e. to give drugs when blood pressure is elevated and stop it when blood pressure is normal.
- d. Hypertension requires life-long monitoring. Blood pressure should be measured regularly at 3 to 6 months intervals, depending on risk profile and level of blood pressure.
- e. Lifestyle modification is an important component of the therapeutic regimen.
- f. Antihypertensive drugs can produce side effects.

2. Prescribe affordable drugs.

3. Regular follow-up (3-6 months).

4. Keep inexpensive and simple care:

- a. Do the least needed work-up.
- b. Add one drug at a time and use the least number of pills.
- c. Start with a small dose.

5. Encourage patient to check his blood pressure at home provided that he has a reliable well-maintained device and he is well trained to measure blood pressure accurately. Home blood pressure measurement will improve compliance but not recommended if it causes anxiety and patient should be advised not to change his blood pressure medicines without the consultation of his physician.

HYPERTENSION ASSOCIATED WITH CARDIOVASCULAR DISEASE

- In chronic stable angina, target BP is <140/90 mmHg. B-blockers, calcium channel blockers and ACE-inhibitors are 1st line drugs. Excessive lowering of diastolic BP (<70 mmHg) should be avoided.
- In acute coronary syndromes associated with hypertension, B-blockers, non-dihydropyridine CCB, and IV nitrate are recommended.
- In systolic HF, target BP is <130/80 mmHg. ACE-inhibitors (or ARB), B-blockers, and diuretics including aldosterone antagonists are the recommended agents. Other agents include amlodipine, felodipine, and hydralazine.
- Patients with evidence of left ventricular hypertrophy should receive an ACE inhibitor or ARB, complemented if necessary, with a CCB.
- Treatment of hypertension with significant aortic stenosis should be done cautiously
- Hypertension is a risk factor for atrial fibrillation, and it is also a major risk factor for AF-related thromboembolism. Uncontrolled hypertension increases the bleeding risk in patients receiving anticoagulant therapy.

HYPERTENSION ASSOCIATED WITH RENAL DISEASES

- Measurements of proteinuria at 6-12 months
- Aim at reduction of micro-albuminuria by >30% within 6 months of starting treatment
- Salt restriction to 2-3 g/d will reduce urinary protein excretion
- Need to lower BP in patients with >1 g protein excretion /d (<130/80 mmHg) and use RAS blockade.
- In absence of albuminuria, BP target is <140/90 mmHg
- Choice of diuretic should be guided by GFR, if <50 ml/min, use a loop diuretic.

Causes of Exaggerated or Progressive Decline in Renal Function Associated with ACE-inhibitors or Angiotensin Receptor Blockers Use

- Bilateral renal artery stenosis.
- Renal artery stenosis in a single functioning kidney.
- Polycystic kidney disease.
- Absolute reduction in intravascular volume (gastroenteritis, aggressive diuresis)
- Reduction in effective arterial volume (moderate to severe CHF).
- Use of NSAIDs or calcineurin inhibitors (increased renal vasoconstriction).

DIABETES AND HYPERTENSION

Diabetic Hypertensives

- Increased sensitivity to dietary sodium.
- Loss of nocturnal decline in blood pressure.
- Tendency to orthostatic hypotension.
- Recommend diet: low fat, low Na, high fiber, low calories.
- RAS blockade is the cornerstone of therapy.
- Diuretics are required for good BP control e.g. low dose HCT (12.5-25 mg).
- In the presence of proteinuria (1 gm/24 h), blood pressure target <130/80 mmHg.

OBSTRUCTIVE SLEEP APNEA (OSA)

- OSA is considered one of the potentially reversible secondary causes of hypertension and among the causes of resistant hypertension.
- OSA is characterized by recurrent episodes of cessation of respiratory airflow caused by upper airway inspiratory collapse during sleep, with a consequent decrease in oxygen saturation.
- Hypertension affects approximately 50% of patients with OSA.
- In addition to weight control and continuous positive airway pressure, spironolactone may be particularly effective in controlling blood pressure because of secondary hyperaldosteronism in patients with OSA.

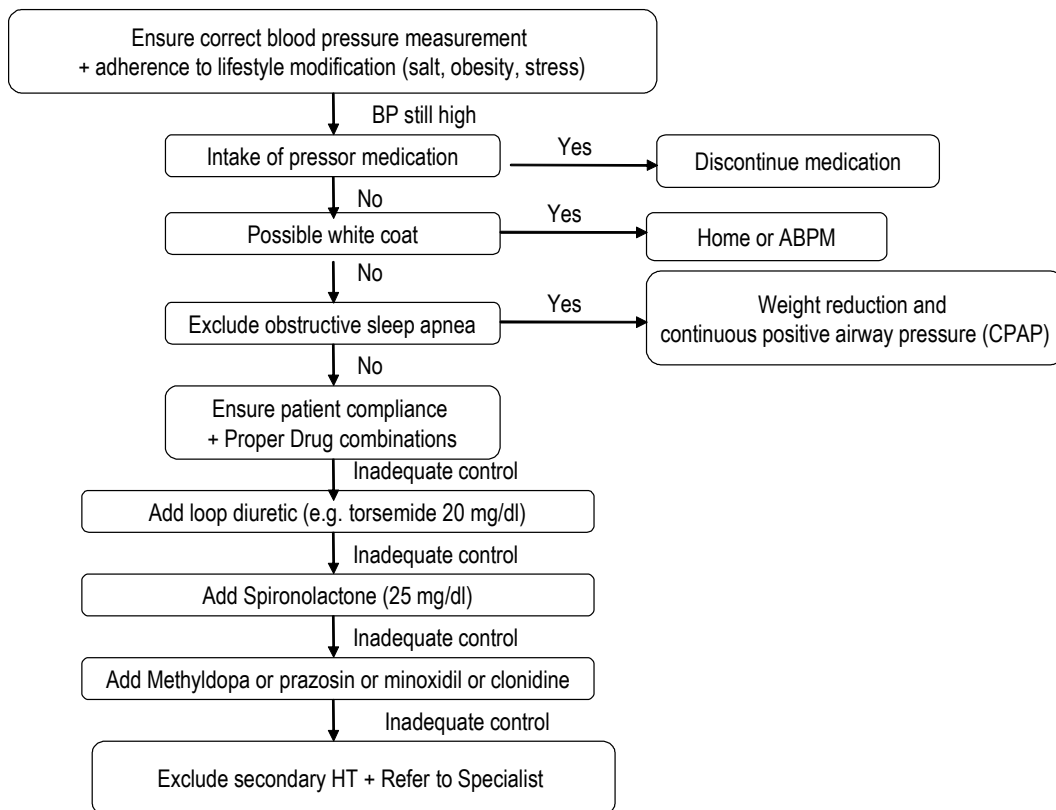
RESISTANT HYPERTENSION

- Resistant hypertension is defined as persistent elevation of blood pressure above the target in patients who are adhering to triple-drug regimen including a diuretic, and all three drugs are prescribed in maximum recommended and tolerated doses for at least three months.
- For older patients with isolated systolic hypertension, resistance is defined as failure of an adequate triple-drug regimen to reduce systolic blood pressure below 160 mmHg.
- The diagnosis of resistant hypertension requires accurate blood pressure measurement to confirm persistently elevated blood pressure levels.
- Referral to a specialist should be considered.
- Although an inadequate response to antihypertensive therapy is unfortunately common, true resistant hypertension is not common in general practice.
- Factors contributing to resistant hypertension include white coat hypertension, inadequate therapy, lack of patient's compliance, failure of correction of obesity, sleep apnea, intake of pressor drugs and excess salt intake. If loop diuretics and spironolactone in addition to adequate dose of triple pharmacologic therapy fail, consider secondary forms. ABPM and detailed laboratory evaluation is needed in this group.

Substances that Can Elevate Blood pressure

NSAIDs (nonsteroidal anti inflammatory drugs).
Oral contraceptives.
Glucocorticoids.
Mineralocorticoids.
Sympathomimetics (e.g., nasal decongestants, appetite suppressants).
Licorice.
Phenothiazines.
Antidepressants.
Cyclosporine.
MAO inhibitors and tyramine rich foods.
Erythropoietin.
Cocaine.

Algorithm (4): Resistant Hypertension



Source: M. Mohsen Ibrahim, 2013

HYPERTENSION IN THE ELDERLY

- Hypertension in the elderly is characterized by excess BP variability, postural changes, white coat effect, sensitivity to salt intake and associated co-morbidities. Diuretics and CCB are the drugs of first choice.
- BP goal in the elderly is <150/90 mmHg.
- Reduction in cardiovascular morbidity and mortality can be achieved with antihypertensive treatment even above 80 years.
- The diagnostic pitfalls of pseudo-hypertension, auscultatory gap and white coat hypertension should be carefully considered in these patients.
- Because of the increased risk of postural hypotension in the elderly, BP should always be measured also in standing posture.

Management of Elderly Hypertensive

- Start with smaller antihypertensive doses, at almost half the standard doses and increase the dose gradually over several weeks.
- Check for adverse drug reactions which are two to three times more common in the elderly.
- Follow-up visits should be scheduled every two to four weeks until blood pressure is controlled.

HYPERTENSIVE EMERGENCIES

- Hypertensive crisis is arbitrarily defined as severe elevation of blood pressure (exceeding 220 mmHg systolic and/or 120 mmHg diastolic). It is considered an emergency when complicated by acute progressive target organ damage such as encephalopathy, cerebral hemorrhage, pulmonary edema, aortic dissection etc.....
- Patients who present with severe elevation of blood pressure in the absence of acute target organ damage have hypertensive urgency. They can be managed as out-patients using a combination of rapidly acting oral antihypertensive drugs such as calcium channel blockers or sympatholytic. sublingual administration should NOT be used
- Patients who present with a hypertensive emergency should be hospitalized for rapid controlled lowering of blood pressure in the ICU. The target blood pressure level and the rate of reduction depend on the nature of emergency, the age of the patient and the clinical response.
- The antihypertensive drugs of choice (sodium nitroprusside, nitroglycerin) are rapidly acting parenteral agents with a short duration of action which effectively reduce the systemic vascular resistance. Their action can be rapidly reversed in case of excessive hypotension.

General Principles

- Avoid using rapidly acting **sublingual** nifedipine and captopril that may result in uncontrolled reduction of arterial pressure and marked organ hypoperfusion leading to catastrophic end-organ damage such as cerebral infarction, or acute myocardial infarction
- **Intravenous** diuretics should not be used as initial therapy in a hypertensive crisis unless the patient presents in acute pulmonary oedema or there is evidence of extracellular volume expansion
- Avoid rapid and uncontrolled reduction in blood pressure to the normal level within the first few hours, that may lead to target organs hypoperfusion. The mean arterial pressure should be reduced to a level of 120 mmHg (160/100) over several hours. In patients with acute pulmonary edema or aortic dissection, rapid lowering of BP (within <1 hour) may be needed.

Types and Clinical Presentation of Hypertensive Emergencies

- **Malignant hypertension with papilloedema**
- **Cerebrovascular**
 - Hypertensive encephalopathy
 - Atherothrombotic brain infarction with severe hypertension
 - Intracerebral haemorrhage
 - Subarachnoid haemorrhage
- **Cardiac**
 - Acute aortic dissection
 - Acute left ventricular failure
 - Acute myocardial infarction
- **Renal**
 - Acute glomerulonephritis
 - Renal crisis from collagen vascular disease
 - Severe hypertension after kidney transplantation
- **Excessive circulating catecholamines**
 - Pheochromocytoma crisis
 - Food or drug interactions with monoamine-oxidase inhibitors
 - Sympathomimetic drug use (cocaine)
 - Rebound hypertension after sudden cessation of antihypertensive drugs
e.g. clonidine.
- **Eclampsia**
- **Surgical**
 - Severe hypertension in patients requiring immediate surgery
 - Postoperative hypertension
 - Postoperative bleeding from vascular suture lines
 - Severe body burns

Management of Hypertensive Emergencies

Goals of Therapy

- Rapid controlled blood pressure lowering is recommended in cerebral infarction if blood pressure is 220/120 mmHg or greater (180/105 mmHg in patients with cerebral hemorrhage). Do not lower mean blood pressure by more than 25% in the first two hours, then to 160/100 mmHg within the next six hours.
- Rapid reduction of blood pressure to normal levels is indicated in patients with aortic dissection, acute pulmonary oedema, and cerebral hemorrhage.
- The primary goal of the emergency physician is to determine which patients with acute hypertension are exhibiting symptoms of end-organ damage and require immediate intravenous (IV) parenteral therapy. In contrast, patients presenting with acutely elevated BP (systolic BP [SBP] >200 mm Hg or diastolic BP [DBP] >120 mm Hg) without symptoms and whose BP stays significantly elevated to this level on discharge should have initiation of medical therapy and close follow-up in the outpatient setting.

HYPERTENSION IN WOMEN

- The use of estrogen-containing oral contraceptive (OC) pills can cause secondary hypertension in young women.
- Newer progestins such as drospirenone contain a spironolactone-like moiety with mild mineralocorticoid antagonist action; as a result, drospirenone-estrogen combinations generally cause a small decrease in BP.
- Mild preeclampsia is managed by close observation of the mother and fetus preferably in hospital. If the diastolic blood pressure remains persistently >100 mmHg, oral antihypertensive drug therapy is instituted.
- The oral antihypertensive drug of choice in pregnancy is methyldopa. Alternatives include CCB blockers and labetalol.

HYPERTENSION IN CHILDREN AND ADOLESCENTS

- The prevalence of hypertension in children and adolescents varies from 1-2%.
- The blood pressure measurement in a child should be compared with the childhood reference data tables based on age, gender and height.
- High blood pressure (hypertension) in children is diagnosed when average systolic blood pressure or diastolic blood pressure (or both) is equal to or greater than the 95th percentile for age and gender.
- Younger children with severe blood pressure elevation may have secondary hypertension, and need careful and laboratory evaluation. The major causes of secondary hypertension in children and adolescents are of renal parenchymal origin.

SECONDARY HYPERTENSION

Patients with any of the following clinical clues, should suggest a secondary cause for hypertension:

- Onset of hypertension before age 25 or after age 60 years.
- Sudden onset change from normal blood pressure to severe hypertension in less than a year.
- Resistant hypertension.
- Poor response to prior effective drug therapy.
- Paroxysmal attacks of hypertension with palpitation, pallor, sweating and tremors.
- Multiple system involvement on initial evaluation.
- Delayed and weak femoral pulses with lower blood pressure in the lower extremities.
- Continuous abdominal bruit.
- Renal masses.
- Advanced end organ damage: more than grade 2 retinopathy or serum creatinine >2.0 mg/dl.
- Laboratory abnormalities: (e.g., hypokalemia, or hypercalcemia).

Causes Of Secondary Hypertension

Renal Causes:

- Chronic renal parenchymal disease (3-5 %).
- Renal artery stenosis (1-2%).

Drugs

Endocrinal Causes

- Primary hyperaldosteronism. (5-12%)
- Hyper- or hypothyroidism.
- Pheochromocytoma (<0.3%).
- Cushing syndrome.

Aortic Coarctation.

Other Causes

- Central nervous system diseases e.g., brain tumor.
- Sleep apnea, acute porphyria, polycythemia vera.

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