

The Egyptian Hypertension Society

EGYPTIAN HYPERTENSION GUIDELINES

2016

From the Egyptian Minister of Health

Hypertension is considered a global public health crisis affecting populations all over the world and accounting for approximately 17 million deaths each year.

In Egypt; between 2006 -2011 an increased percent change in hypertension of 44% had occurred during this five years interval with a total prevalence of about 39.7% of the population

Hypertension is a silent, invisible killer that rarely causes symptoms. Every year thousands of patients suffer disabling and life threatening complications of hypertension such as myocardial infarction, stroke, renal injury and premature mortality. A considerable percentage of those complications result from late diagnosis, improper management and follow up.

Prevention and control of hypertension is complex, and demands multi-stakeholder collaboration, including, governments, civil society, academia as well as the private sector. Increasing public awareness is key, as is access to early detection.

In recognition of the challenge and the heavy burden of the disease and its complications on both the patient and the health systems, The Ministry of health and population in collaboration with the Egyptian Hypertension Society have developed the National Guidelines of Hypertension to unify the standards of diagnosis, management and follow up and even included dealing with special conditions pertaining to local traditions and habits.

The national hypertension guidelines are a fundamental and key accomplishment resulting in a profound progress in the health care services delivered to all patients. These guidelines are designed to support physicians at all levels of health care services to provide an integrated approach leading to comprehensive management of hypertension.

Finally, I would like to present this valuable tool to all doctors of MOHP and to express my deep gratitude to the Egyptian Hypertension Society for the development of this document and their commitment to improving health of the Egyptian population.

Minister of Health and population
Prof. Ahmed Emad El Din Rady

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.

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BLOOD PRESSURE MEASUREMENT

Diagnosis of Hypertension

- BP must be measured in a standardized fashion using a properly validated, well maintained and 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 140/90-150/95 mmHg, while for average home readings and for daytime ambulatory blood pressure (ABP) is 130/85 mmHg.
- If all BP measurements are 140/90 mmHg or higher, to confirm the diagnosis of HT 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 disease and CV event rates correlate more closely with ABP than clinic measurements.

Precautions to Obtain Correct BP Reading

1. Choose the correct cuff size.
2. Avoid placing the cuff over clothes.
3. 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. Avoid talking during measurement.
6. No caffeine or cigarette smoking at least 1 hour before procedure.
7. 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 has 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 inconvenience to 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 hypertension.

Sequential Automated office BP (SABP)

- Use fully automated, validated, electronic sphygmomanometer.
- Device should take multiple readings without requiring activation of readings by the patient or health professional.

- Linked with TOD
- More consistent from visit to visit
- Eliminates office-induced HT

Cut-off points for Diagnosing HT

1. Routine clinical practice: at office 140/90-150/95 mmHg
2. Daytime: ABPM: $\geq 135/85$ mmHg
3. Average home BP 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 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 or severe anxiety and repeat in 30 min

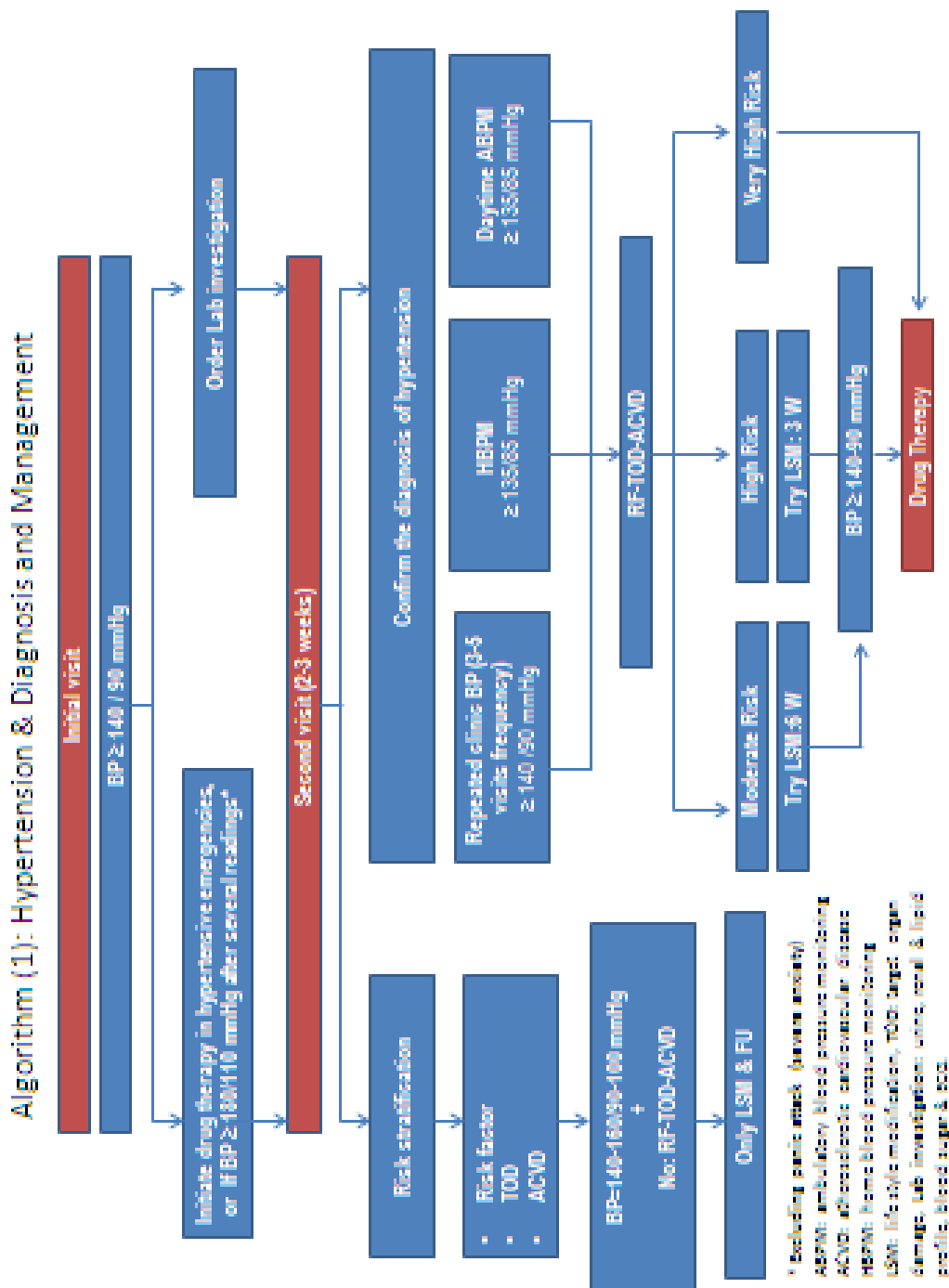
White Coat Hypertension

- In some patients office blood pressure is persistently elevated while daytime or 24-hour blood pressure, 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 ambulatory BP is high.
- Masked hypertension should be suspected if TOD progresses or does not resolve, despite BP control in the clinic.

Algorithm (1): Diagnosis & Management of hypertension (1)



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 disease.
- b. Identify secondary causes of hypertension and comorbid conditions.

Laboratory Tests

- Essential (in all patients):
 - a. Urine: dipstick for protein, blood, sugar
 - b. Blood tests: sugar, creatinine
- Recommended (if facilities are available)
 - a. Blood lipid profile: total cholesterol, LDL, HDL, 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 polyurea and polydypsia.
2. Males > 55 years or Females >65 y.
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 SV₁+RV₅ or V₆ > 35 mm, tall R in AVL > 11mm).
 - b. Echo criteria (wall thickness ≥ 12 mm or LVMI in males ≥ 125 gm/m² or in females ≥ 110 gm/m²).
- Carotid bruits.
- Proteinuria: microalbuminurea 30-300 mg/24 hrs.
- Increased serum creatinine > 1.4 mg/dl in females and > 1.5 mg/dl in males.
- Optic fundus changes: > grade I retinopathy.

Cardiovascular Risk Categorization

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

Risk Group A (Low risk): patients with no other cardiovascular risk factors, no target organ damage or associated atherosclerotic cardiovascular diseases.

Risk Group B (Moderate risk): patients with additional 1 or 2 risk factors (not including diabetes) but with no target organ damage or associated atherosclerotic cardiovascular diseases.

Risk Group C (High risk): patients with diabetes, target organ damage or associated asymptomatic atherosclerotic cardiovascular diseases or patients with 3 or more risk factors or a very high level of a single risk factor.

Risk Group D (Very high risk): Patients with **symptomatic established** cardiovascular or renal disease:

- Coronary artery disease (angina, MI, CABG, PCI).
- Cerebrovascular disease (stroke, TIA).
- Peripheral arterial disease.
- Heart failure.
- Abdominal aortic aneurysm.
- Renal failure: serum creatinine > 2 mg/dl.

LIFESTYLE MODIFICATION

- 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/day	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.*

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

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 derivatives (D), beta adrenergic blockers (BB), calcium channel blockers (CCB), angiotensin-converting- enzyme inhibitors (ACEIs) and angiotensin receptor blockers (ARBs). There is 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, chronic kidney disease (CKD) or associated co-morbid conditions.
- 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 depend upon the global risk profile of the patient and will vary from $<150/95$ mmHg in low risk patients to $< 130/80$ mmHg in high risk patients.

- In patients with mild hypertension (BP 150-159/95-99 mmHg) 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	95

- Provided that there is response to LSM
- ** 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 first office or hospital visit

- Hypertensive emergency.
- BP $> 210/120$ mmHg on 3 consecutive measurements 2-3 minutes apart after excluding a panic attack.
- BP $> 180/110$ mmHg on 3 consecutive measurements (2-3 minutes apart)* in 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 $> \text{gr I}$ retinopathy, aortic aneurysm, carotid bruits
 - Symptomatic CVD (CAD, HF), stroke, transient ischemic attack (TIA), peripheral arterial disease (PAD), chronic kidney disease (CKD).

* If persistent after 30 minutes of rest, consider SABP.

2. Within days to months after 1st office visit

1.

<i>Timing of Initiation (office visits)</i>	<i>BP Grade</i>	<i>Risk Category</i>
1-3 weeks (2 visits)	Grade III (severe)	Moderate
	Grade II (moderate)	High
	Grade I (mild)	Very high
1-3 m (2-4 visits)	Grade II (moderate)	Moderate
	Grade I (mild)	High
3-6 m (2-3 visits)	Grade I (mild)	Moderate
> 6 m (2-3 visits)	Grade I (mild)	Low

BP grades: mild (150-159/95-99), moderate (160-179/100-109), severe ($\geq 180/110$ mmHg)

Risk Categories for Hypertensive Patients

- *Low risk:*
 - o No additional CV risk factors
 - o No TOD
 - o No associated atherosclerotic CV or renal disease
- *Moderate risk:*
 - o 1-3 additional CV risk factors
- *High risk:*
 - o > 3 additional RFs, or TOD or DM or renal failure
- *Very high risk*
 - o Symptomatic CVD

Initiation of Drug Therapy in Patients with mild Hypertension (150-159/95-99 mmHg)

Depends on risk profile:

- *Low:* Lifestyle modification with follow-up can be the only therapy .
- *Moderate:* Initiate therapy after 2-3 months if BP persists $\geq 140/90$ mmHg.
- *High:* Initiate therapy after 2-3 weeks if BP persists $\geq 140/90$ mmHg.
- *Very high:* Initiate therapy within 1 week.

Selection of Antihypertensive Drug

Class of Drug	Indications	Contraindications	Caution/ Limited Value
<i>Thiazide 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 - Dyslipidemia - Hypokalemia - Advanced RF
<i>B- Blockers</i>	<ul style="list-style-type: none"> - CAD - Tachyarrhythmia - 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 - Bil 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 		- Postural hypotension

Blood Pressure Targets

- < 150/95 mmHg in low risk patients and in elderly (> 65 years).
- < 140/90 mmHg: ≥ 2 risk factors, diabetes, CKD, TOD
- < 130/80 mmHg: HF, CKD or diabetes when associated with proteinuria > 1 gm/24 hrs.

SELECTING FIRST-LINE THERAPY

In absence of compelling indications for a specific pharmacologic group:

- In mild-moderate hypertension (150-179/95-109 mmHg) 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 180/110 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 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: 1 or 2 or 3 or 4 or 5

1. HCT \pm amiloride e.g. (moduretic) or chlorthalidone (hygroton) or HCT + spironolactone (aldactazide) 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 young and female hypertensives and 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 > 170/105 mmHg.

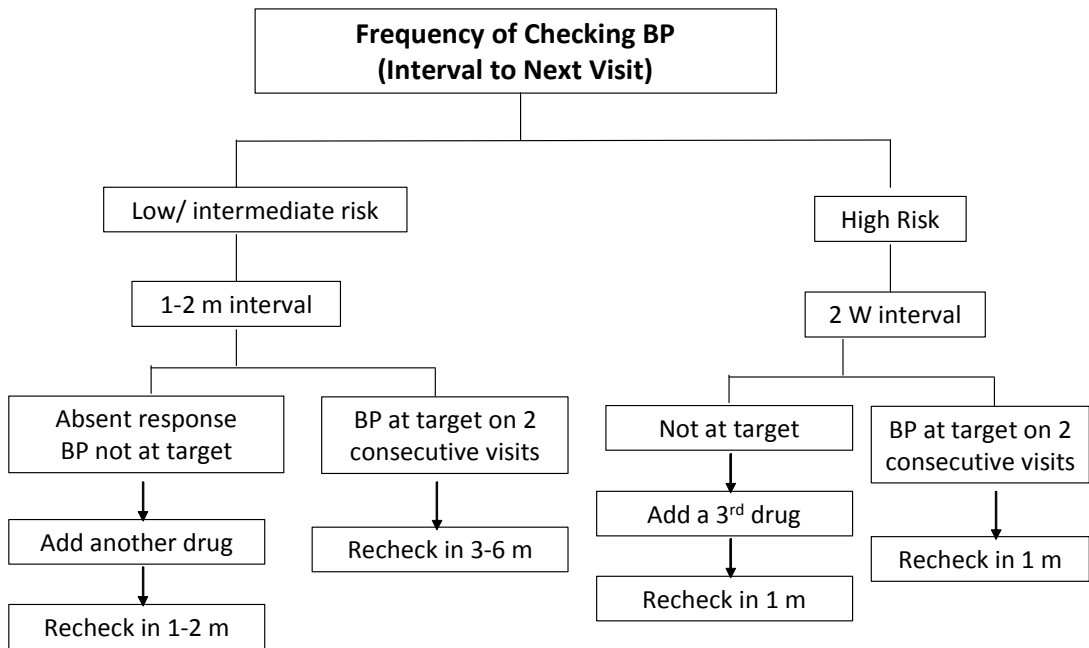
Step II: Combine 1 + two other groups if inadequate response in step I.

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.

Algorithm (2): Monitoring of Drug Therapy



What to Do If there is Inadequate BP Response?

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

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. 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 care inexpensive and simple:

- a. Do the least work-up needed .
- 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 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 calcium antagonist
- 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
- Na restriction to 2-3 g/d will reduce urinary protein excretion
- Need for lower BP in patients with > 1 g protein excretion /d (< 130/80 mmHg) and use of RASB
- 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 to 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 calcineurine 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.
- RASB is the cornerstone of therapy.
- Diuretics are required for good BP control e.g. low dose HCT (12.5-25 mg).
- In 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 CPAP, spironolactone may be particularly effective in controlling blood pressure because of secondary hyperaldosteronism in patients with OSA.

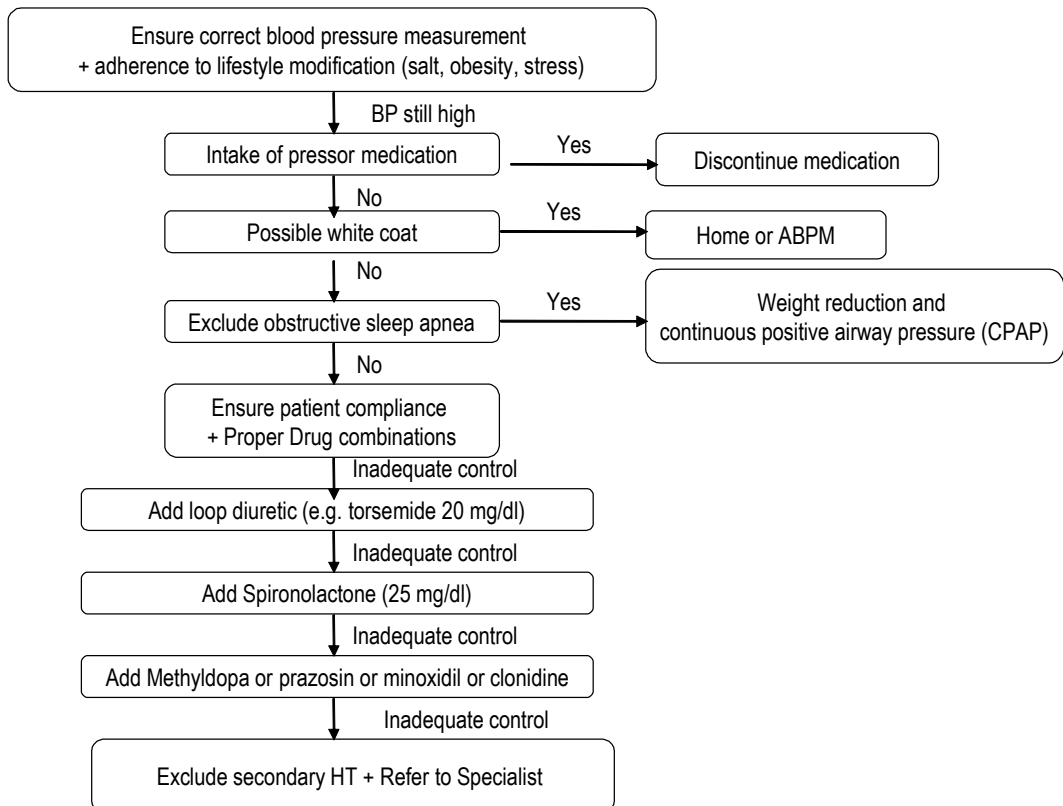
RESISTANT HYPERTENSION

- Resistant hypertension is defined as persistent elevation of blood pressure above 140/90- 150/95 mmHg 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 details of 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.

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 < 150/95 mmHg
- Reduction in cardiovascular morbidity and mortality can be achieved with antihypertensive treatment even above 80 years.
- The diagnostic pitfalls of pseudohypertension, 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 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.

- 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 an adverse clinical response.

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 more often have secondary hypertension, and need careful clinical evaluation. The major causes of secondary hypertension in children and adolescents are of renal parenchymal origin.

SECONDARY HYPERTENSION

Patients presenting 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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