

Hypertension in 2023

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Hypertension in 2023

- Learning aims:
 - Current diagnostic points for hypertension and treatment targets
 - Office vs home vs 24 hour blood pressure measurements
 - Current treatment strategies
 - Secondary causes

Case 1

- Incidental BP of 150/80mmHg
- BP at GP: 135/70mmHg
- [BP Monitors \(stridebp.org\)](http://stridebp.org)

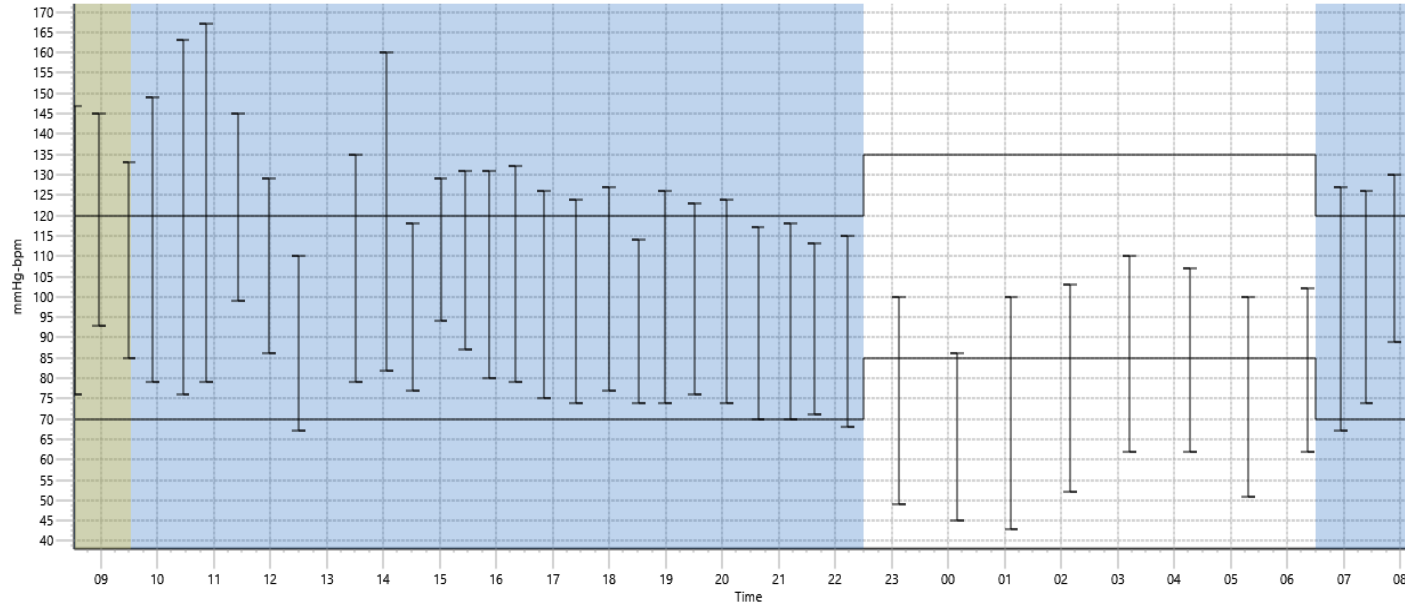
Table 1. Classification of Hypertension Based on Office Blood Pressure (BP) Measurement

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

Table 2. Criteria for Hypertension Based on Office-, Ambulatory (ABPM)-, and Home Blood Pressure (HBPM) Measurement

	SBP/DBP, mm Hg
Office BP	≥140 and/or ≥90
ABPM	
24-h average	≥130 and/or ≥80
Day time (or awake) average	≥135 and/or ≥85
Night time (or asleep) average	≥120 and/or ≥70
HBPM	≥135 and/or ≥85

Further visits



Period	Time	Samples	Mean SYS	Mean DIA	Mean HR	BP Load	BP Load
			mmHg	mmHg	BPM	Sys(%)	Dia (%)
			(+/- Std.Dev)	(+/- Std.Dev)	(+/- Std.Dev)		
Overall	08:33-08:23 (23:50)	39	125 (+/- 18.2)	73 (+/-12.9)	81 (+/-13)	62	67
Awake Period	06:30 - 22:30	31	131 (+/-14.6)	78 (+/-7.9)	85 (+/-12.5)	77	84
Asleep Period	22:30 - 06:30	8	101 (+/-7.1)	53 (+/-7.8)	68 (+/-2.8)	0	0
White Coat Period	08:33-09:32 (1st Hr)	3				100	100
	Max		147	93	96		
	Mean		142	85	84		

- 24-hour ambulatory blood pressure $\geq 130/80$ mm Hg indicates hypertension (primary criterion).
- Daytime (awake) ambulatory blood pressure $\geq 135/85$ mm Hg and nighttime (asleep) $\geq 120/70$ mm Hg indicates hypertension

Consultation

Not mentioned but important:

- Relevant Symptoms
 - Cardiovascular symptoms, blurred vision, headaches, dizziness, peripheral oedema, nocturia, haematuria
- Medical and family history
 - Family history of hypertension, premature CVD, hypercholesterolaemia (familial), diabetes
- Physical exam including BMI
- Blood tests/Investigations: e.g. Dipstick urine test, ECG

- OTC Medications and Others:
 - NSAIDS, Combined OCPs, Antidepressants (SNRI, SRI and TCA). No increase in BP in SSRI
 - Daily paracetamol use. Steroids

Further consultations

- Banker:
 - BMI 32, no DM, Cholesterol 5.6 (ratio 3.5)
 - Little exercise
 - Doesn't smoke
 - Excess alcohol

Salt reduction

Healthy diet – DASH diet

Moderation of alcohol

Smoking cessation

Physical activity

Reducing stress

Banker's discussion

- Hypothetically:
 - If I have hypertension
 - Medications?
 - Would you look for other causes?

Banker's Father (2nd case)

- 69 years old. Prev. TIA age 60.
- Known HTN on treatment.

July	16 th	8 am	before meds 25mg	133/67	64
	17 th	8:30	before meds	155/84	63
		9:25	after " 50mg	153/79	68
	18 th	9:30	before meds 25mg	162/72	64
		10:25	after tabs	146/68	68
	19 th	8:45	before meds 25mg	141/69	63 irregular heartbeats
		10:30	after "	151/76	59
	20 th	1:05 pm	after 25mg	150/73	76
July	21 st	8:50 am	before meds	147/80	
		12:10	after " 50mg	159/80	
	22 nd	8:20 am	before meds	144/72	irregular heart
		9:40	after " 25mg	153/75	

- Medications:
 - Losartan/Hydrochlorothiazide 50/12.5mg 1 tablet daily
 - Losartan 25mg 1 tablet daily
 - Amlodipine 10mg daily

Resistant Hypertension

- Defined as seated office BP of >140/90mmHg (~10% of pts)
 - on 3 or more antihypertensives at optimal (or maximally tolerated doses), including a diuretic
 - Exclude pseudoresistance (~50%)
 - (poor BP measurement technique, white coat effect, non-adherence and suboptimal choices in antihypertensives)
 - Excluded substance/drug-induced hypertension

- Managements to consider

Medications

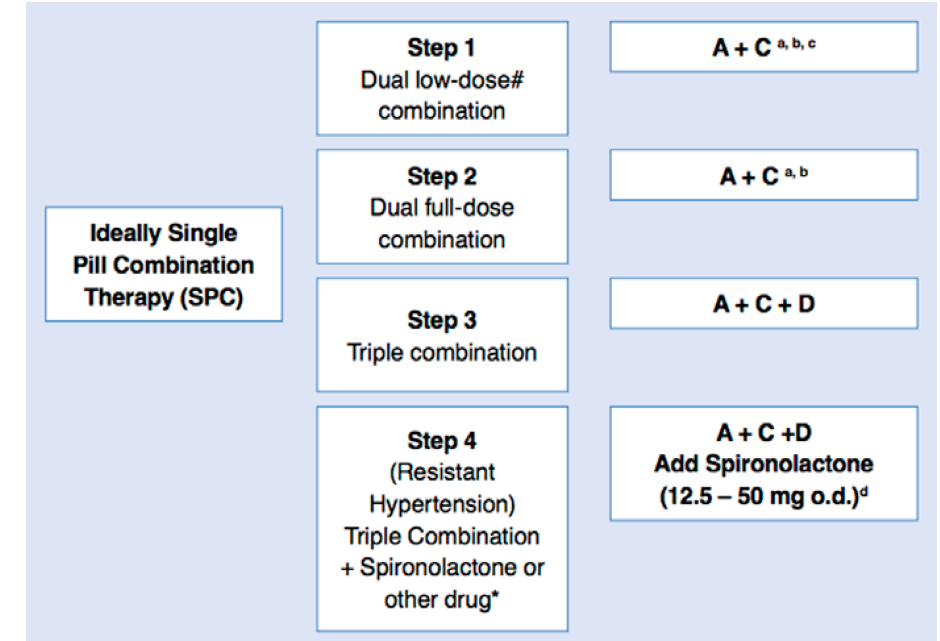
- Ideally, Single Pill Combination
 - Monotherapy in low risk Grade 1 HTN, or Age >80/frail
- Other medical conditions
 - E.g. beta-blockers in HF
- Alternatives
 - Doxazosin
 - Eplerenone
 - Clonidine
 - Beta-blocker

Medications

A – ACEi or ARB

C – Dihydropyridine CCB

D – Thiazide-like diuretic



Secondary Hypertension Clues

Secondary Hypertension	Clinical History and Physical Examination	Basic Biochemistry and Urine Analysis
Renal parenchymal disease	<ul style="list-style-type: none"> Personal/familial history of CKD 	<ul style="list-style-type: none"> Proteinuria, hematuria, leukocyturia on dipstick urine analysis Decreased estimated GFR
Primary aldosteronism	<ul style="list-style-type: none"> Symptoms of hypokalemia (muscle weakness, muscle cramps, tetany) 	<ul style="list-style-type: none"> Spontaneous hypokalemia or diuretic-induced hypokalemia on blood biochemistry (50%–60% of patients are normokalemic). Elevated plasma aldosterone-renin activity ratio
Renal artery stenosis	<ul style="list-style-type: none"> Abdominal bruit Bruits over other arteries (ie, carotid and femoral arteries) Drop in estimated GFR >30% after exposure to ACE-inhibitors/ARBs For suspected atherosclerotic RAS, history of flash pulmonary edema or history of atherosclerotic disease or presence of cardiovascular risk factors For suspected fibromuscular dysplasia, young women with onset of hypertension <30 years 	<ul style="list-style-type: none"> Decrease in estimated GFR

Secondary Hypertension	Clinical History and Physical Examination	Basic Biochemistry and Urine Analysis
Pheochromocytoma	<ul style="list-style-type: none"> Headaches Palpitations Perspiration Pallor History of labile hypertension 	<ul style="list-style-type: none"> Increased plasma levels of metanephrines Increased 24-hour urinary fractional excretion of metanephrines and catecholamines
Cushing's syndrome and disease	<ul style="list-style-type: none"> Central obesity Purple striae Facial rubor Signs of skin atrophy Easy bruising Dorsal and supraclavicular fat pad Proximal muscle weakness 	<ul style="list-style-type: none"> Hypokalemia Increased late-night salivary cortisol
Coarctation of the aorta	<ul style="list-style-type: none"> Higher blood pressure in upper than lower extremities Delayed or absent femoral pulses 	
Obstructive sleep apnea	<ul style="list-style-type: none"> Increased BMI Snoring Daytime sleepiness Gasping or choking at night Witnessed apneas during sleep Nocturia 	
Thyroid disease	<ul style="list-style-type: none"> Symptoms of hyperthyroidism: heat intolerance, weight loss, tremor, palpitations Symptoms of hypothyroidism: cold intolerance, weight gain, dry brittle hair 	<ul style="list-style-type: none"> TSH, Free T4

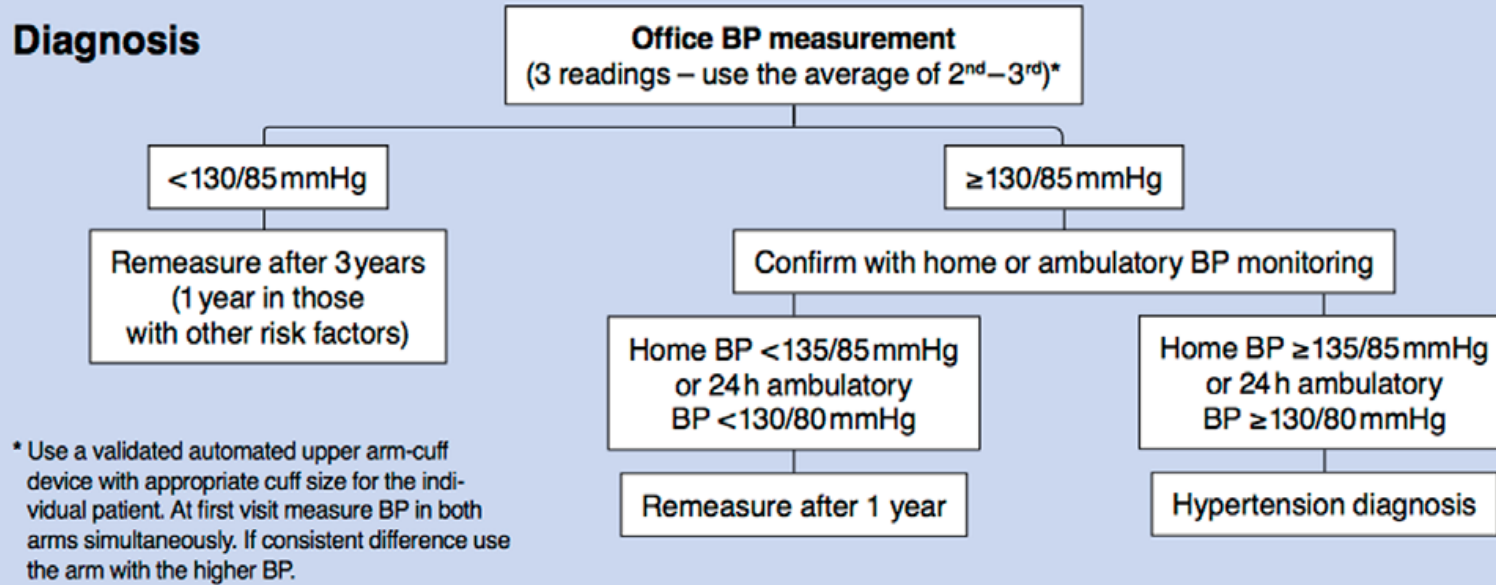
Cardiovascular Risk Factors

- >50% hypertensive pts have cardiovascular risk factors
- Diabetes: 15–20%
- Lipid disorders and triglycerides: 30%
- Overweight/obesity: 40%
- Hyperuricaemia: 25%
- Metabolic syndrome: 40%
- Unhealthy habits: smoking, high alcohol intake, sedentary lifestyle

Conclusion

- Diagnostic criteria for hypertension
 - Modalities: Office BP, home BP or 24hr BP monitor
- Evaluation
 - History and physical exam – end organ damage, cardiovascular risk (signs of secondary causes)
 - Investigations – ECG, blood tests and urine dipstick
- Treatment
 - Non-pharmacological/Lifestyle
 - Pharmacological – ACEi/ARB, DHP-CCB, Thiazide like diuretics, Spironolactone
- Monitoring

Diagnosis



Evaluation

History & Physical Exam

- Exclude drug-induced hypertension
- Evaluate for organ damage
- Consider additional CV risk factors
- Assess total cardiovascular risk
- Search for symptoms/signs of secondary hypertension
- Check adherence

Lab Tests

- Serum sodium, potassium & creatinine, uric acid
- Lipid profile & glucose
- Urine dipstick
- 12 lead ECG

Additional Tests

- If necessary for suspected organ damage or secondary hypertension

Treatment

Grade 1 Hypertension:

140–159/90–99 mmHg

1. Start lifestyle interventions
2. Start drug treatment:
 - **Immediately:** In high-risk patients (CVD, CKD, diabetes or organ damage)
 - **After 3–6 months of lifestyle intervention:** In low-moderate risk patients with persistent BP elevation

Grade 2 Hypertension:

≥160/100 mmHg

1. Start drug treatment immediately
2. Start lifestyle intervention

Lifestyle Interventions

- Stop smoking
- Regular exercise
- Lose weight
- Salt reduction
- Healthy diet and drinks
- Lower alcohol intake
- Lower stress
- Reduce exposure to air pollution

Drug Therapy Steps

Simplify regimen with once daily dosing and single pill combinations.
Consider monotherapy in low-risk grade 1 hypertension and in patients aged >80 years or frail

Non-Black Patients

1. Low dose ACEI/ARB* + DHP-CCB
2. Increase to full dose
3. Add thiazide-like diuretic
4. Add spironolactone or, if not tolerated or contraindicated, amiloride, doxazosin, eplerenone, clonidine or beta-blocker

Black Patients

1. Low dose ARB* + DHP-CCB or DHP-CCB + thiazide-like diuretic
2. Increase to full dose
3. Add diuretic or ACEI/ARB
4. Add spironolactone or, if not tolerated or contraindicated, amiloride, doxazosin, eplerenone, clonidine or beta-blocker

* No ACEI/ARB in women with or planning pregnancy

Monitoring

Target

- BP <130/80 mmHg
- Individualise for elderly based on frailty

Monitor

- BP control (achieve target within 3 months)
- Adverse effects
- Long-term adherence

Referral

- If BP still uncontrolled, or other issue, refer to care provider with hypertension expertise

