HTN TREATMENT DR.N.MONTAZERI



• More people die each year from cardiovascular diseases than from any other cause

 Hypertension or elevated blood pressure is a serious medical condition that significantly increases the risk of heart, brain, kidney and other diseases An estimated 1.4 billion people worldwide have high blood pressure, by 2025 at the current rate will exceed 1.6 billion but just 14% have it under control. However, cost-effective treatment options do exi

Ethnicity, Race and Hypertension

Populations from ASIA

Morning & nighttime hypertension vs Europeans

EAST ASIAN populations

- Likelihood of salt-sensitivity + mild obesity in hypertensive patients
- Stroke prevalence (esp. hemorrhagic) & nonischemic HF vs Western populations

SOUTH ASIAN populations (Indian subcontinent)
 Risk for CV & metabolic diseases (CAD & T2DM)

Management of hypertension SOUTH EAST ASIA: Standard treatment until more evidence becomes available



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BP Measurement

			E R	
NO SMOKING, CAFFEINE, FOOD, EXERCISE 30MIN BEFORE	QUIET ROOM	COMFORTABLE TEMPERATURE	3-5 MIN REST	NO TALKING DURING OR BETWEEN MEASUREMENTS



High	White-coat	Sustained	hypertension phenomena (in untreated or treated individuals)			
	hypertension 15-25%	hypertension	White-coat Masked hypertension ^a hypertension ^a			
			Diagnosis Elevated OBP, but not 24 h ambulatory and/or home BP ^b Elevated 24 h ambulatory and/or home BP, but not OBP ^b			
Low	Normotension	Masked hypertension 10-20%	Management Lifestyle changes and annual follow-up. Lifestyle changes and consider drug consider drug treatment in patients with high or very-high CVD risk			
Low		High	^a These diagnoses require confirmation with repeat OBP and out-of-office BP measurements. ^b 'Elevated' based on OBP threshold \geq 140/90 mmHg, 24 h ambulatory BP \geq 130/80 mmHg, home BP \geq 135/85 mmHg.			

Home or Ambulatory BP

Office **BP**

Classification of BP

Categories of BP in Adults* 2017 & 2018 ACC/AHA

BP Category	SBP		DBP
Normal	<120 mm Hg	and	<80 mm Hg
Elevated	120–129 mm Hg	and	<80 mm Hg
Hypertension			
Stage 1	130–139 mm Hg	or	80–89 mm Hg
Stage 2	≥140 mm Hg	or	≥90 mm Hg

Definition and classification of hypertension



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SBP (mmHg)		DBP (mmHg)						
Categories for conventionally measured seated office blood pressure ^a								
<120	and	<80						
120-129	and/or	80-84						
130-139	and/or	85-89						
140-159	and/or	90-99						
160-179	and/or	100-109						
≥180	and/or	≥110						
≥140	and	<90						
≥140	and/or	≥90						
g to office, ambulatory,	and home bloo	d pressure						
≥140	and/or	≥90						
≥135	and/or	≥85						
≥120	and/or	≥70						
≥130	and/or	≥80						
≥135	and/or	≥85						
	SBP (mmHg) red seated office blood <120	SBP (mmHg)red seated office blood pressurea<120						

www.escardio.org/guidelines

2021 ESC Guidelines on cardiovascular disease prevention in clinical practice (European Heart Journal 2021 – doi:10.1093/eurheartj/ehab484)

Secondary Hypertension

Underlying cause of high BP in about 10% of adults with hypertension

Common causes

Renal parenchymal disease
Renovascular disease
Primary aldosteronism
Obstructive sleep apnea
Drug or alcohol induced
Uncommon causes
Pheochromocytoma/paraganglioma
Cushing's syndrome
Hypothyroidism
Hyperthyroidism
Aortic coarctation (undiagnosed or repaired)
Primary hyperparathyroidism
Congenital adrenal hyperplasia
Mineralocorticoid excess syndromes other than primary aldosteronism
Acromegaly



Basic and Optional Laboratory Tests for Primary Hypertension

Basic testing	Fasting blood glucose*
	Complete blood count
	Lipid profile
	Serum creatinine with eGFR*
	Serum sodium, potassium, calcium*
	Thyroid-stimulating hormone
	Urinalysis
	Electrocardiogram
Optional testing	Echocardiogram
	Uric acid
	Urinary albumin to creatinine ratio

*May be included in metabolic panel. eGFR indicates estimated glomerular filtration rate.

We take a more personalized approach

• The contemporary focus of HTN treatment has appropriately shifted to the following:

- 1)The patient characteristics (age, absolute 10-year ASCVD risk, known CVD, and comorbidities) that determine the BP level at Which antihypertensive drug therapy will be initiated, and
- 2)The level to which BP should be minimally lowered to for optimal

Blood Pressure (BP) Thresholds and Recommendations for Treatment and Follow-Up (continued on next slide)









Colors correspond to Class of Recommendation in Table 1.

*Using the ACC/AHA Pooled Cohort Equations. Note that patients with DM or CKD are automatically placed in the highrisk category. For initiation of RAS inhibitor or diuretic therapy, assess blood tests for electrolytes and renal function 2 to 4 weeks after initiating therapy.

†Consider initiation of pharmacological therapy for stage 2 hypertension with 2 antihypertensive agents of different classes. Patients with stage 2 hypertension and BP ≥160/100 mm Hg should be promptly treated, carefully monitored, and subject to upward medication dose adjustment as necessary to control BP. Reassessment includes BP measurement, detection of orthostatic hypotension in selected patients (e.g., older or with postural symptoms), identification of white coat hypertension or a white coat effect, documentation of adherence, monitoring of the response to therapy, reinforcement of the importance of adherence, reinforcement of the importance of treatment, and assistance with treatment to achieve BP target.





2017 ACC/AHA BP Guideline: Thresholds for Treatment

SBP		DBP		CVD Risk/other circumstances	Recommended Treatment
<120	and	<80		N/A	Healthy Lifestyle
120–129	and	<80		N/A	Nonpharmacological therapy
130-139	or	80-89		No CVD /10-yr ASCVD risk <10%*	Nonpharmacological therapy
130–139	or	80–89		CVD /10-year ASCVD risk ≥ 10%	Antihypertensive drug
≥130	or	≥80	+	Diabetes or CKD	therapy (plus nonpharmacological therapy)
≥130				Age ≥65 years	
≥140	or	≥90		N/A	

* AHA/ACC 2013 Pooled Cohort CVD Risk Equations

IDIOLOGY ASCVD	Risk Estimator P	lus	imate Risk		
Current Age 🛛 *	Sex *		Race *		
	Main	Paula	where	African American	Ode
Systolic Blood Pressure immilig	* Diaste	olic Blood Pressure one Hg ⁻⁰			
Total Cholesterol (mg/m) *	HDL C	holesterni ingrali *	LDI	Chalesterol ing/dLi O 🗘	
ALCONTRACTOR OF THE	9409	a in proved 26 - 100		and id atoms 55.81	
History of Diabetes?	Smok	er7 0 *			
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- Absolute cardiovascular risk is utilized, for the first time, to determine high –risk status when BP130–139/80–89mmHg(Stage1 HTN) and highrisk patient characteristics/comorbidities are absent including:
 - Age 65 and older
 - Diabetes
 - CKD (eGFR <60ml/min/1.73 m2 and/or urine Alb: Cr ratio ≥300mg/g)
 - Known CVD,PAD
 - Post-renal transplantation
 - HFrEF or pEF
 - − And/or ≥10% ten year ASCVD risk

New 2021 Guidance on Stage 1 Hypertension Management in Low-Risk Adults.



Table 1: AHA/ACC^a Guideline Recommendations by Blood Pressure Category

BP ^b Category	Pressure Ranges	Recommendations		
Normal BP	<120/<80 mmHg	Promote healthy lifestyle; reassess BP annually.		
Elevated BP	120-129/<80 mmHg	Start with nonpharmacologic therapy, reassess BP in 3-6 months.		
Stage1 Hypertension	130-139/80- 89 mmHg	ASCVD ^c or 10-year CVD ^d risk ≥10%: Start with both nonpharmacologic and pharmacologic therapy. Reassess BP in 1 month. If at goal, reassess every 3-6 months. If not at goal, assess for adherence and consider intensification of therapy.		
		No ASCVD and 10-year CVD risk <10%: Start with nonpharmacologic therapy, reassess BP in 3-6 months. If not at goal, consider initiation of pharmacologic therapy.		
Stage 2 Hypertension	≥140/≥90 mmHg	Start with both nonpharmacologic and pharmacologic therapy. Reassess BP in 1 month. If at goal, reassess every 3-6 months. If not at goal, assess for adherence and consider intensification of therapy.		

WHO recommends initiation of pharmacological antihypertensive treatment of individuals with a confirmed diagnosis of hypertension and systolic blood pressure of \geq 140 mmHg or diastolic blood pressure of \geq 90 mmHg.

Strong recommendation, moderate- to high-certainty evidence

WHO recommends pharmacological antihypertensive treatment of individuals with existing cardiovascular disease and systolic blood pressure of 130–139 mmHg.

Strong recommendation, moderate- to high-certainty evidence

WHO suggests pharmacological antihypertensive treatment of individuals without cardiovascular disease but with high cardiovascular risk, diabetes mellitus, or chronic kidney disease, and systolic blood pressure of 130–139 mmHg.

Strong recommendation, moderate- to high-certainty evidence

Implementation remarks:

 Initiation of pharmacological hypertension (HTN) treatment should start no later than four weeks following diagnosis of HTN. If blood pressure level is high (e.g. systolic ≥160 mmHg or diastolic ≥100 mmHg) or there is accompanying evidence of end organ damage, initiation of treatment should be started without delay.

BP Target during Treatment

□ High risk individuals initiate drug therapy when

BP≥130/80mmHg

 The exception amongst high-risk individuals is for secondary (non-lacunar) stroke prevention in drug naïve individuals as drug therapy is initiated when blood pressure ≥140/90mmHg

 Non-high risk individuals will initiate drug therapy when BP is 2140/90mmHg

 Irrespective of blood pressure threshold for initiation of drug therapy, the target BP is minimally<130/80mmHg in most

However, target Bp is <130 systolic amongst those 65 and older as the committee made no recommendation for a DBP target

 Treatment should be initiated with two drugs Having complementary mechanisms of action when blood pressure is >20/10mmHg above goal

2017 ACC/AHA BP Guideline: Treatment Targets

SBP		DBP	CVD Risk	Recommended Treatment		
<120	and	<80	N/A	N/A		
120–129	and	<80	N/A	N/A		
130-139	or	80-89	No CVD and 10-year ASCVD risk <10%			
130–139	or	80–89	Clinical CVD or 10-year ASCVD risk ≥ 10%	SBP <130 and DBP <80 mm H		
≥130	or	≥80	Diabetes or CKD			
≥140	or	<i>≥90</i>	N/A			
≥130			Age ≥65 years	SBP <130 mm Hg		



- Nonpharmacological (lifestyle change) therapy

- Nonpharmacological and antihypertensive drug therapy

Best Proven Nonpharmacological Interventions for Prevention and Treatment of Hypertension

	Intervention	Dose	Approximate Impact on SBP		
			Hypertension	Normotension	
Weight loss	Calorie reduction & physical activity	Best goal is ideal body weight. Expect about 1 mm Hg for every 1-kg reduction in weight.	-5 mm Hg	-2/3 mm Hg	
Healthy diet	DASH diet	Diet rich in fruits, vegetables, whole grains, and low- fat dairy products, with reduced saturated and total fat.	-11 mm Hg	-3 mm Hg	
Dietary sodium	Reduced intake	<i>Optimal goal <1500 mg/d, but at least a 1000-mg/d reduction in most adults.</i>	-5/6 mm Hg	-2/3 mm Hg	
Dietary potassium	Enhanced intake through diet	3500–5000 mg/d, preferably by diet rich in potassium.	-4/5 mm Hg	-2 mm Hg	
Physical activity	Aerobic	• 90–150 min/wk (65%–75% heart rate reserve)	-5/8 mm Hg	-2/4 mm Hg	
	Dynamic resistance	 90–150 min/wk (50%–80% 1 rep maximum) 6 exercises, 3 sets/exercise, 10 repetitions/set 	-4 mm Hg	-2 mm Hg	
	Isometric resistance	• 4 × 2 min (hand grip), 1 min between exercises, 30%–40% max. voluntary contraction, 3 sessions/wk (8–10 wk)	-5 mm Hg	-4 mm Hg	
Moderation in alcohol intake	Alcohol consumption	In individuals who drink alcohol, reduce alcohol to: ● Men: ≤2 drinks daily ● Women: ≤1 drink daily	-4 mm Hg	-3 mm Hg	

Follow the DASH diet to potentially lower your blood pressure.





• First-step agents:

- Compelling indication
 - Use agent(s) that concurrently lower BP (e.g. post-MI, SIHD, HF)

No compelling indication
 Achieving BP goal more important than choice of drug therapy

• The three first-line drug classes for hypertension are:

- (1) CCB (amlodipine)
- (2) ACEI or ARB, and
- (3) Thiazide type diuretic(favors indapamide or chlorthalidone over HCTZ)

Choice of Initial Medication

COR	LOE	Recommendation for Choice of Initial Medication
I	A ^{SR}	For initiation of antihypertensive drug therapy, first- line agents include thiazide diuretics, CCBs, and ACE inhibitors or ARBs.

SR indicates systematic review.





General Principles of Drug Therapy

COR	LOE	Recommendation for General Principle of Drug Therapy
III: Harm	Α	Simultaneous use of an ACE inhibitor, ARB, and/or renin inhibitor is potentially harmful and is not recommended to treat adults with hypertension.





• Combination drug therapy

Initial treatment with two drugs in most patients
 esp. in blacks and adults with stage 2 hypertension with BP ≥20/10 above target

Use agents with complimentary modes of action
e.g. diuretic or CCB with ACEI or ARB

- Use combination pill when feasible

Antihypertensive Drug Treatment: Older Adults

• In adults ≥ 65 years, with average SBP ≥ 130 mm Hg:

- If noninstitutionalized ambulatory community-dwelling adult, treat to <130 mm Hg

- If high burden of comorbidity and limited life expectancy, treatment decisions should be based on clinical judgement and patient preference, using a teambased approach to assess risk/benefit of potential treatment

Antihypertensive Drug Treatment: Diabetes Mellitus

- If average BP ≥130/80 mm Hg, initiate antihypertensive drug therapy and treat to <130/80 mm Hg
- All first-line classes of antihypertensives (i.e., diuretics, ACE inhibitors, ARBs, and CCBs) useful and effective
- Consider ACEI or ARBs in presence of albuminuria

Antihypertensive Drug Treatment: Heart Failure

Hypertension and heart failure with reduced ejection factor (HFrEF)

- Prescribe guideline directed medical therapy (GDMT)
- Nondihydropyridine CCBs not recommended
- BP goal: <130/80 mm Hg

Hypertension and heart failure with preserved ejection factor (HFpEF)

- If symptoms of volume overload, prescribe diuretics
- If high BP persists, prescribe ACE inhibitors or ARBs and beta blockers
- BP goal: <130 mm Hg

Management of Hypertension in Patients With SIHD



Colors correspond to Class of Recommendation in Table 1.

*GDMT beta blockers for BP control or relief of angina include carvedilol, metoprolol tartrate, metoprolol succinate, nadolol, bisoprolol, propranolol, and timolol. Avoid beta blockers with intrinsic sympathomimetic activity. The beta blocker atenolol should not be used because it is less effective than placebo in reducing cardiovascular events. †If needed for BP control.

•ACE indicates angiotensin-converting enzyme; ARB, angiotensin receptor blocker;

BP, blood pressure; CCB, calcium channel blocker; GDMT, guideline-directed management and therapy; and SIHD, stable ischemic heart disease.





Management of Hypertension in Patients With CKD



•Colors correspond to Class of Recommendation in Table 1.

•*CKD stage 3 or higher or stage 1 or 2 with albuminuria ≥300 mg/d or ≥300 mg/g creatinine.



American Heart Association life is why*

COLLEGE of •ACE indicates angiotensin-converting enzyme; ARB, angiotensin receptor blocker; BP CARDIOLOGY blood pressure; and CKD, chronic kidney disease.



Beta-blockers

Consider beta-blockers at any treatment step, when there is a specific indication for their use e.g. heart failure, angina, post-myocardial infarction, atrial fibrillation, or younger women with, or planning, pregnancy Core drug treatment strategy for hypertension. This algorithm is appropriate for most patient with hypertension-mediated organ damage, diabetes mellitus, cerebrovascular disease, and peripheral artery disease



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2021 ESC Guidelines on cardiovascular disease prevention in clinical practice (European Heart Journal 2021 – doi:10.1093/eurheartj/ehab484)

ESC-



Consider beta-blockers at any treatment step when there is a specific indication for their use, e.g. heart failure, angina, post-MI, atrial fibrillation, or younger women with, or planning pregnancy.



- a) Consider monotherapy in low risk grade 1 hypertension or in very old (≥80 yrs) or frailer patients.
- b) Consider A + D in post-stroke, very elderly, incipient heart failure or CCB intolerance.
- c) Consider A + C or C + D in black patients.
- d) Caution with spironolactone or other potassium sparing diuretics when estimated GFR <45 ml/min/1.73m² or K⁺ >4.5 mmol/L.
- A = ACE-Inhibitor or ARB (Angiotensin Receptor Blocker)
- C = DHP-CCB (Dihydropyridine -Calcium Channel Blocker)

Antihypertensive Drug Treatment: Follow-up

- Adults initiating a new or adjusted drug regimen for treatment of hypertension should have a follow-up evaluation of adherence and response to treatment at monthly intervals until control is achieved
- In normal BP & white coat :rechecked annually
- Elevated BP: Every 3–6 months
- Stage 1HTN whitout drug therapy : Every 3–6 months

The ACC/AHA guideline recommends making orthostatic BP measurements at the index visit

Nursing management



Assessment

Monitor BP

Obtain complete history

- to assess for symptoms that indicate target organ damage (whether other body systems have been affected by the elevated blood pressure).
- Ex: anginal pain; shortness of breath; alterations in speech, vision, or balance; nosebleeds; headaches; dizziness; or nocturia.

Pulse

 rate, rhythm, and character of apical and peripheral pulses

Nursing Interventions

- objective : lowering and controlling the blood pressure without adverse effects and without undue cost
- support and teach the patient to adhere to treatment regimen
 - Implement necessary lifestyle changes
 - Take medications as prescribed
 - Schedule regular follow-up appointments
- Teach disease process and how lifestyle changes and meds can control hypertension.
- emphasize concept of controlling hypertension rather than curing it

Teaching About Medication

- Most common side effects of diuretics are potassium depletion and orthostatic hypotension.
- The most common s/e of different antihypertensive drugs is orthostatic hypotension
- 3. Take meds at regular basis
- Assume sitting or lying position for few minutes
- 5. Change position gradually
- 6. Avoid very warm bath, prolonged sitting or standing

Strategies to Improve Hypertension Treatment and Control

• Adherence strategies

- Once daily dosing/combination pills

- Strategies to promote lifestyle modification
- Team-based care

Shared Decision-making

- Health professionals: physicians, nurses, pharmacists
- Patient
- Staff: office staff and community health workers
- Others: spouse, relatives, friends
- Telehealth strategies
- Financial incentives

Resistant Hypertension: Diagnosis, Evaluation, and Treatment



Summary

 Accurate BP measurement to improve diagnosis and management of hypertension

 More intensive BP control than previously recommended to reduce risk of CVD and mortality

Employ strategies known to improve BP control

Q.1. What is the target blood pressure goal for current hypertension management by AHA/ASA?

- a) < 140/90 mm Hg
- b) < 120/80 mm Hg
- c) < 120/90 mm Hg
- d) < 130/80 mm Hg
- e) < 130/90 mm Hg

Q.2. Which of the following drugs is not recommended for 1st line monotherapy for management of hypertension?

- a) Amlodipine
- b) Enalapril
- c) Atenolol
- d) Losartan
- e) Hydrochlorothiazide

Q.3. Blood pressure of an asymptomatic person consistently shows 150/70 mm Hg. Which stage of hypertension does he fit in?

- a) Stage 1 Hypertension
- b) Stage 2 Hypertension
- c) Hypertensive crisis
- d) Hypertensive Urgency
- e) Normal blood pressure

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- d) Hypertensive Urgency
- e) Normal blood pressure

