

Evaluation and Management of

Hypertension

2026 Update

This resource was developed through collaboration of Intermountain Health's Cardiovascular, Primary and Preventive Care, and Children's Health Ambulatory Clinical programs in addition to Clinical Shared Services Pharmacy, and operational teams. It provides guidance for outpatient hypertension management and supports clinicians in evaluating, assessing risk, and treating hypertension, including considerations for special populations.

Key Points

- **Hypertension is the most common and modifiable risk factor** for cardiovascular disease, stroke, dementia, chronic kidney disease, and all-cause mortality. It affects more than 100 million U.S. adults under current ACC/AHA definitions.
- **Hypertension is defined as blood pressure $\geq 130/80$ mm Hg** according to ACC/AHA guidelines. Treatment is recommended for both high- and low-risk adults, including older adults, using individualized plans based on comorbidities. See treatment algorithm ([pg 2](#)) and special populations guidance ([pg 6](#)).
- **Risk assessment may include the new AHA PREVENT score**, which estimates 10-year and 30-year risk of ASCVD and major cardiovascular events for adults aged 30–79 without existing CVD.
- **Rapid cycling is a structured, accelerated follow-up model** designed to achieve timely BP control through frequent touch points until target blood pressure is reached. Core elements include:
 - Validated home BP monitoring, including device validation and technique review.
 - Two-week follow-ups until blood pressure reaches target.
 - Flexible visit modalities (in-person or virtual).
 - Team-based management by providers, pharmacists, or RNs.

Refer to the [Rapid Cycle Toolkit](#) for detailed nursing workflow and patient education materials.

What's new in this update?

- New 2025 [AHA Adult Hypertension Guideline](#): Outlined ([pg 2–7](#))
- Review of AAP Pediatric Guideline: ([pg 8–12](#))
- New risk assessment tool in adults: [AHA PREVENT Online Calculator](#)
- Goal Blood Pressure and Treatment for Special Populations ([pg 6](#))
- [Rapid Cycling Toolkit](#) with workflow and patient education plans
- Updated patient education materials regarding hypertension ([pg 13](#))

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Hypertension Diagnosis and Management (Adults)

Automated office blood pressure (AOBP) at every visit

Note: If concern for inaccurate measurement (white-coat, masking) at any time consider (A)

Is BP $\geq 130/80$ mmHg?

no

yes

Wait ≥ 5 min. then remeasure

Is BP $\geq 130/80$ mmHg?

no

yes

Notify provider
(if BP $\geq 160/100$ verbally notify provider)

Normal BP
($<120/80$ mmHg)

- Annual screening

Elevated BP
($120-129/<80$ mmHg)

- Initiate therapeutic lifestyle modification (D)
- Reassess in 3-6 months

Diagnostic Work-up

- Obtain a detailed history and physical exam (B)
- Initiate diagnostic testing (C)
- Calculate 10-yr risk of cardiovascular event using ASCVD (.ASCVD RISK) or [PREVENT](#)

Initiate Therapeutic Lifestyle Modifications (TLM) (D)

Staging

SBP 130-139
or DBP 80-89

SBP ≥ 140 or
DBP ≥ 90

SBP > 180
or DBP > 120

Stage 1 Hypertension

Stage 2 Hypertension

Severe Hypertension

10-yr ASCVD
risk $\leq 7.5\%$

10-yr ASCVD
risk $> 7.5\%$

See algorithm
on [pg 4](#)

Shared decision
making

TLM only

Reassess in
3-6 months

Initiate pharmacotherapy

Consider initiating single agent for stage 1 HTN and two agents for stage 2 HTN (preferably in combination pill)

- ACE inhibitors
- ARBs
- Thiazide-type diuretics
- Long-acting DHP CCB

See drug table ([pg 5](#)) and special populations on ([pg 6](#))

* Specialists initiate/titrate as needed and refer back to primary care in 2 weeks for rapid cycling.

Begin assessment for secondary causes ([pg 7](#))

Initiate rapid cycling process* ([next page](#))

(A) If concern for inaccurate measurement consider:

- Average 3-6 AOBPs taken in a quiet room to decrease error or improper diagnosis, especially useful to identify WCH
- 2-week home monitoring of blood pressure after validation of home device (preferred)
 - Patient education regarding proper BP measurement
 - At least 6-10 home BP readings over 2 weeks, with measurements taken twice daily
- 2-week AOBP recheck

Always use the most accurate measures to drive clinical decisions

(B) History and Physical Exam

- History: CVA, CHF, valvular stenosis, renal disease, endocrine or thyroid disorders, OSA
- Family history
- Diet and exercise habits (in 50-60% of patients, sodium reduction alone can improve hypertension)
- Screen for drugs, alcohol, and tobacco
- Medication review: steroids, NSAIDs, OTCs, contraceptives, TCAs, SNRIs, and stimulants
- Physical exam: displaced apical pulse, S4 heart sounds, JVD, pulmonary crackles, abdominal or renal bruit, enlarged kidneys on palpation, pedal edema, decreased peripheral pulses, and note any findings from annual eye exam

(C) Diagnostic Testing

- Urinalysis
- Kidney Risk Score (uACR + eGFR)
- Metabolic panel
- Fasting blood glucose or HgBA1c
- ECG (for left ventricular hypertrophy)
- To aid in CVD risk stratification and detect target organ damage consider: fundoscopic eye exam findings, ABI, BNP, ECG, CAC
- CBC
- Lipid profile
- TSH

(D) Therapeutic Lifestyle Modifications

- Sodium intake: $<2,300$ mg/day, ideally $<1,500$ mg/day
- Alcohol: ≤ 2 drinks/day (male), ≤ 1 drink/day (female); smoking cessation
- Weight loss $\geq 5\%$ if BMI ≥ 25
- Physical activity: 75-150 min/week
- Stress management: meditation, breathing exercises, yoga
- See [pg 12](#) for specific diet and lifestyle interventions and [pg 13](#) for patient handouts

Rapid-Cycling Process in Hypertension Management (Adults)

Default follow-up model for newly diagnosed and/or uncontrolled hypertension

Adult patient diagnosed with Stage 1, 2, or severe hypertension

During first visit

- Schedule follow-up appointment with RN, Provider, or PharmD* for two weeks.
- Give patient HTN follow-up handout: *Scheduled Nurse Visit for Blood Pressure Check*. Request patient bring home BP monitor and handout to first follow-up visit. (See handout and recommended home BP monitors in the [Rapid Cycle Toolkit](#))
- Instruct patient to begin home BP monitoring and tracking.

First Follow-up Appointment (In-person)

- Measure BP and draw labs if needed. (e.g. metabolic panel if patient is on thiazides, ACEIs, ARBs, diuretics, or aldosterone antagonists).
- Notify provider of results.
- Validate home BP cuff and verify patient BP measurement technique.
- Ongoing patient education using teach-back (BP basics, BP tracker). Instruct patient to monitor and record BP. See [pg 13](#) for education tips.
- Schedule follow-up visit in 2 weeks with RN, Provider or PharmD*.

See the [Rapid Cycle Toolkit](#) for patient education workflow and documentation resources

Subsequent Follow-up Appointments

- BP check and/or review of home measurements.
- Assess for pharmacology adherence and any changes to prior medications.
- Review and order labs as needed (e.g. metabolic panel for thiazides, ACEIs, ARBs, diuretics, or aldosterone antagonists)
- Notify provider or Pharm D for titration of medication.

Consider referral to health promotion and wellness specialty:

- Exercise physiologist
- Nutrition coach or Dietitian
- Health coach with behavioral modifications
- Care managers
- Sleep center
- Community educator (Desert only)

Schedule follow-up appointment every 2 weeks until at goal

Is patient at goal?

(≥ 2 consecutive days of home measurements or 2 clinic BPs at target)

no

yes

Schedule provider follow-up in 3–6 months and then every 6–12 months if remains controlled. Return to rapid cycling process as needed.

Consider referral to specialist for hypertension if:

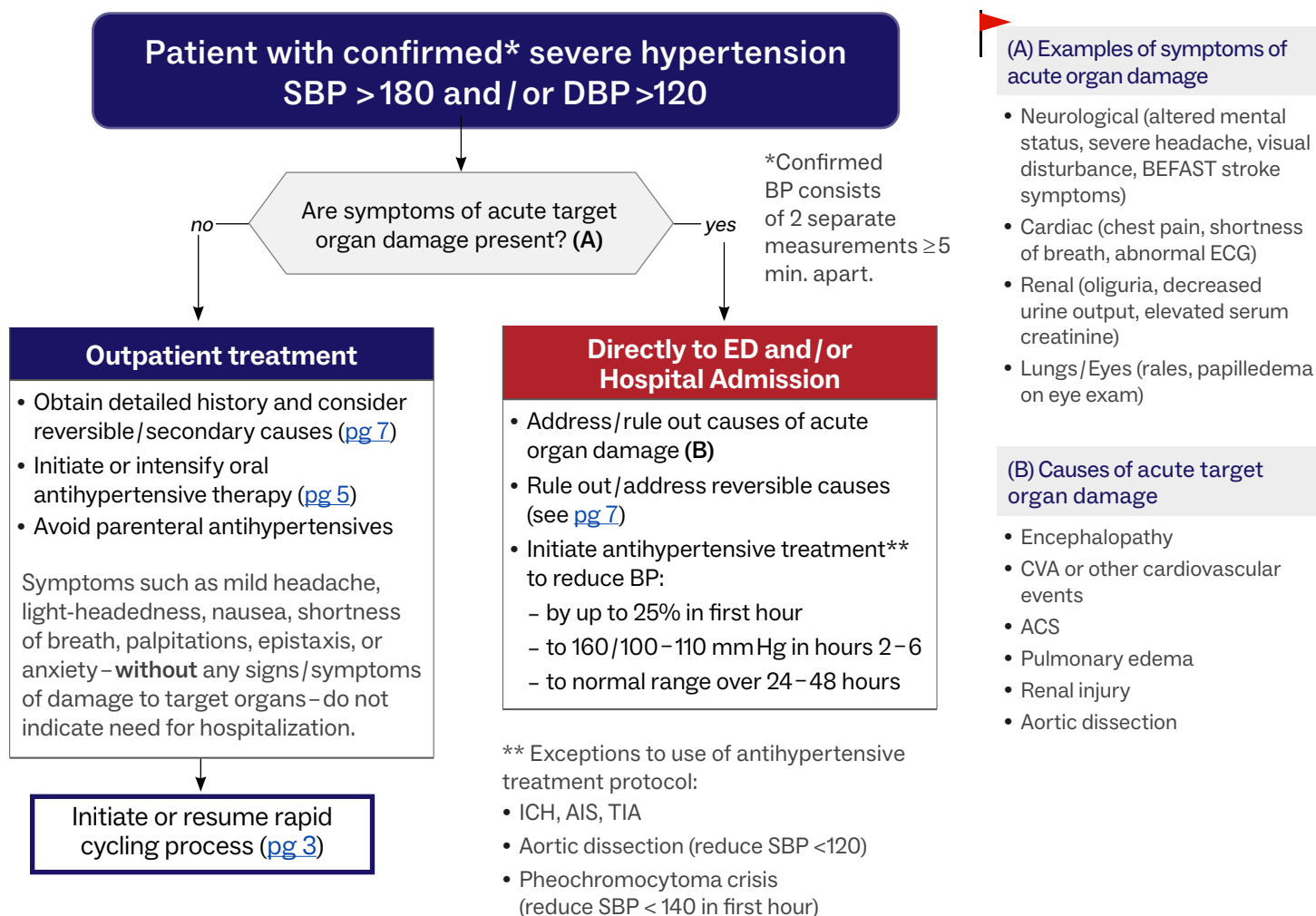
- BP remains elevated if on 3 antihypertensives with good adherence
- BP uncontrolled after 6 months of rapid cycling
- Abnormal diagnostic workup

Responsibilities Within Scope of Practice

Task	Provider	PharmD*	RN	LPN	MA
Collecting information related to home BP monitoring	X	X	X	X	X
Documenting BP in vitals flow sheet	X	X	X	X	X
Validating home BP machine	X	X	X	X	X
Providing patient education	X	X	X	X	
Interpretation of home BP reading	X	X	X		
Determination of reliability/accuracy of home BP reading	X	X			
Determining intervention including pharmacologic therapy	X	X			

* Clinical ambulatory pharmacists operate under state-approved [collaborative practice agreements](#)

Severe Hypertension Management (Adults)



Orthostasis or Postural Hypotension Management (Adults)

Evaluation

- Evaluate patients who are elderly or diabetic.
- Check for symptoms when patients change to upright position at 1 min. and 3 min. Symptoms include: dizziness, syncope, light-headedness, blurry vision, dyspnea, fatigue, nausea, palpitations, elevated HR, decreased mental acuity, and weakness.

Management

- Consider reducing or holding antihypertensives especially alpha-1 antagonists, beta-blockers, vasodilators, and diuretics. Continue with ARBs and DHP-CCBs which are less likely to cause orthostasis.
- Consider non-pharmacologic interventions such as salt tabs, compression stockings, and/or ensuring optimal fluid hydration.
- Consider medications to increase blood pressure such as midodrine, fludrocortisone, or pyridostigmine.
- If symptomatic postural hypotension, consider permissive HTN. Document in EMR.

Hypertension Pharmacotherapy (Adults)

First-Line Therapies

Thiazide-type diuretics	ARBs	ACEi	CCB-dihydropyridines
Chlorthalidone (12.5–25 mg/d) Hydrochlorothiazide (12.5–50 mg/d) Indapamide (1.5–2.5 mg/d)	Candesartan (8–32 mg/d) Irbesartan (150–300 mg/d) Losartan (50–100 mg/d) Olmesartan (5–40 mg/d) Telmisartan (20–80 mg/d) Valsartan (80–320 mg/d)	Benazepril (10–40 mg/d) Enalapril (5–40 mg/d) Lisinopril (10–40 mg/d) Ramipril (2.5–20 mg/d)	Amlodipine (2.5–10 mg/d) Felodipine (2.5–10 mg/d) Isradipine (5–10 mg/d) Nifedipine XL (30–90 mg/d)
Hyponatremia, hypokalemia, ↑calcium, ↑uric acid/acute gout, ↑glucose	Hyperkalemia, renal function, angioedema, fetal toxicity	Hyperkalemia, renal function, cough, angioedema, fetal toxicity	Dose-related lower extremity edema
If hypokalemia, can combine with triamterene (50–100 mg/d) or amiloride (5–10 mg/d) if GFR >45 Chlorthalidone and indapamide are longer acting and have greater potency GFR >30 mL/minute	Do NOT use in combination with ACEi, ARNI, direct renin inhibitor Avoid if angioedema history or pregnancy	Do NOT use in combination with ARBs, ARNI, direct renin inhibitor Avoid if angioedema history or pregnancy	None

Alternative Therapies

Beta Blockers	CCB-nondihydropyridines	Loop diuretics	Alpha-1 Blockers
Carvedilol (6.25–50 mg/d) Labetalol (200–1200 mg/d) Nebivolol (5–40 mg/d) Bisoprolol (2.5–10 mg/d) Metoprolol succinate (50–200 mg/d) Propranolol (80–160 mg/d)	Diltiazem ER (120–360 mg/d) Verapamil IR (120–360 mg/d) Verapamil SR (120–360 mg/d) Verapamil ER (100–300 mg/d)	Bumetanide (0.5–2 mg/d) Furosemide (20–80 mg/d) Torsemide (5–10 mg/d)	Doxazosin (1–16 mg/d) Prazosin (2–20 mg/d) Terazosin (1–20 mg/d)
Bradycardia, fatigue, worsening respiratory status in asthma/COPD (carvedilol, propranolol, labetalol) Metoprolol, nebivolol are cardioselective Carvedilol, labetalol, and nebivolol offer vasodilation; dose 2x/d	Bradycardia Avoid routine use with beta blockers as ↑ risk of bradycardia and heart block Do NOT use in HFrEF patient Dose verapamil IR 3x/d	Hypokalemia, renal function Preferred over thiazide-type when GFR <30 mL/min Bumetanide and furosemide can be dosed 2x/d	Orthostatic hypotension, lower extremity edema Consider for patients with symptomatic benign prostatic hypertrophy Consider prazosin 2–3x/d and terazosin 2x/d
Aldosterone antagonist diuretics	Direct Vasodilators	Central acting	
Eplerenone (50–100 mg/d) Spironolactone (25–100 mg/d)	Hydralazine (100–200 mg/d) Minoxidil (5–40 mg/week)	Clonidine (0.1–0.8 mg/d) Clonidine patch (0.1–0.3 mg/week) Methyldopa (250–1000 mg/d) Guanfacine (0.5–2 mg/d)	
Hyperkalemia, renal function, gynecomastia, impotence Do NOT use in pregnancy Spironolactone has > risk of gynecomastia and impotence GFR >45 mL/minute	Rebound tachycardia Use in combination with beta blocker and loop diuretic Dose 3–4x/day	Drowsiness, rebound HTN, bradycardia, rash (patch) Caution if used with B-blockers, non-DHP CCB Must taper to avoid rebound HTN Significant CNS adverse effects, especially in elderly Clonidine and methyldopa dose 2–3x/d	
Direct renin inhibitor	Dual endothelin receptor antagonist	Novel agents/procedure	KEY
Aliskiren (150–300 mg/d)	Amprocitentan (12.5 mg/d)	Aldosterone synthase inhibitors • Lorundrostat* • Baxdrostat* siRNA • Zirbesivan* Renal Denervation • Device-based sympathetic nerve ablation	Drug (dose range in milligrams/day) Monitoring or side-effects Clinical considerations See pg 6 for special populations
Hyperkalemia, renal impairment, angioedema Do NOT use in combo with ACEi or ARB Very long acting Do NOT use in pregnancy	Fluid retention on initiation Do NOT use in pregnancy		

* Not currently FDA approved

Hypertension Treatment in Special Populations (Adults)

Treat most adults to <130/80 mm Hg unless listed below

Population	Goals	Treatment notes
Arrhythmia or CVD		Beta blockers or non-DHP CCB
CKD		- If eGFR <60 mL/min/1.73 mm² or albuminuria ≥ 30 mg/g, initiate RAAS inhibitor and monitor closely for hyperkalemia - If the patient has ESRD and is on dialysis, use caution when treating SBP to <120 mm Hg due to risk of treatment-induced hypotension - If increasing K⁺ intake through diet or salt substitute, monitor patient closely for hyperkalemia
CHF reduced EF (HFrEF)	HR <70 BPM in sinus rhythm HR <110 BPM while resting with permanent A-fib	- Uptitrate therapy to max tolerated dose or symptomatic hypotension - ARNI or ACEi or ARB - Beta blocker (carvedilol, metoprolol succinate, bisoprolol) - Aldosterone antagonist diuretic (eplerenone, spironolactone) - SGLT2i (empagliflozin, dapagliflozin) - Isosorbide dinitrate - Hydralazine and loop diuretics as needed
CHF preserved EF (HFpEF)		- SGLT2i, Aldosterone antagonist diuretic - Loop diuretic as needed - Therapy based on comorbidities
Dementia/cognitive problem		- Early treatment to SBP <130 mm Hg to reduce risk of cognitive decline - Monitor for autonomic dysfunction affecting BP and heart rate
Diabetes		- First-line antihypertensive ACEi or ARB - Consider GLP-1 receptor agonists for patients with HTN and obesity
Ischemic heart disease (stable)		- Within one year of event, recommend beta blocker as first-line antihypertensive - ACEi or ARB if diabetes or CKD - DHP CCB, thiazide-type diuretic, aldosterone antagonist diuretic - Consider long-acting nitrates
Peripheral vascular disease (Gout)		- Consider losartan or lisinopril as first-line - If elevated urate (>6mg/dL) consider urate lowering drug in addition to antihypertensive
Pregnancy	< 140/90 mmHg	Treat chronic hypertension when BP ≥ 140/90
Postpartum	≤ 6 wks <140/90 mm Hg > 6 wks <130/80 mm Hg	- Patients with a hypertensive disorder of pregnancy (HDP) should be - Treated with antihypertensives suitable for their circumstance (e.g. breastfeeding, contraception) - Perform home BP monitoring: 1–2 times daily for the first 2 weeks postpartum - If severe features of HDP, get hypertension symptom check 72 hours postpartum - Have in-person visits: at 1 week and at 4–6 weeks postpartum - Long-term follow-up: at 3, 6, and 12 months for antihypertensive titration - See Postpartum follow up of patients with hypertensive disorders of pregnancy
Contraception		- For women on contraception, follow general pharmacologic recommendations (pg 5) - Women of reproductive age who are NOT on contraceptives should avoid any teratogenic agents given risk of pregnancy (e.g. ACEi/ARBs). First-line recommendations include nifedipine, amlodipine, hydrochlorothiazide, and labetalol.
Geriatrics ≥ 65 y.o.		- Individualized approach based on age, health, and other circumstances - After 50, diastolic BP can begin to decrease while systolic BP continues to rise causing widening pulse pressure which increases risk of cardiovascular events and progression of kidney disease. Consider treating SBP to <120 mm Hg. - Assess and monitor for orthostatic symptoms and check standing blood pressures - Caution when treating standing DBP <70 mm Hg in elderly patients, as it can increase risk of syncope

See the [Intermountain Heart Failure Guideline](#) for detailed treatment

Causes of Secondary Hypertension (Adults)

Secondary causes are present in 5%–25% of adult patients with HTN. Assess for secondary causes if:

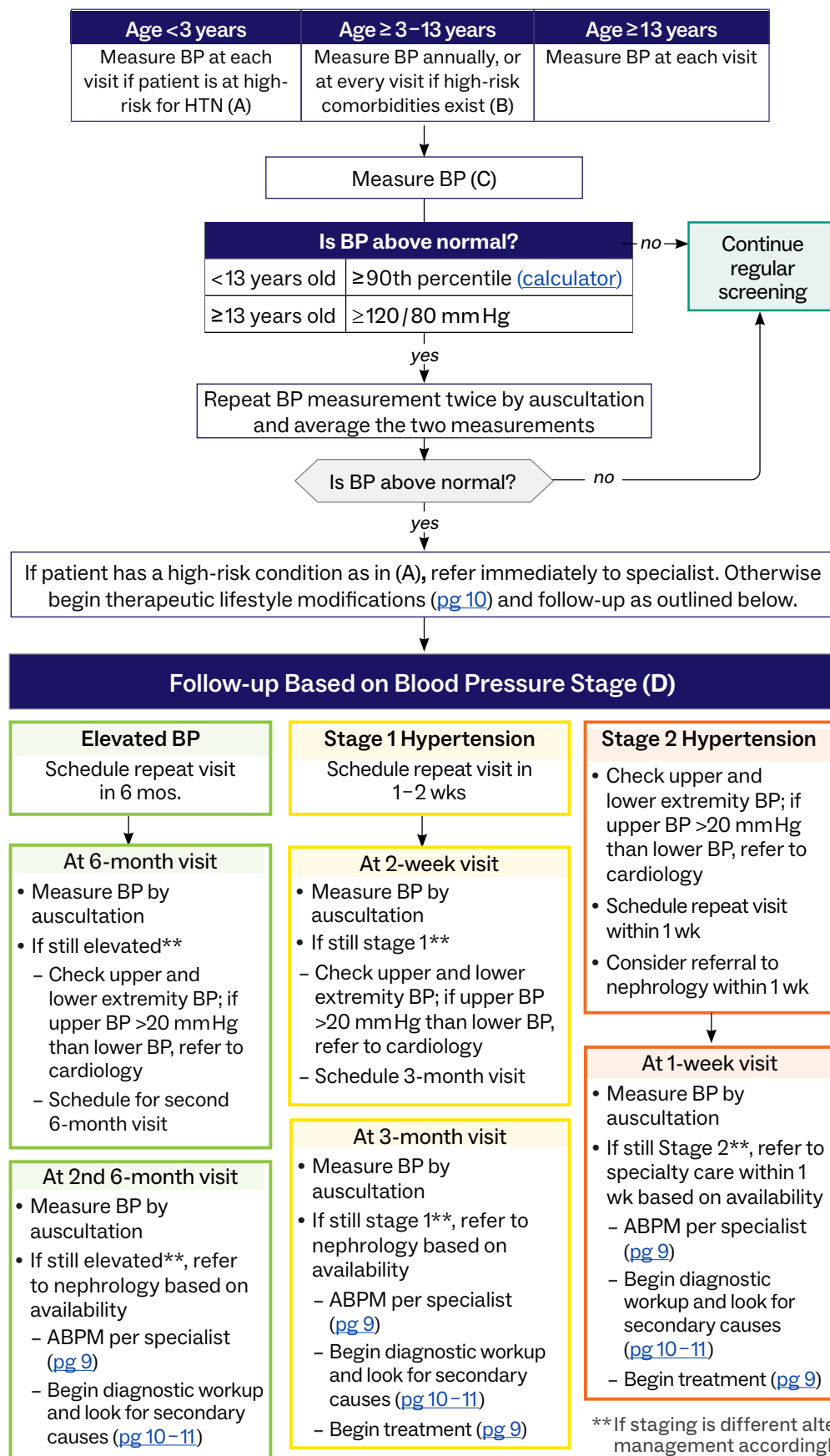
- sudden onset of HTN
- onset of HTN in patients <30 years old
- sudden exacerbation of previously controlled HTN
- disproportionate target-organ damage based on BP
- early onset CVA
- unprovoked hypokalemia
- adrenal nodule, insomnia, or family history of primary aldosteronism
- onset of diastolic hypertension in adults ≥65 years old

Common Secondary Causes of Hypertension				
Clinical clues that may indicate a secondary cause of hypertension		Consider	Initial Evaluation	Notes for Primary Care
• Loud snoring • Daytime sleepiness • Resistant HTN	• Obesity • Large neck • Apneas	Obstructive sleep apnea	STOP-Bang Questionnaire; consider home sleep apnea testing or referral for polysomnography	OSA is common in patients with obesity and resistant HTN; diagnosis may substantially improve BP control without medication escalation
• Long-standing DM • Abnormal urinalysis • Rising creatinine • Incontinence • Palpable kidneys	• Nocturia • Hematuria • Obstruction • ↑ frequency	Chronic kidney disease	Serum creatinine, eGFR	Evaluate for CKD even with modest BP elevation; Rule out renal artery stenosis if patient also has history of PVD, CAD, hypokalemia or vascular bruits
• Resistant hypertension • Hypokalemia (spontaneous or diuretic-induced)	• Arrhythmias • Family hx of early stroke	Primary aldosteronism	Aldosterone-to-renin ratio (after correcting hypokalemia and holding MRAs if feasible)	Consider even if potassium is normal; prevalence is higher in resistant HTN than historically recognized
• Abrupt onset or worsening HTN • Flash pulmonary edema	• abdominal or other artery bruit	Renovascular hypertension	Renal duplex doppler ultrasound or cross-sectional vascular imaging	Fibromuscular dysplasia should be considered in younger patients, especially women
New or worsening hypertension after medication or substance exposure		Drug or alcohol associated hypertension	Medication and substance history; targeted labs or urine drug screen	Common contributors include nicotine, alcohol, NSAIDs, steroids, stimulants (including supplements), decongestants, illicit drugs, contraceptives, TCAs, and SNRIs

Less-Common Secondary Causes of Hypertension (<1% prevalence)				
Clinical clues that may indicate a secondary cause of hypertension		Consider	Initial Evaluation	
• Fatigue • Weight gain • Cold intolerance	• Hair thinning • Brady cardia	• Constipation • Dry skin	Hypothyroidism	Thyroid-stimulating hormone and free thyroxine
• Weight loss • Heat intolerance	• Tachycardia • Warm skin	• Tremor • Diarrhea	Hyperthyroidism	
• Fatigue • Depression • Muscle weakness	• Osteoporosis • Constipation	• Bone pain • Kidney stone	Primary hyperparathyroidism	Serum calcium
• Resistant HTN • Flushing	• BP fluctuations overlying HTN	• Diarrhea • Headaches	Pheochromocytoma/ paraganglioma	Urinary or plasma metanephrines
• <30 y. o. with HTN • Absent femoral pulse	• Murmur	• Abdominal bruit	Aortic coarctation	Compare BP in upper and lower extremities, Echo
• Rapid central weight gain • Proximal muscle weakness	• Hyperglycemia • "Moon" face • Bruising	• Poor wound healing • Hirsutism • Osteoporosis (young)	Cushing's syndrome	Dexamethasone suppression test (1 mg overnight)
HTN with severe or refractory hypokalemia first presenting in young women during pregnancy or upon use of contraception			Geller's syndrome	Aldosterone-to-renin ratio

Hypertension Diagnosis and Management² (Pediatrics)

Pediatricians and Family Medicine providers typically refer children with confirmed elevated or hypertensive BP to a specialist. If specialty resources are limited, the guidance on pg 9–12 outlines essential initial workup and stabilization steps to use until referral becomes available.



(A) Risk factors for HTN (≤3yrs)

- Prematurity (<32 weeks) or small for gestational age
- Congenital heart disease
- Recurrent UTI, hematuria, proteinuria
- Family hx of congenital renal disease
- Solid-organ transplant
- Malignancy
- Neurofibromatosis, tuberous sclerosis, or sickle cell disease
- Evidence of intracranial pressure

(B) High-risk comorbidities (3–13 yrs)

- BMI ≥95%tile
- Renal disease
- Diabetes
- Aortic arch obstruction
- Coarctation
- Medications known to increase BP

(C) Measuring BP in pediatrics

- Cuff size width ≥ 40% of mid-arm circumference
- In length, bladder should cover ≥80% of mid-arm circumference
- See [Tips for Measuring BP in Children with Intellectual Disability or Autism](#) on [pg 12](#)

(D) Blood pressure staging[†]

<13 years old

Elevated BP	≥90th – <95th or 120/80 – <95th*
Stage 1	≥ 95th – < (95th + 12 mmHg) or 130/80 – 139/89 mmHg*
Stage 2	≥ (95th + 12 mmHg) or ≥140/90 mmHg*
If 95th + >30 mmHg or symptomatic, refer to ED	

≥13 years old

Elevated BP	120 – 129 / <80 mmHg
Stage 1	130 – 139 / 80–89 mmHg
Stage 2	≥ 140 / 90 mmHg
If >180/120 mmHg or symptomatic, refer to ED	

[†] 95th refers to 95th percentile by sex/age/height ([calculator](#))

* Use the lower value for staging

Therapeutic Lifestyle Management (Pediatrics)

- Nutrition: DASH diet (low sodium (1.5–2.3 g/day), high vegetables and fruits).
- Weight loss: $\geq 5\%$ (if BMI ≥ 95 th percentile).
- Physical activity: ≥ 60 min. moderate/vigorous activity/day. Limit screen time to < 2 hrs/day.
- Abstain from alcohol and illicit drugs.
- Stress management: Yearly screening for mental health and behavioral health involvement if needed. Stress management skills (e.g. meditation, breathing exercises).

Ambulatory Blood Pressure Monitoring (Pediatrics)

Ambulatory Blood Pressure Monitoring (ABPM) should be used (when available) to accurately assess pediatric hypertension and detect abnormal BP patterns.

- The child is sent home with a calibrated automatic blood pressure monitor, cuff, and recorder to wear for 24 hours with measurements taken every 15–30 minutes. The device is returned to clinic for analysis.
- Ordering done by specialty clinic.

Hypertension Pharmacotherapy (Pediatrics)

CCB-dihydropyridines

Amlodipine

< 6 years: 0.1 mg/kg/dose, once daily;

(max 0.6 mg/kg/day or 5 mg/day)

≥ 6 years: 2.5 mg, once daily; (max 10 mg/day)

Nifedipine XL

Child: 0.2–0.5 mg/kg/day (initial max 60 mg/day), 1–2 divided doses daily; (up-titration max 3 mg/kg/day up to 120 mg/day)

Dose-related lower extremity edema

None

Thiazide-type diuretics

Chlorthalidone

Children/Adolescents: 0.3 mg/kg/dose, once daily;

(max 2 mg/kg/day or 50 mg/day)

Hydrochlorothiazide

Child: 1–2 mg/kg/day, 1–2 divided doses daily; (max 37.5 mg/day)

Hyponatremia, hypokalemia, dizziness $\uparrow$ calcium, $\uparrow$ uric acid/acute gout, $\uparrow$ glucose, pancreatitis

Contraindicated with anuria

Chlorthalidone is longer acting and has greater potency as well as once daily administration to ease medication adherence

ACEi

Benazepril

≥ 6 years: 0.2 mg/kg/day (initial max 10 mg/day), once daily;

(up-titration max 40 mg/day)

Captopril:

Infants: 0.05 mg/kg/dose, 1–4x daily; (max 6 mg/kg/day)

Children: 0.3–0.5 mg/kg/dose, 3x daily; (max 6 mg/kg/day)

Enalapril:

> 1 month: 0.08 mg/kg/day (initial max 5 mg/day), 1–2 divided doses daily; (up-titration max 40 mg/day not to exceed 40 mg/day)

Fosinopril:

≥ 6 years and ≤ 50 kg: 0.1 mg/kg/dose, once daily;

(max 0.6 mg/kg/day not to exceed 40 mg/day)

≥ 6 years and > 50 kg: 5 mg, once daily; (max 40 mg/day)

Lisinopril

≥ 6 years: 0.07 mg/kg/dose (initial max 5 mg/day), once daily;

(up-titration max 0.6 mg/kg/day not to exceed 40 mg/day)

Hyperkalemia, renal function, cough, angioedema, increased sensitivity to dehydration.

If patient develops vomiting or diarrhea > 24 hrs. or if otherwise significantly dehydrated, stop ACEi and call physician's office.

Do NOT use in combination with ARBs, ARNI, direct renin inhibitor

Avoid if angioedema history or pregnancy

ARBs

Candesartan

1–5 years: 0.2 mg/kg/day, 1–2 divided doses daily;

(max 0.4 mg/kg/day)

≥ 6 years and < 50 kg: 4–8 mg, once daily; (max 32 mg/day)

≥ 6 years and ≥ 50 kg: 8–16 mg, once daily; (max 32 mg/day)

Irbesartan

6–12 years: 75 mg, once daily; (max 150 mg/day)

≥ 13 years: 150 mg, once daily; (max 300 mg/day)

Losartan

≥ 6 years: 0.7 mg/kg/dose (initial max 50 mg/day), once daily; (up-titration max 1.4 mg/kg not to exceed 100 mg/day)

Olmesartan

≥ 6 years and < 35 kg: 10 mg, once daily; (max 20 mg/day)

≥ 6 years and ≥ 35 kg: 20 mg, once daily; (max 40 mg/day)

Valsartan

≥ 6 years: oral solution, 0.65 mg/kg/dose, twice daily; (2.7 mg/kg/day not to exceed 160 mg/day)

Hyperkalemia, renal function, angioedema, fetal toxicity, increased sensitivity to dehydration

If patient develops vomiting or diarrhea > 24 hrs. or if otherwise significantly dehydrated, stop ARB and call physician's office.

Do NOT use in combination with ACEi, ARNI, direct renin inhibitor

Avoid if angioedema history or pregnancy

Drug – population: initial dose (initial max if needed), frequency; (titration max)

Monitoring or side-effects

Clinical considerations

Hypertension Diagnostic Workup² (Pediatrics)

History

Perinatal	- Maternal HTN in pregnancy or postpartum - Gestational age and birth weight - Complications (ICU, umbilical catheter placement)	Psychosocial	- Depression and anxiety - Bullying and body perceptions - Smoking, alcohol and illicit drug use
Nutritional and Activity	- Consumption of salt, fat, sugary beverages, fruits, vegetables, and low-fat dairy - Screen time, activity levels	Family	- Patient history of HTN - First and second degree relatives with HTN history.

Common Pediatric Medications With Hypertensive Potential

Over the Counter	- Decongestants - Caffeine	- Herbal supplements (e.g. Ma Huang, ephedra, St. John's Wart, yohimbe) - NSAIDs
Prescription	- Stimulants for ADD/ADHD - Hormonal contraception - Tricyclic antidepressants (e.g. amitriptyline)	Illicit Drugs - Amphetamines - Cocaine

Laboratory Evaluation

All Patients	- UA, CMP, BUN, Cr - Lipid profile (fasting or non-fasting) including HDL and total cholesterol - Renal ultrasound in those <6 years old or with abnormal renal function
Obese (BMI >95th) child or adolescent	- HgA1c - AST and ALT - Fasting lipid panel (dyslipidemia)
Optional	- Fasting glucose (high-risk of diabetes) - Thyroid-stimulating hormone - Drug screen - Urinary fractionated/plasma metanephrines (if suspect pheochromocytoma/paraganglioma) - Sleep study (if suspect OSA, sleep disorder) - CBC (if growth delay or abnormal renal function) - Aldosterone to Renin ratio (ARR) (potassium abnormalities, family history of primary aldosteronism)

Consider other labs based on physical exam ([pg 11](#)) and potential causes of secondary hypertension. See [page 11](#) and [pg 7](#) for information on causes of secondary hypertension.

Physical Exam Findings Suggestive of Secondary HTN or Related to End-Organ Damage Secondary to HTN

Body system	Finding (possible etiology)
Vitals	Tachycardia (Hyperthyroidism, neuroblastoma, pheochromocytoma, paraganglioma)
Height and weight	- Growth delay (Chronic renal failure, CKD) - Obesity (Cushing syndrome) - Truncal obesity (Insulin resistance)
Eyes	- Proptosis (Hyperthyroidism) - Retinal changes (Severe HTN, more likely secondary HTN)
Ear, nose, throat	- Adenotonsillar hypertrophy (Sleep disordered breathing) - History of snoring (OSA)
Head and neck	- Elfin face (Williams syndrome) - Moon face (Cushing syndrome) - Thyromegaly/goiter (Hyperthyroidism) - Webbed neck (Turner syndrome)
Skin	- Pallor, flushing diaphoresis (Pheochromocytoma) - Acne, hirsutism, striae (Cushing, anabolic steroids) - Cafe-au-lait spots (Neurofibromatosis) - Adenoma sebaceum (Tuberous sclerosis) - Malar rash (Systemic lupus erythematosus-SLE) - Acanthosis nigricans (T2DM)

(Continued on next page)

Hypertension Diagnostic Workup² (Pediatrics)- continued

Physical Exam Findings Suggestive of Secondary HTN or Related to End-Organ Damage (continued)

Body system	Finding (possible etiology)
Hematologic	• Pallor or sickle cell anemia (Renal disease)
Neurologic metabolic	• Hypokalemia, headache, dizziness, polyuria, nocturia (Reninoma) • Muscle weakness, hypokalemia (Liddle syndrome, glucocorticoid-remediable aldosteronism, apparent mineralocorticoid excess)
Cardiac, chest	• Heart murmur (Coarctation of aorta) • Widely-spaced nipples (Turner syndrome) • Chest pain, palpitation, or exertional dyspnea (Heart disease) • Friction rub (SLE, Collagen vascular disease) • Apical heave (LVH)
Abdomen	• Abdominal mass (Wilms tumor, neuroblastoma, pheochromocytoma, paraganglioma) • Epigastric, flank bruit (Renal artery stenosis) • Palpable kidneys (Polycystic kidney disease, hydronephrosis, multicystic dysplastic kidney)
Genitourinary	• Ambiguous or virilized genitalia (Congenital adrenal hyperplasia) • UTIs, vesicoureteral reflux, hematuria, edema, fatigue, or abdominal trauma (Renal disease)
Extremities	• Joint swelling (SLE, Collagen vascular disease) • Muscle weakness (Hyperaldosteronism, Liddle syndrome)

Secondary Causes of Hypertension in Pediatric Patients

Name of disorder	Clinical features
Pheochromocytoma, paraganglioma	Palpitations, headache, sweating, abdominal mass
Mineralocorticoid excesses (in general)	Early onset HTN, potassium level abnormalities, family history of primary aldosteronism, resistant HTN
Congenital adrenal hyperplasia	Hypokalemia, acne, hirsutism, virilization or infantilism in girls, pseudoprecocious puberty or under-virilization in boys, low aldosterone and renin
Familial hyperaldosteronism	Early onset of severe HTN, young subjects with primary aldosteronism, family history of young strokes, adrenal adenoma or bilateral adrenal hyperplasia
Carney complex	Skin pigmentation, pituitary and other tumors
McCune Albright syndrome	Cutaneous pigmentation, fibrous dysplasia
Primary glucocorticoid resistance	Ambiguous genitalia, precocious puberty, androgen excess, menstrual abnormalities or infertility in females
Apparent mineralocorticoid excess	Hypokalemia, low birth weight, failure to thrive
Liddle syndrome	Hypokalemia, metabolic alkalosis, muscle weakness
Geller syndrome	Early onset of HTN, exacerbated by pregnancy
Pseudohypo-aldosteronism type 2	Short stature, hyperkalemic and hyperchloremic metabolic acidosis
Glucocorticoid excess (Cushing, adrenocortical carcinoma, iatrogenic excess)	Moon face, buffalo hump, truncal obesity, purple or pink striae on skin, thin/fragile skin, muscle weakness, facial hirsutism and irregular/absent menstruation in females, fatigue, growth slowing despite weight gain
Hyperthyroidism	Tremors, tachycardia, weight loss despite good appetite, eye lid lag and retraction, accelerated growth and bone age, hyperactivity
Hyperparathyroidism	Bone pain, osteoporosis, hypercalcemia, abdominal pain, nausea, constipation, kidney stones, polyuria, hematuria, poor weight gain, failure to thrive

Hypertension Treatment in Special Populations (Pediatrics)

Population	Goals	Treatment notes	
CKD or proteinuria	MAP <50th percentile	First line treatment: ACEi or ARB	
Competitive sports	For participation in sports: < (95th percentile + 12mmHg) or ≤ 140/90	Elevated BP	• No limitations
		Stage 1 hypertension	• Must be evaluated for LVH with Echo; if no LVH or heart disease, no restrictions • If LVH, restrict high-static activities* until BP is normalized
		Stage 2 hypertension	• Restrict high-static activities* until BP is normalized

*High-static activities include: gymnastics, martial arts, sailing, sport climbing, water skiing, weight lifting, windsurfing, body building, downhill skiing, skateboarding, snowboarding, wrestling, boxing, kayaking, cycling, decathlon, rowing, speed skating, triathlon

Tips for Blood Pressure Monitoring in Children With Intellectual Disabilities or Autism

Sensory accommodations	• Before beginning, allow the child to briefly explore the equipment—touch the cuff, hear the Velcro, and feel the pump—to reduce sensory defensiveness. • Use child-friendly language to describe the sensation (e.g., “This is a muscle tester” or “The cuff gives your arm a quick hug”) to make the tightening feel less threatening. • Perform the measurement in a calm, low-stimulation space, such as a quiet room with dim or warm lighting. • If upper-arm placement is not tolerated, consider whether the child can be measured using a wrist monitor or lower-arm cuff. Note that readings may differ from standard upper-arm measurements.
Offer flexibility	• Offer simple choices—such as which arm to use or whether to sit in a chair or on the exam table—to increase cooperation. • If the child is significantly distressed, postpone vitals until the end of the visit or schedule a dedicated follow-up appointment for blood pressure measurement. • Home blood pressure monitoring may provide more reliable readings for neurodivergent children who experience elevated stress in the clinical setting.
Communication	• Use visual schedules, social stories, or step-by-step picture guides to prepare the child for what will happen during the procedure.
Training	See Provider Training Video: How to test blood pressure in patient with autism (Ohio State) .

Specific Therapeutic Lifestyle Modifications (Adults)

Areas of modification	Individual interventions shown to decrease SBP (average 5-7 points)
Diet	• DASH diet (vegetables, fruits, whole grains, low-fat dairy, and ↓ saturated fat, added sugars, and refined carbs) • Dietary sodium ≤2300 mg/day with a target of <1500 mg/day when possible • Use of a salt substitute in and on food (25%–30% potassium chloride, 65%–75% sodium chloride) • Daily potassium intake of 3500–5000 mg (dietary sources or low-dose pharmacological supplementation) • Decrease alcohol consumption (decrease by 50% to no more than 2 drinks/day for men or 1 drink/day for women. Complete avoidance gives best results.
Activity	• Moderate-intensity aerobic activity for at least 90–150 min per week • Resistance training 90–150 minutes per week (~6 exercises, 3 sets per exercise, 10 reps per set) • Isometric resistance exercise such as hand-grip efforts at moderate intensity 3 x per week
Weight	• ≥5% reduction in weight • ≥3 kg/m² decrease in BMI
Stress and emotional health	• Meditation 20 min. 2 times per day after training by professional • Using device guidance to slow down breathing to 10 breaths/min for 15 min/day

Patient Education in Rapid Cycle Process

- Provide patient with documents from the Rapid Cycle Toolkit as needed including:
 - BP tracker ([English](#)) / ([Spanish](#))
 - BP basics booklet ([English](#)) / ([Spanish](#)) includes how to check BP and DASH diet
 - Hypertension in Pregnancy ([English](#)) / ([Spanish](#))
 - Driving with a Chronic Health Condition ([English](#)) / ([Spanish](#)) (requirement in Canyons)
 - High Blood Pressure: Personal Action Plan ([English](#)) / ([Spanish](#))
- Review hypertension and long-term health problems associated with uncontrolled hypertension
- Assess patient's motivation and readiness to participate in therapeutic lifestyle management
- Identify any barriers to therapeutic or pharmacological treatment, acknowledging that it is challenging to make changes
- Focus on one or two specific goals at a time, formulate a plan, including patient self-monitoring, i.e. keeping a blood pressure log, tracking dietary intake, and physical activity, and schedule clinician or care team follow-up
- Consider having patients check and log their BP before and 1 hour after administration of antihypertensives to monitor effectiveness of therapy or utilize AM/PM readings
- Education on medication adherence as this accounts for 10–80 % of suboptimal BP control
- Use teach back ([Health Literacy and Teach-Back Training](#))

Patient Resources

Blood Pressure Management Skills

- BP basics booklet ([English](#)) / ([Spanish](#))
- BP tracker ([English](#)) / ([Spanish](#))
- High Blood Pressure Personal Action Plan ([English](#)) / ([Spanish](#))
- Driving with a Chronic Health Condition ([English](#)) / ([Spanish](#))

Special Populations

- Hypertension in Pregnancy ([English](#)) / ([Spanish](#))
- OSA obstructive sleep apnea ([English](#)) / ([Spanish](#))
- Kidney Disease, High Blood Pressure, and Urine Proteins ([English](#)) / ([Spanish](#))

Lifestyle Modifications

- High Blood Pressure and the DASH Diet ([English](#)) / ([Spanish](#))
- The Way to Wellness ([English](#)) / ([Spanish](#))
- Improving and Maintaining Physical Activity ([English](#)) / ([Spanish](#))
- Alcohol: Rethink Your Drink ([English](#)) / ([Spanish](#))
- 8 to LiVe by Habit Builder ([English](#)) / ([Spanish](#))
- Stress Less ([English](#)) / ([Spanish](#))
- Managing your Sodium Goals: Aim for 2300 mg or less daily ([English](#)) / ([Spanish](#))
- Move More ([English](#)) / ([Spanish](#))
- Eat Meals Together ([English](#)) / ([Spanish](#))

Pediatrics

- [KidsHealth.org](#)
- High Blood Pressure in Children ([English](#)) / ([Spanish](#))

In EPIC, you can find further patient education resources by using "Education Materials" also known as Ignite, (videos and text resources) or "Clinical Reference" (text documents only). [Epic Training on Ignite](#) [Superuser Training on Ignite](#)

Glossary of Terms

A-fib – atrial fibrillation
 ACR – albumin-to-creatinine ratio
 ACS – acute coronary syndrome
 ACEi – angiotensin-converting enzyme inhibitor
 AHA – American Heart Association
 AIS – acute ischemic stroke
 AOBP – automated office blood pressure
 ARB – angiotensin II receptor blocker
 ARNI – angiotensin receptor–neprilysin inhibitor
 ASCVD – atherosclerotic cardiovascular disease
 BEFAST – balance, eyes, face, arms, speech, time
 BNP – b-type natriuretic peptide
 BP – blood pressure
 BUN – blood urea nitrogen
 CAC – coronary artery calcium
 CBC – complete blood count
 CCB – calcium channel blocker
 CHF – congestive heart failure
 CKD – chronic kidney disease
 CMP – comprehensive metabolic panel
 CNS – central nervous system
 Cr – creatinine

CT – computed tomography
 CVA – cerebrovascular accident
 CVD – cardiovascular disease
 DBP – diastolic blood pressure
 DHP CCB – dihydropyridine Ca channel blocker
 Echo – echocardiogram
 EF – ejection fraction
 eGFR – Estimated Glomerular Filtration Rate
 Ga-DOTATATE – gallium-DOTATATE
 GLP-1 – glucagon-like peptide-1
 HDL – high-density lipoprotein
 HDP – hypertension disorder of pregnancy
 HFpEF – heart failure w/ preserved ejection fraction
 HFrEF – heart failure w/ reduced ejection fraction
 HR – heart rate
 hs-cTN – high-sensitivity cardiac troponin
 HTN – hypertension
 ICH – intracerebral hemorrhage
 ICU – intensive care unit
 IR – immediate release
 JVD – jugular venous distention
 K⁺ – potassium

LVH – left ventricular hypertrophy
 MAP – mean arterial pressure
 MRA – mineralocorticoid receptor antagonist
 Na⁺ – sodium
 NSAIDs – nonsteroidal anti-inflammatory drugs
 OSA – obstructive sleep apnea
 OTC – over the counter medications
 PET/CT – positron emission tomography / CT
 SBP – systolic blood pressure
 SGLT2i – sodium-glucose cotransporter-2 inhibitor
 SLE – systemic lupus erythematosus
 SNRIs – serotonin-norepinephrine reuptake inhibitor
 SR – sustained release
 TCAs – tricyclic antidepressants
 TIA – transient ischemic attack
 T2DM – type 2 diabetes mellitus
 TSH – thyroid-stimulating hormone
 UA – urinalysis
 US – ultrasound
 UTI – urinary tract infection
 VEGF – vascular endothelial growth factor
 WCH – white coat hypertension

CPM

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This CPM presents a model of best care based on the best available scientific evidence at the time of publication. It is not a prescription for every physician or every patient, nor does it replace clinical judgment. All statements, protocols, and recommendations herein are viewed as transitory and iterative. Although physicians are encouraged to follow the CPM to help focus on and measure quality, deviations are a means for discovering improvements in patient care and expanding the knowledge base. Send feedback to Brian Leonard DO, Intermountain Health, Senior Medical Director for Primary and Preventative Care Clinical Program, brian.leonard@imail.org