MANAGEMENT OF

High Blood Pressure

2018 Update

The High Blood Pressure Management Development Team, under the guidance of Intermountain's Primary Care and Cardiovascular Clinical Programs, developed this care process model (CPM) to guide the effective, consistent management of high blood pressure for patients across the Intermountain system. This CPM is based on the JNC-8,[JAM] other new guidelines released by national and international societies,[MAN,REB,AHA] and national initiatives led by the CDC[CDC1] and the American Medical Association.[AMA]

Why Focus ON HIGH BLOOD PRESSURE?

- **It's the most common chronic condition in primary care.** About one in three US adults, nearly 75 million, has high blood pressure (BP).[MER1]
- **It's dangerous.** In 2014, there were 73,345 deaths attributable to high BP and 410,624 deaths with any mention of high BP. Of children and adolescents aged 8 to 17 years, 11 % had either high BP or elevated high BP. Life expectancy is 5 years shorter for people with high BP.[CDC2]
- **It's expensive.** High BP costs the nation $51 billion annually in direct medical expenses, and another $3.5 billion in lost productivity.[AHA]
- **It's undertreated.** While effective treatments have been available for more than 50 years, fewer than half of Americans with high BP have their condition under control. The lack of consistent treatment within healthcare delivery systems appears to be a major contributor.[AHA]
- **Outcomes improve when systems consistently follow practical treatment guidelines and adopt team processes.** Recent initiatives[CDC1, AMA] and evidence reviews[COCH] show that it's essential to create system-wide targets and algorithms, and to use health information technology to identify hypertensive patients and update providers on patient status.
- **A powerful opportunity to improve outcomes.** Intermountain has the data collection and reporting, decision support, and team coordination to identify and engage all patients with high BP across our system.

What's new in this update?

- **New ACC/AHA Guidelines** for the prevention, detection, evaluation, and management of high blood pressure in adults have been incorporated throughout this CPM.
- **New guidelines** for managing high blood pressure in pediatric populations. (See page 16.)
- **Guidance for incorporating AOBP (Automated Office Blood Pressure)** into the HBP clinic workflow. (See pages 4–5.)
- **New process for rapid cycling during medication titration.** This includes clinical team processes to improve communication and efficiency. (See pages 6–8.)
- **Improved tools for patient education and shared decision-making on therapeutic lifestyle changes.** (See pages 10–11.)
- Updated **medication tables** and guidance on **special populations**. (See pages 12–18.)
- **Reports to help you manage your patient population.** (See page 21.)

WHAT'S INSIDE?

MEASUREMENT & GOALS

As a result of implementing this updated CPM, Intermountain aims to **achieve and maintain BP control for** Intermountain patients diagnosed with high blood pressure.

This goal is designed to assist Intermountain in reducing the rate of serious conditions associated with high BP, such as stroke, chronic kidney disease, and cardiovascular diseases.

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Intermountain® Healthcare

ALGORITHM 1: BLOOD PRESSURE SCREENING, DIAGNOSIS, AND TREATMENT

Check BP at each office visit (a)

Yes — **Systolic ≥130 OR diastolic ≥80 (mmHg)?** — *No*

RECHECK BP after waiting quietly for 5 minutes OR perform AOBP

Yes — **BP remains elevated?** — *No*

SCHEDULE follow-up visit within 2 to 4 weeks to confirm high BP

Yes — **High BP confirmed? (b)** — *No*

DIAGNOSE high BP

Classify high BP (in mm Hg):[MAN]
- **Normal: <120 and <80**
- **Elevated BP: 120-129 and <80**
- **Stage 1 HBP: 130-139 or 80-89**
- **Stage 2 HBP: ≥140 or ≥90**

Perform diagnostic workup: (see page 5)
- **History and exam:** Assess for personal/family history of associated conditions and CV risk factors; identifiable causes of hypertension; end-organ damage
- **Tests:** Comprehensive metabolic panel, urinalysis, and urine albumin to creatinine ratio (ACR)

TREAT high BP to management target

RECOMMEND therapeutic lifestyle changes (TLC) (c)

- **If BP <160/<100 mm Hg AND NO kidney disease, diabetes, heart failure, or vascular disease:** Start meds concurrently with TLC or start with trial of 3 months of TLC alone **(c)**
- **If BP ≥160/≥100 mm Hg OR any of the conditions above:** Start meds concurrently with TLC and consider adding two-drug regimen

MAINTAIN TLC throughout course of treatment

INITIATE TREATMENT with ACE-I (or ARB)**: lisinopril** (or losartan) **(e)**
Lisinopril titration: 10 mg daily ➔ 20 mg daily

ADD amlodipine (e)
Amlodipine titration: 5 mg daily ➔ 10 mg daily

ADD HCTZ (as single combo pill with ACE-I/ARB) **(e)**
Lisinopril/HCTZ (20/12.5 mg pill) titration: 1 pill daily ➔ 2 pills daily

Resistant high BP: If BP is still not in control when patient is prescribed 3 medications and adherence has been confirmed, consider referral to Resistant High Blood Pressure Clinic (if available), cardiology (if heart failure), or nephrology (if kidney disease). (See page 14.)

ADD carvedilol (keep heart rate >55 bpm) **(e)**
Carvedilol titration: 6.25 mg, twice daily ➔ 12.5 mg, twice daily ➔ 25 mg, twice daily

Treatment process:

- **Rapid cycle: Evaluate BP every two weeks** while titrating or switching meds. **(d)**
- **Order BMP two to three weeks** after initiation or dose changes of lisinopril or HCTZ.
- **Consider divided dosing** (AM/PM) when patient is on three medications or more.
- **When BP is at target,** maintain current therapy and evaluate BP every 6 to 12 months.
- **Ongoing:** Patients should see a PCP or specialist at least yearly.

Special populations:

See note **(f)** for options in treating high blood pressure in the following:
- Coronary artery disease
- Heart failure
- Chronic kidney disease
- Diabetes
- Patients of African ancestry
- Pregnancy
- Pediatric patients
- Older patients

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ALGORITHM NOTES

(a) Checking BP

When

- **At every office visit.** Regardless of the visit's purpose, measure BP, and make a plan to confirm high BP if the patient's BP is ≥ 130 / ≥ 80 mmHg.
- **Every 2 weeks** during medication titration.
- **Every 6 to 12 months** once a patient with high BP has achieved BP control.

How

See page 4 for tips on checking BP, including timing, patient position, cuff size and position, and so forth.

(b) Confirming high BP

Methods

Follow-up office visit

High BP can be confirmed through 2 office visits total, with 2 BP checks during each visit.

Home BP monitoring

- Train patient on checking BP at home (see page 4), and make sure patient has appropriate home BP monitor.
- Patient takes at least 6 to 10 home BP readings over 2 weeks or more; provider evaluates readings.

Results

Suspected high BP

If BP is ≥ 130 / ≥ 80 mmHg with several readings, but you suspect BP is not truly elevated:

- Code appropriately in EMR (see page 5).
- Educate patient and counsel on lifestyle changes.
- Follow up until it's clear whether BP is normal or elevated.

See pages 5–8 for process details.

Elevated BP

If BP is 120–129 / < 80 mmHg:

Counsel patient on therapeutic lifestyle changes.

See pages 5–8 for process details.

High BP

Treat as per algorithm. See pages 6–8 for process details.

(c) Therapeutic Lifestyle Changes (TLC)

TLC elements

- TLC elements include weight reduction, the DASH eating plan, sodium reduction, regular physical activity, limiting alcohol, and smoking cessation. See page 10 for more information on these elements and their BP effects.

Shared decision making on TLC

- ALL patients with high BP should be advised to start TLC as part of their treatment plan. For patients with Stage 1 HBP who do NOT have kidney disease, diabetes, heart failure, or vascular disease, TLC alone is a proven therapeutic option **IF** the patient can make these lifestyle changes.
- Present the option of starting with a 3-month trial of TLC alone, assess the patient's readiness for these changes, and decide whether or not to start meds along with TLC from the start.
- See pages 10–11 for tools and processes to help you assess readiness and motivate patients to maintain TLC.

(d) Frequent monitoring and titration

- **Rapid cycling:** See "Population and Process Management," pages 6–8, for information on processes that can assist in frequent monitoring.
- **If BP is not in control after 2 weeks therapy** on a new medication or dose, move to the next step in the medication cascade.

(e) Medication notes (see pages 18–20 for details)

- **Consider nonadherence.** Nearly 50 % of patients referred to an Intermountain Resistant HBP Clinic were found to be not taking their medication and, therefore, did not have resistant HBP.
- **Consider interfering agents.** Ask about NSAID use.

Medications in the algorithm

Lisinopril / Losartan

- If dry cough with lisinopril, switch to losartan. Losartan titration: 50 mg daily ➔ 100 mg daily.
- Avoid all ACE-I or ARB medications in pregnancy (can cause fetal toxicity).[MER2]
- Do NOT combine an ACE-I and an ARB.

Amlodipine

- Monitor for peripheral edema.
- If patient is on simvastatin > 20 mg daily, consider alternative statin due to drug interaction.
- Consider starting with 2.5 mg daily in elderly patients.

Carvedilol

Monitor for bradycardia (keep HR > 55 BPM).

(f) Special populations (see pages 12–16 for details)

Coronary artery disease

Consider adding carvedilol (preferred) or metoprolol succinate to ACE-I / ARB. As needed, add amlodipine and then a diuretic.

Heart failure

If ejection fraction ≤ 40 %, ACE-I / ARB **PLUS** carvedilol (preferred) or metoprolol succinate **PLUS** spironolactone (if not contraindicated). If needed for BP, add amlodipine.

Kidney disease

As per the current CKD CPM, treat to < 140 / < 90 mmHg or < 130 / 80 mmHg if ACR > 300. Monitor K^+ and creatinine with ACE-I / ARBs.

Diabetes

As per the current *Adult Diabetes Mellitus CPM*, treat to < 140 / < 90 mmHg. In **prediabetes,** consider avoiding thiazides and beta blockers (based on BG effects).

African ancestry

Consider starting with CCB or thiazide; then, add thiazide or CCB as 2nd line.

Pregnancy

Avoid ACE-I / ARB medications. Consider labetalol, CCB (nifedipine preferred), hydralazine, or methyldopa.

Resistant hypertension

If BP is still not in control after patient is on 3 meds or more, consider referral to Resistant High Blood Pressure Clinic, cardiology (if heart failure or coronary disease), or nephrology (if kidney disease).

Pediatric patients

For ages 3–11, check BP annually and at every visit for ages 12–18. Initiate TLC for all stages. Initiate workup, referral, and treatment for Stages 1 and 2 HBP.

Older patients

Institute an individualized approach considering age, health, and risk factors.

BP MEASUREMENT ERRORS HAN

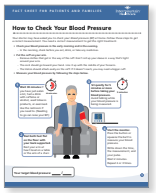
Faulty BP measurement technique can lead to false high readings.

Common error	mm Hg too high
Cuff too small	5–10
Unsupported arm	5–10
Patient talking	10
Patient listening	5
Back unsupported	5–10
Feet not on floor	5–10
Legs crossed	5–10
Full bladder	5–10
Forearm BP	5–10

RESOURCES TO IMPROVE BP MEASUREMENT

- **Office measurement (clinical staff):** Intermountain University training and pamphlet *Obtaining an Accurate Blood Pressure Measurement*

- **Home measurement (patients):** Fact sheet *How to Check Your Blood Pressure*



BP MEASUREMENT & DIAGNOSIS

Tips for accurate BP measurement

Follow these tips to avoid common errors in BP measurement:

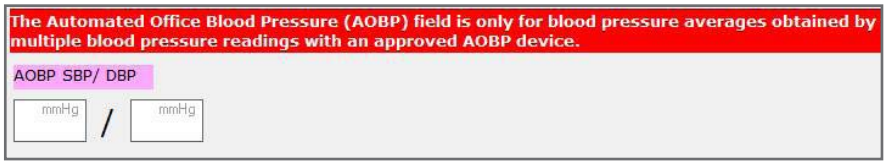
- **Timing and preparation.** Wait 30 minutes after the patient has had a heavy meal, caffeine, alcohol, nicotine, or heavy exercise. Before checking BP, give the patient three to five minutes of rest, and let the patient void the bladder if needed.
- **Patient positioning.** Make sure the patient's feet are on the floor, the back and arm are supported, and the arm is at the level of the heart. For patients with diabetes, it is recommended that physicians evaluate standing blood pressure to assess autonomic function and potential volume depletion.[ADA]
- **Cuff and arm.** Use a properly sized cuff (avoid using a too-small cuff). Don't take BP on the forearm, and don't roll up tight sleeves. Don't check BP on the side of a radical mastectomy, a limb with an IV or a dialysis fistula, or a limb with paralysis.
- **Process.** Avoid talking with the patient or asking questions while checking BP. Use of either an automatic or manual cuff is acceptable, as proper technique is significantly more important than the method.

Confirming an elevated blood pressure

Confirm an initial elevated blood pressure using:

- **Automated Office Blood Pressure (AOBP).** This is done with an automatic cuff and machine that performs, and then averages three to six blood pressure measurements at one-minute intervals while the patient is seated alone in a quiet room. It is recommened for patients with known high BP or for any patient whose initial BP reading is elevated. This methodology can decrease error, overdiagnosis, and overtreatment of high BP and eliminate the "white coat effect."

  To maintain data accuracy, a BP reading obtained by AOBP must be entered in the separate AOBP field in the "vitals" or "intake" section in iCentra.



- **A follow-up office visit with clinic staff.** Frequent follow-up checks can be done without a scheduled appointment (see pages 6–8). For initial diagnosis it is recommended that a follow-up visit be scheduled.
- **Home BP measurements.** In most guidelines, the diagnosis of high BP is made based on in-office BP measurements. However, high BP should be confirmed by home BP measurements due to the possibility of "white coat" high BP. If accurate BP measurements at home are consistently < 130 / < 80 mmHg, the diagnosis of high BP is in question. This CPM recommends **at least 6 to 10 home BP readings over two weeks**, preferably with measurements taken twice daily. Train patients how to choose an appropriate monitor and check their BP correctly.

IDENTIFIABLE CAUSES OF HIGH BP

- Primary aldosteronism (frequent in patients with type 2 diabetes)
- Obstructive sleep apnea
- Drug induced / related (e.g., NSAIDs, cold remedies, some antidepressants)
- Chronic kidney disease
- Renovascular disease
- Cushing's syndrome or steroid therapy
- Pheochromocytoma
- Coarctation of aorta
- Thyroid / parathyroid disease
- Pregnancy
- NSAIDS
- Birth control pills
- Scleroderma
- Alcohol abuse

Suspected high or elevated blood pressure

For some patients with elevated BP, the diagnosis of Stage 1 high BP is not clear-cut. See the guidance below.

Suspected high blood pressure

For patients with first-time BP of ≥ 130 or ≥ 80 mmHg, **if you strongly feel there's a good chance the patient truly doesn't have high blood pressure** (the measurement was due to stress, white-coat hypertension, or other factors):

- **Provide brief patient education; advise on therapeutic lifestyle changes.** Talk about the possibility of having high BP and the impact of high BP. Discuss therapeutic lifestyle changes and encourage action.
- **Consider repeat BP readings using AOBP.** This methodology can help decrease both over and under diagnosis of HBP.
- **Create a follow-up plan to recheck and confirm BP**:
  - Ask the patient to return in two weeks for another BP check under ideal circumstances to get an accurate reading (see the previous page).
  - Offer the patient the option of obtaining a BP cuff (if available) and educate the patient on accurate BP monitoring. Contact the patient in two weeks to obtain measurements.
  - Consider ambulatory BP monitoring. Intermountain's Resistant High BP clinic provides this service (see sidebar, page 14).

Elevated blood pressure (120 – 129 and < 80 mmHg)

Add this to the patient's problem list. This will provide a reminder to follow the issue in the future as needed.

Basic diagnostic workup

While some guidelines[MAN] describe an extensive workup for every patient with elevated BP, many of the recommended tests do not change treatment decisions for managing the patient's blood pressure. This CPM recommends the following basic workup for patients with high BP:

- **History and physical** to assess personal / family history of associated conditions and CV risk factors, assess for identifiable causes of high BP (see the sidebar), and check for signs of end-organ damage (heart failure symptoms, eyes, peripheral vascular disease).
- **Metabolic panel (MP)** to check that baseline electrolytes are normal and to evaluate serum creatinine.
- **Urinalysis (U / A)** and albumin-creatinine ratio (ACR) to check for protein and signs of kidney disease. If U / A shows protein of 1+ or greater consider microscopic exam (first morning specimen preferred). See the *Chronic Kidney Disease CPM* for details on evaluating patients for CKD.

Depending on the patient, other tests may be necessary to rule out related conditions such as heart failure or cardiovascular disease, or to screen for diabetes or lipid disorders.

POPULATION & PROCESS MANAGEMENT

Population health management aims to reach every person who needs care. It deploys health IT, broad-reaching policies, and system changes to complement clinic-level care efforts. Population approaches are especially relevant with chronic conditions, which require longitudinal, team-based care.

Studies suggest that population and systems-level approaches are the strongest opportunity to improve blood pressure in the communities we serve. A Cochrane review of blood pressure interventions concluded that the most likely way to improve BP control, more effective than patient or provider education, is "...an organized system of registration, recall, and regular review allied to a vigorous stepped care approach."[COCH] In a joint scientific advisory, the American Heart Association, American College of Cardiology, and the US Centers for Disease Control and Prevention called for system-level approaches as well.[AHA]

Elements of population management

The following list outlines the American Heart Association's recommendations and the system-level steps Intermountain is taking to implement them:[AHA]

- **Standardization of care with an evidence-based diagnosis and treatment algorithm.** The algorithms on page 2 and page 8 provide default clinical and process approaches with proven benefits.
- **A hypertension registry to identify all patients eligible for management.** Intermountain's hypertension registry meets these needs (see page 21).
- **System-level process approaches** including:
  - **Monitoring and frequent reporting** on the control status of all patients at the practice and population levels. The Primary Care Clinical Program will maintain reports on the reports portal to compare data at both clinic and population levels.
  - **Systematic follow up** of patients for therapy initiation and intensification. See the process algorithm on page 8 for a model that Intermountain will use for diagnosis and to facilitate follow-up reminders.
  - **Technology-facilitated decision support and feedback.** The recommendations in this CPM will be integrated into the EMR workflow to provide decision support during treatment.
  - **Clarification of the roles and responsibilities** of healthcare providers to implement a team approach. See the table on page 7 for key clinical processes and how a clinic might assign them.
  - **Reducing barriers to medication adherence and lifestyle modifications.** A key tenet of this care process is to contact patients every two weeks during medication titration (rapid cycling) and inquire about medication issues and lifestyle changes. See page 10 for ideas on how to support patients with lifestyle changes.

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KEY RECOMMENDATIONS

- This model's success depends on clinical integration. Each staff member has an important role to play in BP management.
- Frequent follow-up BP measurements can be taken by a medical assistant, a clinical pharmacist, or PCP.

COLLABORATIVE PHARMACY MANAGEMENT

The collaborative pharmacy model of disease management is an emerging program to help providers achieve clinical goals and improve satisfaction for patients with dyslipidemia, diabetes, and / or hypertension.

This program allows providers to partner with a pharmacist for support in selecting, titrating, and monitoring medications. For more information on this program, see the *Disease Management in Collaboration with Your Pharmacist: Dyslipidemia, Diabetes, and Hypertension* Care Process Model.

Clinic team roles to ensure adequate blood pressures

Table 1 below describes general roles and responsibilities to help a clinic team share accountability for blood pressure management. Each clinic should adopt a process that ensures best practices.

TABLE 1: Key roles and responsibilities

Responsibility	Possible roles	Resources
Check BP for every high-BP patient. At every visit: Record side effects and medication compliance, and ask about lifestyle change	• PCP • PharmD, if using Collaborative Pharmacy Program • Medical assistant (MA) • Patient (home check)	EHR documentation and communication
Prescribe and update medications	• PCP • PharmD, if using Collaborative Pharmacy Program	Decision support provided in algorithm 1 (page 2)
Rapid-cycle follow up: • Review reports and action list to identify patients due for follow up • Contact all patients not at goal or with a new prescription every 2 weeks • Follow up once BP controlled • Contact patients who don't show up for follow-up visits.	• Patient Services Representative (PSR) or member of clinic management team may call to arrange appointment or to collect home BP data • MA may check BP without appointment • Homecare nurse can check BP during home visits • PCP or PharmD • Intermountain Community Pharmacy can check a BP without an appointment and enter the result in iCentra.	In the reports portal, a hypertension patient list will be regularly updated with relevant information on patients due for follow up (see page 8).
Patient education • Initial • Follow up	• PCP may provide initial education • Care manager may provide initial and ongoing education • MA or health advocate may compile and hand out printed materials	• *BP Basics booklet* • *High BP Treatment: Decision Guide* • *Elevated High BP* • Other patient handouts (see page 22)

The following algorithm shows how the clinic team can implement the process of "rapid cycling" to appropriately and quickly get patients with Stages 1 and 2 HBP treated to their appropriate goal.

HIGH BP READINGS IN A SPECIALTY CARE OFFICE

For undiagnosed high BP identified in a specialty care office:

- Refer to PCP.
- Code as "elevated BP" (RO3.0) in the EHR.
- Make sure correct PCP is listed in Revenue Cycle / EHR.
- Provide patient education

THE HIGH BP PATIENT MANAGEMENT REPORT

A High BP Patient Management Report for each provider will be maintained in the "reports" portal and will include patients who:

- Are due for two-week follow-up visit, including all patients coded as "high BP" or "elevated BP"
- Are due for 12-month follow-up visit, including all patients whose high BP is in control
- Have either two or three consecutive elevated BP readings
- Have elevated BP but no diagnosis in EHR problem list, including patients with **EITHER** of the following:
  - Each of the last three BPs elevated,
  - One BP in last 12 months is > 180 / 110

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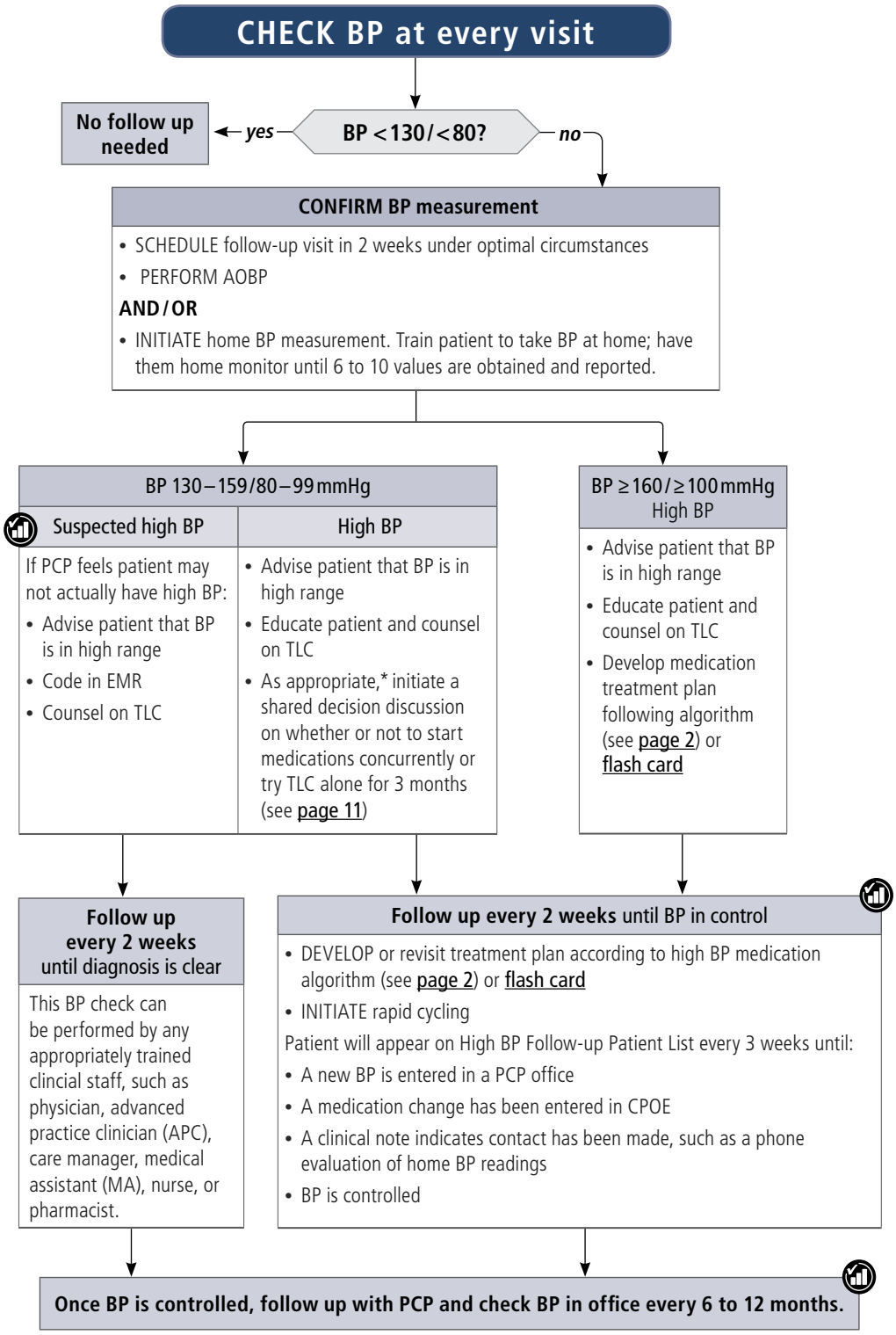
ALGORITHM 2: CLINIC PROCESS FOR RAPID CYCLING



***Note:** Patients with diabetes, kidney disease, heart failure, or vascular disease should start with medications and TLC concurrently, not TLC alone.

KEY RECOMMENDATION

Frequently ask patients about barriers that may prevent full engagement, and suggest support resources when possible.

PATIENT EDUCATION

Patient education is critical for blood pressure management because adequate control depends on how well the patient engages in treatment by making lifestyle changes (see pages 10–11) and taking medications appropriately. To engage most fully, patients need support to:

- **Understand their personal risk.** High BP is a "silent killer," and patients may be less likely to believe it is serious and needs treatment when compared with conditions that cause pain or other symptoms. They need a vivid understanding of risk.
- **Maintain focus and self-control.** BP management requires lifelong commitment. Patients need ongoing support to develop the habits of regularly monitoring their BP, taking medication, and maintaining lifestyle changes.
- **Manage demands on time, focus, and finances.** Patients often need to take several medications, have frequent follow-up appointments, and take other actions to address other health conditions along with managing BP. It's hard to keep track of it all.

Recommended strategies and tools

Table 2 below outlines key actions for patients, barriers that may make these actions difficult, and education materials that can provide support.

TABLE 2: Patient education strategies and tools

Patient goal	Potential barriers	Education tools and methods
Understand high BP and personal risk of complications	• Not taking risk seriously • Low health literacy • Feeling overwhelmed	• *BP Basics booklet* — in-depth information on BP, risk, and what patients can do about it • *Elevated Blood Pressure* fact sheet — handout for patients
Take medications daily	• Medication side effects • Need for frequent medication changes • Patients may not be honest about medication adherence	• *BP Basics booklet* — describes treatment process • *BP Tracker* — includes space for keeping track of medications and noting side effects • During medication titration, continue discussion about side effects, financial concerns, or other issues that patient may see as barriers
Make key lifestyle changes • Activity • Nutrition • Weight loss	• Not being convinced of the difference lifestyle change can make • Not feeling ready or able to make necessary changes	• *High BP Treatment: Decision Guide* — a shared-decision tool on whether or not to start treatment with TLC alone • Lifestyle and Weight Management materials (see page 10) — address patient readiness to change and help identify changes most likely to succeed • *The Weigh to Health*® program — Intermountain's intensive lifestyle intervention program
Arrange for rapid-cycle follow up	• Time • Transportation • Cost or insurance issues	• Expectations set for rapid-cycle follow up from the start • Regular conversation with care management staff about barriers • *High Blood Pressure Personal Action Plan* fact sheet (for use with care manager)
Monitor BP at home	• Not having a monitor or not knowing how to use it correctly • Patient forgets to check BP	• *How to Monitor Your Blood Pressure* fact sheet plus training in clinic office • *BP Tracker* may remind patient to check BP • BP record checked at every appointment; patient brings in monitor and demonstrates
Communicate with providers Sign up for MyHealth	• Not knowing about MyHealth • Not having a computer or only using computer in very minimal way • Lack of dependable internet access • Lack of physician involvement	• (At diagnosis) handout on MyHealth and registration assistance • Online tour of MyHealth at intermountainhealthcare.org/flashComponents/myhealth/myhealth.html • Physician encouragement to enroll in MyHealth

MATERIALS TO SUPPORT LIFESTYLE CHANGE

Most people find lifestyle change to be very challenging. The materials below were developed to support the behavior change in patients.

Motivational interviewing six-minute video demonstration

The *Lifestyle and Health Risk Questionnaire* asks evidence-based questions related to key lifestyle issues

Rx to LiVe Well is a tool for prescribing healthy behaviors and referring to specialists

The *Readiness Worksheet* is a tool to help determine which behaviors the patient is ready to change

LiVe Well Action Plan helps patients outline steps to meet their goals

The *LiVe Well 1-Week Habit Tracker* helps patients keep track of their health behaviors

Quitting Tobacco outlines steps for quitting and provides references to resources

THERAPEUTIC LIFESTYLE CHANGES (TLC)

Effects of TLC on blood pressure

Clinical studies show that the BP-lowering effects of targeted lifestyle changes can be equivalent to drug monotherapy. While guidelines agree on which lifestyle changes lower blood pressure, the American Heart Association is the only one that approximates reduction in systolic blood pressure (SBP).[MAN,JAM,AHA] Table 3 below summarizes these recommendations:

TABLE 3: Therapeutic lifestyle changes to lower BP

Lifestyle change	Recommendation	Approximate reduction in SBP[AHA]
Reduce weight	Maintain a normal body weight (BMI 18.5–24.9)	5–20 mmHg per 10 kg lost
Adopt DASH eating plan	Consume a diet rich in fruits, vegetables, and low-fat dairy products with a reduced content of saturated fat and total fat	8–14 mmHg
Lower sodium intake (The effect of sodium reduction is greater in people of African ancestry, older people, and people with diabetes, metabolic syndrome, or CKD.[MAN])	• Consume ≤ 2,400 mg of sodium / day • Further reduce of sodium intake to ≤ 1,500 mg / day (associated with even greater reduction in SBP) • Advise that even if the desired daily sodium intake is not achieved, a reduction of 1,000 mg / day from baseline shows benefit	2–8 mmHg
Increase physical activity	Engage in regular aerobic physical activity, such as brisk walking at least 30 minutes / day, most days of the week	4–9 mmHg
Limit alcohol consumption	Limit alcohol to ≤ 2 drinks / day in most men, or ≤ 1 drink / day in women and lighter-weight persons (One drink = 12 oz beer, 5 oz wine, or 1.5 oz hard alcohol)	2–4 mmHg
Quit smoking	Quit smoking by initiating a tobacco cessation program (see *Quitting Tobacco: Your Journey to Freedom* booklet.)	(not reported)

Tools to support education and motivation for TLC

BP management requires modification of daily behaviors, which most patients find challenging. For detailed, evidence-based support in this process, see the "Behavior Change Techniques and Tools" section (pages 8 – 11) in the *Lifestyle and Weight Management* CPM. Clinicians should work with patients to:

- **Agree on one or two appropriate goals.** Efforts to promote lifestyle change should begin with identifying recommended behaviors the patient currently feels ready to change, and developing specific goals and plans around those behaviors.
- **Create a plan for self monitoring.** The most important behavior modification for patients is the **daily tracking of food intake and physical activity.** Patients should record calorie and activity totals daily and weekly and weight at least weekly.
- **Arrange for clinician monitoring and follow up.** Visits with a care team should focus on individualized assessment of progress, review of self-monitoring records, problem solving, and goal setting. Visits should reinforce behavioral strategies and, when appropriate, apply them to the problem of relapse.
- **Arrange for additional assistance.** Patients experiencing difficulty adhering to diet and exercise recommendations or who lose < 1 % of weight per month may require additional assistance. Referral to an intensive lifestyle intervention program (such as *The Weigh to Health®*) or additional contact with a clinician may help.

Provider counseling makes a difference

Healthcare providers are sometimes discouraged at patients' low level of adherence to lifestyle change regimens. It's important to remember that some patients will be more motivated to change when presented with a new diagnosis like high BP and fear of complications.

Research shows that provider counseling does make a difference. For example, studies show that structured physical activity counseling by a primary care provider is recalled by patients; even if they don't change immediately, they become more prepared to change.[JAY] In one large study, the number of patients needed to treat (NNT) with brief counseling to motivate one additional sedentary adult to meet recommended levels of physical activity (assessed a year later) was only 12.[ORR]

Considering treatment with TLC alone

All patients should be counseled to begin therapeutic lifestyle changes upon diagnosis with high BP or elevated high BP. In some patients, several months of TLC can be attempted with the goal of reducing BP without medication.[WEB, MAN] If patients are able to lower BP within three months, it is appropriate to continue without medication as long as BP remains in control, and monitor BP in the medical office at least annually. If BP does not improve, patients should begin medication therapy.

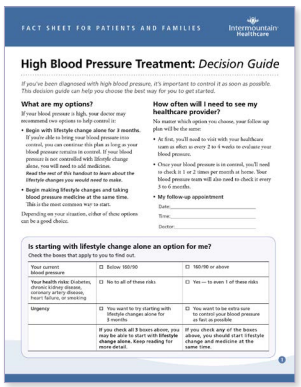
Intermountain experts recommend considering a three-month trial of TLC alone for patients with:

- BP lower than 160 / 100 mmHg
- No other risk factors such as diabetes, chronic kidney disease, heart failure, coronary artery disease or other vascular disease (retinopathy, carotid artery, PVD), or smoking
- Motivation and ability to adopt several lifestyle changes simultaneously

When discussing this option with patients, a **shared decision-making approach** can help both patient and provider assess whether this approach is right for the patient. Shared decision-making helps patients clarify their goals and values and think more concretely about their ability to commit to lifestyle changes. Key elements of shared decision-making include:

- Using conversational techniques that enhance communication.
- Helping patients see the benefits of TLC.
- Helping patients realistically assess their readiness to make and sustain lifestyle changes.
- Asking patients about work, home life, and financial barriers to making therapeutic lifestyle changes.

The patient fact sheet ***High Blood Pressure Treatment: A Decision Guide*** is a tool to help guide this conversation with the patient.


FACT SHEET FOR PATIENTS AND FAMILIES

Intermountain Healthcare

High Blood Pressure Treatment: *Decision Guide*

If you've been diagnosed with high blood pressure, it's important to control it as soon as possible. This decision guide can help you choose the best way for you to get started.

What are my options?

If your blood pressure is high, your doctor may recommend two options to help control it:

- **Begin with lifestyle change alone for 3 months.** If you're able to bring your blood pressure into control, you can continue this plan as long as your blood pressure remains in control. If your blood pressure is not controlled with lifestyle change alone, you will need to add medicine. **Read the rest of this handout to learn about the lifestyle changes you would need to make.**
- **Begin making lifestyle changes and taking blood pressure medicine at the same time.** This is the most common way to start.

Depending on your situation, either of these options can be a good choice.

How often will I need to see my healthcare provider?

No matter which option you choose, your follow up plan will be the same:

- At first, you'll need to visit with your healthcare team as often as every 2 to 4 weeks to evaluate your blood pressure.
- Once your blood pressure is in control, you'll need to check it 1 or 2 times per month at home. Your blood pressure team will also need to check it every 3 to 6 months.
- **My follow-up appointment**

Date:
Time:
Doctor:

Is starting with lifestyle change alone an option for me?

Check the boxes that apply to you to find out.

Your current blood pressure	☐ Below 160/90	☐ 160/90 or above
Your health risks: Diabetes, chronic kidney disease, coronary artery disease, heart failure, or smoking	☐ No to all of these risks	☐ Yes — to even 1 of these risks
Urgency	☐ You want to try starting with lifestyle changes alone for 3 months	☐ You want to be extra sure to control your blood pressure as fast as possible
	If you check all 3 boxes above, you may be able to start with lifestyle change alone. Keep reading for more detail.	If you check any of the boxes above, you should start lifestyle change and medicine at the same time.

KEY RECOMMENDATIONS

- **Coronary artery disease.** Begin by adding carvedilol or metoprolol to an ACE-I/ARB; add amlodipine and a diuretic if control is not achieved.
- **Heart failure.** Customize treatment based on ejection fraction. For fluid retention, use a thiazide (mild retention) or loop diuretic (moderate).

For a quick summary of medications for special populations, see page 18.

MEDICATION GUIDELINES FOR HEART FAILURE PATIENTS

See the Cardiovascular Clinical Program home page for guidelines on the following medications for patients with heart failure: ACE-I/ARBs, aldosterone receptor antagonists, and beta blockers.

SPECIAL POPULATIONS

This section describes considerations for BP management in certain groups, including patients with atherosclerotic cardiovascular disease, heart failure, chronic kidney disease, resistant high blood pressure, and diabetes mellitus, as well as those who are of African ancestry, over 60, pregnant, or pediatric patients.

Atherosclerotic Cardiovascular Disease (ASCVD)

Uncontrolled high BP is a key risk factor for both ASCVD and myocardial infarction (MI); the 2004 international study (INTERHEART) showed that approximately 25 % of the population-attributable risk of MI can be accounted for by high BP.[MAN, YUS]

- **Management target: < 130 / < 80 mmHg.** While some past guidelines suggested a target of < 140 / < 90 mmHg, recent guidelines recommend treatment to a goal of < 130 / < 80 mmHg.[REB]
- **Medications:** Begin medications and therapeutic lifestyle changes concurrently. Consider adding carvedilol (preferred) or metoprolol succinate to an ACE-I/ARB as the first step for patients after ACSVD / MI or revascularization, with ischemia as shown by angina symptoms or stress test, or with ejection fraction < 40 %. As needed for BP control, add amlodipine and then a thiazide (or a loop diuretic if the patient is experiencing volume overload).

Heart failure

For patients with heart failure, alternative medications are more effective, and some medications should be avoided entirely.[REB] Recommendations depend on whether the patient has **heart failure with reduced ejection fraction** (**HFrEF**, with LVEF ≤ 40 %, also called "systolic heart failure") or **heart failure with preserved ejection fraction** (**HFpEF**, with LVEF > 40 %, also called "systolic heart failure"). For all heart failure patients, do not attempt a trial of therapeutic lifestyle changes before starting medications.

- **Treatment notes for patients with HFrEF (reduced ejection fraction):**
  - **First-line medications:** To reduce mortality and prevent hospitalizations, patients with LVEF ≤ 40 % should be on an ACE-I/ARB **PLUS** carvedilol or metoprolol succinate if heart failure is NYHA Class I–IV **PLUS** an aldosterone receptor antagonist (unless contraindicated) if heart failure is NYHA Class II–IV. Ensure the patient is euvolemic before uptitrating carvedilol or metoprolol.
  - **Additional medication if needed for BP control:** Consider adding amlodipine (avoid other calcium channel blockers).
  - **Diuretics for fluid retention:** While thiazides may be considered to treat mild fluid retention, they are less potent than loop diuretics (furosemide, torsemide, and bumetanide). For greater than mild fluid retention, consider using loop diuretics to maintain euvolemia and using agents **other** than thiazides for BP control. Avoid concurrent use of a thiazide and loop diuretic.
  - **Change in BP as disease progresses:** Many patients with HFrEF have a history of high BP, but elevated BP often disappears as systolic dysfunction develops.
- **Treatment notes for patients with HFpEF (preserved ejection fraction):**
  - **General medications:** Start with an ACE-I/ARB as the first-line agent,\ followed by carvedilol (preferred) or metoprolol succinate, then use diuretics if needed. No specific therapies have shown an impact on mortality in HFpEF, although ARBs may reduce hospitalizations.
  - **Diuretics for fluid retention:** See the notes above on diuretics. For mild fluid retention, consider a thiazide diuretic; for moderate fluid retention, use a loop diuretic. Avoid concurrent use of a thiazide and a loop diuretic.

KEY RECOMMENDATIONS

- **Chronic kidney disease.** Set management target based on proteinuria; use the standard medication cascade; adjust doses based on renal function.
- **Diabetes.** Treat to standard target; can consider reduced target (< 130 / < 80) for younger patients and those at increased stroke risk.

For a quick summary of medications for special populations, see page 18.

RELATED CPMS

Intermountain's *Management of Chronic Kidney Disease CPM* provides guidance on:

- Specific dose reductions in ACE-I / ARB medications and aldosterone receptor antagonists based on increases in serum creatinine and potassium
- Other BP control medications
- Overall management of CKD based on disease stage and risk

Intermountain's *Outpatient Management of Adult Diabetes Mellitus CPM* provides guidance on:

- BP medications in adult patients with diabetes and prediabetes
- Overall treatment of diabetes including blood glucose, lipid management, management of comorbidities, and other topics

Intermountain's Diabetes Prevention Program CPM provides guidance on:

- Engaging patients in therapeutic lifestyle changes, including 1:1 and class instruction
- Recommended medical nutrition therapy for weight management

Chronic kidney disease (CKD)

Observational studies have shown a direct relationship between elevated BP and CKD progression. Besides lowering BP, reducing albuminuria is also an important goal that shapes medication choice in hypertensive patients with CKD, since increased urinary protein excretion predicts adverse CV events and progression to end-stage renal disease.[MAN] See Intermountain's Management of Chronic Kidney Disease CPM for details.

- **Management target (per the *CKD CPM*): < 140 / < 90 mmHg; consider < 130 / < 80 mmHg based on ACR (albumin-creatinine ratio).**
  - Guidelines recommend treatment to a goal of < 140 / 90 mmHg due to lack of studies that prove improved mortality or CV outcomes with intensive treatment to a lower BP goal. [MAN, JAM, REB]
  - Some guidelines also suggest that when overt proteinuria is present (albumin : creatinine ratio > 300), providers can consider management to < 130 / 80 mmHg.[MAN, REB] Treatment should include careful monitoring of medication-based changes in potassium, serum creatinine, and eGFR.
- **Management target per the 2017 ACC / AHA Guidelines:** A goal of < 130 / < 80 mmHg is recommended for all patients with CKD.
- **Medication notes:**
  - **Begin medication and therapeutic lifestyle changes concurrently. Start with an ACE-I or ARB** (as in algorithm 1); these medications reduce albuminuria. Do not combine an ACE-I and ARB, and avoid the direct renin inhibitor aliskiren. **Carefully monitor serum creatinine (sCr) and potassium levels;** test sCr and potassium two weeks after initiation or dose increase of an ACE-I or ARB.
  - **Patients with eGFR < 30:** Refer to a nephrologist for medication management; many BP medications will require dose adjustments based on renal function. For renal dosing, see Intermountain's *Management of Chronic Kidney Disease CPM*.
  - **CKD patients over 80 years old:** Starting with a thiazide diuretic or CCB is an option for these patients; see "Older Patients" on page 15 for more details.

Diabetes

Elevated BP is common among patients with diabetes. In diabetes, microvascular disease and increased cardiovascular risks reinforce the importance of BP control . **This CPM recommends evaluating standing BP to evaluate for autonomic dysfunction.**

- **Management target (per the *Adult Diabetes CPM*): < 140 / < 90 mmHg.** Intermountain's Adult Diabetes Team recommends that a target of < 130 / < 80 mmHg be considered for those at high ASCVD risk if the burden of aggressive therapy is not excessive.
- **Management target per the 2017 ACC / AHA Guidelines:** A goal of < 130 / < 80 mmHg is recommended for all patients with diabetes.
- **Medication notes:**
  - **Begin medication and therapeutic lifestyle changes concurrently.**
  - **Diabetes patients:** Follow algorithm 1, starting with an ACE-I / ARB. Do not combine an ACE-I and ARB, and avoid the direct renin inhibitor aliskiren.
  - **Prediabetes patients:** Avoid thiazides and beta blockers as they can increase blood glucose. However, if a beta blocker is used, carvedilol is preferred as it may help with insulin resistance.
- **CKD and diabetes:** See Intermountain's *Management of Chronic Kidney Disease CPM*.

RESISTANT HIGH BP CLINIC

Intermountain's Resistant High Blood Pressure Clinic is a resource to assist in managing patients with resistant high BP. The clinic offers:

- Ambulatory BP monitoring to confirm resistant high BP (or to resolve suspected high BP)
- Management by an interdisciplinary team of blood pressure experts
- Expert evaluation for secondary causes and extended monitoring as needed

Contact the clinic at 801-507-3577.

KEY RECOMMENDATIONS

Patients of African ancestry. Start with a thiazide or calcium channel blocker. For patients of African ancestry with CKD and proteinuria, consider starting with an ACE-I/ARB.

For a quick summary of medications for special populations, see page 18.

Resistant high BP

Resistant high BP occurs in approximately 10% of patients and brings a higher risk of CV events and renal damage.[MAN] **If BP is not controlled to target through adequate doses of three or more medications (including a diuretic):**

- **Confirm that the patient has resistant BP.** Check home blood pressure measures and confirm that BP is being checked accurately in the office and at home. Consider ambulatory BP monitoring; this service is provided by Intermountain's Resistant High Blood Pressure Clinic (described at left). Consider checking BP using AOBP.
- **Check to make sure the patient is taking BP medications as prescribed.** Many patients are falsely diagnosed with resistant BP when in reality they are not taking their medication. Talk with family members, check the patient's prescriptions, and ask the patient about side effects that may be interfering with medication compliance.
- **Check for secondary causes.** These include:
  - **Chronic kidney disease:** See Intermountain's *Chronic Kidney Disease CPM.*
  - **Obstructive sleep apnea:** Use the *STOP-BANG Questionnaire* for initial screening, and see Intermountain's *Obstructive Sleep Apnea CPM.*
  - Aldosterone excess, which may be present in approximately 20% of patients with resistant high BP.[REB]
  - **Renal artery stenosis:** Consider evaluation with duplex renal ultrasound, renal artery CT angiogram, or MR angiogram of the renal arteries.
  - **Coarctation of the aorta:** Perform four-point BP. Consider echocardiogram, chest x-ray, or CT angiogram if indicated.
- **Double-check for interfering agents and lifestyle factors.** These include NSAIDs, cold remedies, some antidepressants, excess alcohol, and excessive dietary sodium.
- **Consider referral to a specialist or specialty clinic.** Refer to a cardiologist (if the patient has heart disease), a nephrologist (if the patient has kidney disease), or to Intermountain's Resistant High Blood Pressure Clinic (described at left).
- **Consider medication changes.** Most patients with resistant high BP will require treatment with more than three medications. Switch the patient to chlorthalidone if they are on HCTZ; if persistent fluid overload is expected, consider a loop diuretic. If needed, add further medications (listed in preferred order): Spironolactone, vasodilator, centrally acting agent, and alpha blocker (see pages 18–20).

Patients of African ancestry

Patients of African ancestry require a special treatment approach for a number of reasons. High blood pressure is common in these patients, it occurs earlier in life, and it is commonly more severe than in Caucasian patients. The resulting risk of stroke is higher with elevated BP, and there is an increased risk of kidney disease when compared with Caucasian patients. In addition, because patients of African ancestry have a reduced response to ACE inhibitors, ARBs, and beta blockers, alternative strategies are important.[REB] Follow these guidelines:

- **Management target: < 130 / < 80 mmHg.** Treat high blood pressure to the standard management target for all patients.
- **Medications:** Start with a thiazide diuretic or calcium channel blocker (CCB). If needed, add a thiazide or CCB, whichever medication class was not used first. The ALLHAT study showed that patients of African ancestry who started with an ACE-I had a significantly higher stroke rate than those who started with a CCB.[JAM]
- **Medications for patients of African ancestry with chronic kidney disease:**
  - **If albuminuria is present:** Start with an ACE inhibitor or ARB due to the elevated risk of developing end-stage renal disease among black patients.[REB] If ACR is > 300 mg/g, refer to a nephrologist.
  - **If albuminuria is not present:** Begin with a thiazide diuretic or calcium channel blocker, but use an ACE inhibitor or ARB as second-line therapy.[REB]

KEY RECOMMENDATIONS

Older patients. Take an individualized approach. In patients >80 years old, treat if systolic BP >150, to a management target of SBP <150.

For a quick summary of medications for special populations, see page 18.

ORTHOSTATIC HYPOTENSION

Consider measuring for orthostatic hypotension, especially in the elderly, during initiation of therapy, and before and after any high blood pressure medication change. To measure for orthostatic hypotension:

1. Have the patient lie down for five minutes.
2. Measure blood pressure and pulse rate.
3. Have the patient stand.
4. Repeat blood pressure and pulse rate measurements after the patient has been standing for three minutes.

A drop of ≥20 mmHg systolic blood pressure or ≥10 mmHg diastolic blood pressure or experiencing lightheadedness or dizziness is considered abnormal.

KEY RECOMMENDATIONS

- **Pregnancy.** Avoid ACE-I/ARB medications. Refer to OB/GYN for BP management during pregnancy.
- **Resistant high BP.** Confirm medication adherence; check for secondary causes and interfering agents; consider referral to resistant hypertension clinic or specialist (cardiologist if heart disease; nephrologist if kidney disease).

For a quick summary of medications for special populations, see page 18.

Older patients

Based on recent guidelines and expert consensus, this CPM recommends taking an **individualized approach** to treating high blood pressure in patients over 60 years old, particularly patients age 60 to 79 years. Older patients vary widely in their overall health, frailty, risk factors, and response to medication. Starting at age 50–60, diastolic pressure may begin to decrease while systolic pressure continues to rise. Standard BP management strategies can lead to isolated systolic hypertension, a major risk factor for CV events, stroke, and kidney disease progression.[REB] **This CPM recommends performing a standing blood pressure in patients 80 year and older. Be cautious to not treat to a standing diastolic BP lower than 70 mmHg as this can cause syncope.**

- **Potential management targets:**
  - **Patients age 60–79 years: <140/90 mmHg.** While the JNC-8 recommends treating BP to a management goal of <150/<90 mmHg in patients over 60, the report also describes a lack of full consensus among panel members on this recommendation.[JAM]
  - **Patients 80 years and older: <150/90 mm Hg.** Begin treatment if systolic BP is ≥150 mmHg, with a management target of a systolic BP <150 mmHg as long as the treatment is well tolerated. Carefully monitor for orthostatic hypotension, side effects, and the development of isolated systolic hypertension. In very fit patients older than 80 years, consider management to a systolic BP target of <140 mmHg.
  - **Patients 65 and older (noninstitutionalized, ambulatory, community-living adults):** The 2017 ACC/AHA guidelines recommend initiating treatment at ≥130 mmHg, with a BP goal of <130 mmHg.
- **Medications:** In patients with isolated systolic hypertension, start with a thiazide or CCB, then add a CCB or thiazide (whichever not started first). If needed, add an ACE-I/ARB as a third step.

Pregnancy

Recent US data show an increasing rate of pregnancy-related stroke.[MAN] Women with chronic hypertension have an increased risk of superimposed preeclampsia and also have poorer perinatal outcomes. Careful BP monitoring and management is advised, including the following for:

- **Women with preexisting high BP who become pregnant.** Refer to the patient's OB/GYN, who can follow the risk-specific protocol for these patients. If the patient has been taking an ACE inhibitor or ARB, discontinue immediately and substitute an agent safe for use during pregnancy, such as labetalol or nifedipine (see medication notes below). Baseline labs including CBC, LFT, and urine protein are recommended. Consider referral to MFM.
- **Women who develop high BP in pregnancy.** Consider starting drug treatment if BP is >140/90 in women with gestational hypertension (with or without proteinuria) or who have high BP with signs of organ damage at any time during pregnancy. Evaluate for signs/symptoms of preeclampsia (headache, scotomata, epigastric pain). Perform serial BP measurements and obtain labs including CBC, LFT, and urine protein.
- **After delivery.** Ensure BP is under control before discharge, and have the patient monitor BP at home. Plan for a follow-up visit within a week after delivery. Patients should continue to monitor for symptoms of preeclampsia as this can develop postpartum.
- **Treating high BP in pregnancy with medications:**
  - **Avoid ACE inhibitors and ARBs,** which can cause fetal toxicity.[MER2] Women of child-bearing potential should use birth control if taking an ACE-I or ARB.
  - **Use caution** in prescribing beta blockers in early pregnancy (they may retard fetal growth). If plasma volume is already reduced, use caution with diuretics. **Do not use atenolol in pregnancy as it may cause harm to the fetus.**
  - **Consider** oral labetalol (generally used first-line), CCB (nifedipine preferred, as it has been tested in pregnancy), hydralazine, and/or methyldopa. **For emergency treatment, use IV labetalol, IV hydralazine, or oral nifedipine.**

KEY RECOMMENDATIONS

- Check BP at least annually for ages 3–11 and at every visit for ages 12–18. Most pediatric HBP is primary and is a result of obesity.
- Treat all stages with TLC.
- For stages 1 and 2: initiate workup, referral, and treatment as per the algorithm on page 17.

Pediatric patients[HANS]

High blood pressure in pediatric patients is increasing due to the obesity epidemic and affects rougly 3.5 percent of all pediatric patients (Elevated readings due to white coat prevalence is estimated to affect nearly 30 %). The cause may be secondary to another illness, such as kidney disease (most common), cardiovascular or endocrine disorders, coarctation, and malignancy, although primary causes are most often related to a family history of hypertension and / or excess weight.

Diagnostic Definitions

- **Pre-High Blood Pressure (HBP) — Within the 90th to 95th percentile.** Any BP ≥ 120 / 80 mmHg in any patient < 18 years is considered pre-HBP. Confirmed by three consecutive readings on three separate days.
- **Stage 1 HBP — 95th to 99th percentile + 5 mmHg.** Confirmed by three consecutive readings on three separate days.
- **Stage 2 High Blood Pressure — 99th percentile + 5 mmHg.** Confirmed with one reading or if symptomatic.

Measurement

For an initial check, the use of either automatic or manual readings is acceptable. Automatic cuffs may read higher in children under 6 years, although obtaining a reading with proper technique is more important than the type of cuff used. If the initial reading is elevated, wait at least 5 minutes and repeat manually. It may be helpful to eliminate misdiagnosis or "white coat" HBP by performing a second reading in 24 hours. For ages:

- **3 – 11 years:** Perform a BP check at least annually. Consider a check at each visit, depending on the child's personal and family health history.
- **12 – 18 years:** Perform a BP check at every visit.

In iCentra:

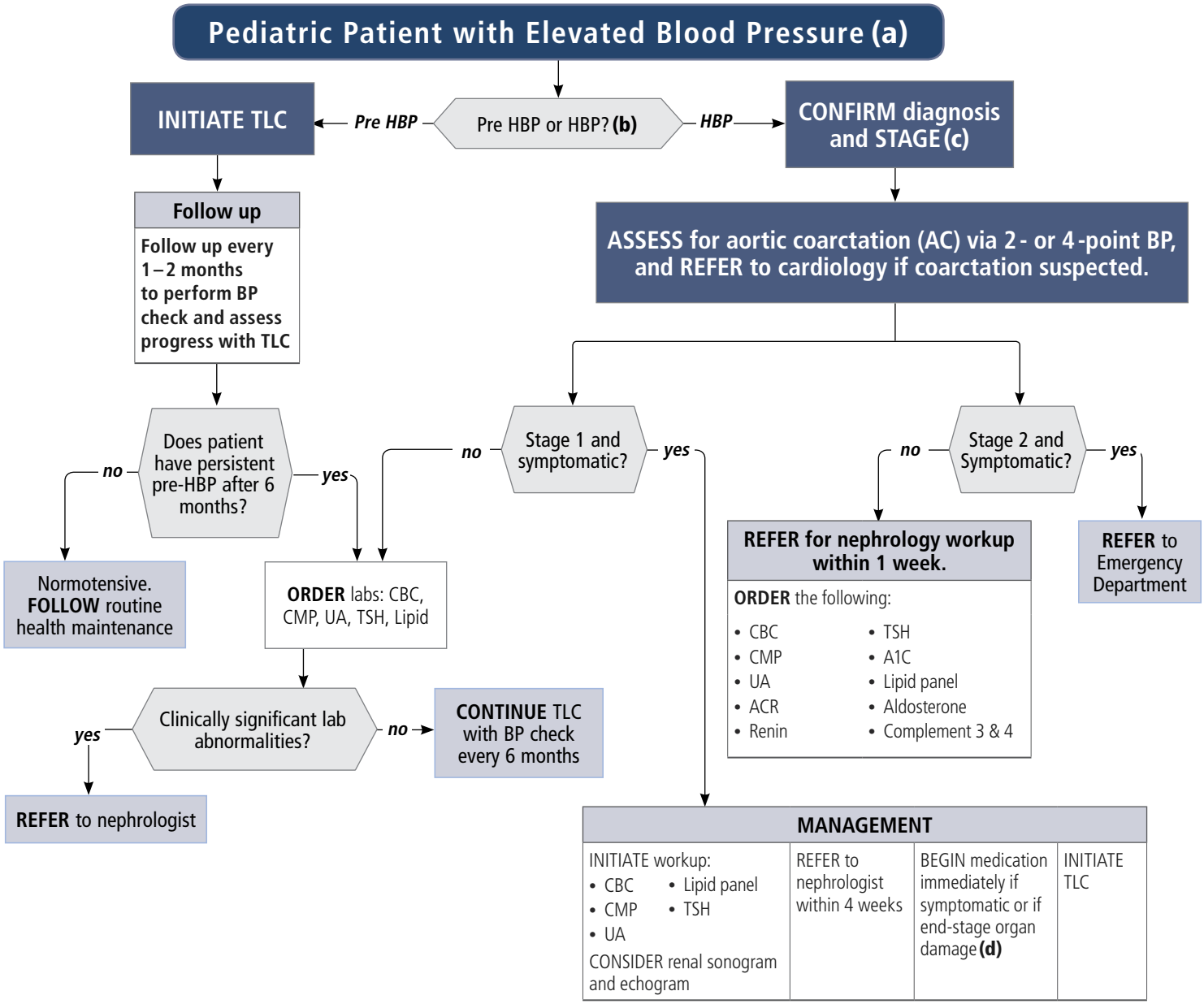
- Pre HBP and Stage 1 HBP results will be highlighted as yellow in the iCentra vital signs.
- Stage 2 HBP results will be highlighted as red in the iCentra vital signs.

Management

- **Pre HBP:** Initiate Therapeutic Lifestyle Changes (TLC) (exercise, diet, weight loss) and follow up every one to two months, checking BP at each visit. If BP remains elevated after six months of TLC, consider lab work (CMP, Lipids, CBC, UA, TSH) and / or referring to a nephrologist.
- **Stage 1 HBP:** Initiate TLC and lab work (CMP, CBC, UA, Lipids, TSH). Consider renal sonogram with Doppler and echo. Obtain 2 or 4 point BP to assess for coarctation. Refer to outpatient nephrology within 4 weeks. Initiate medication therapy only if symptomatic or evidence of organ damage is present.
- **Stage 2 HBP:** As most Stage 2 is secondary, it is recommended that the patient be referred to to nephrology within one week if asymptomatic. If the patient is symptomatic (headache, dyspnea, confusion, seizure, blurry vision, nausea and / or vomiting), refer to nephrology or the ER immediately. Initiate lab work at time of referral (CMP, CBC, UA, ACR, Renin, Aldosterone, Serum Complement 3 & 4, Lipids, and A1C).

For more information on secondary hypertension, refer to the National Kidney Foundation (Kidney.org).

ALGORITHM 3: BP MANAGEMENT IN PEDIATRIC PATIENTS[NAT]



ALGORITHM NOTES

(a) Measuring BP and height in pediatric patients

- **≥ 12 years:** Every visit.
- **3 to 11 years:** Annually.

(b) High BP in pediatric patients

- **Pre-high BP:** 90–95 % or > 120/80 mmHg
- **High BP:** > 95 % or + 5 mmHg

(c) Confirm diagnosis and stage

- **Stage 1 HBP:** 95–99 % + 5 mmHg. Diagnosis is confirmed if BP is elevated in 3 consecutive readings on 3 separate days
- **Stage 2 HBP:** > 99% + 5 mmHg (usually secondary HBP). One reading is adequate to establish a diagnosis.

(d) Symptoms of stage 1 HBP

- Headache
- Dyspnea
- Confusion
- Seizure
- Blurry vision
- Nausea
- Vomiting
- Epistasis
- Flushing
- Cough
- Palpitation
- Slurred speech

KEY RECOMMENDATIONS

"Rapid cycling" helps you efficiently arrive at the best therapy for each patient. Check BP and adjust every 2 weeks until BP is controlled.

LOW BP

What about low BP while on treatment, especially if symptomatic?

- It is not clear if very low systolic or diastolic BP is harmful. Base a decision to reduce or stop medications on low BP symptoms, not on a specific threshold.
- If SBP is above target but DBP is low, consider increasing medications to achieve SBP goal as long as low BP symptoms are absent.

MEDICATIONS TO CONTROL BP

Table 4 below (and on the next two pages) provides medication dosing for most patients. (Those in **bold** type are first-line recommendations). For effective medication management, use the following guidelines:

- **Check for side effects,** and assess **medication compliance** at every visit. **Monitor for orthostasis,** especially with elderly or compromised patients.
- **Encourage patients to keep an updated list** of all their prescribed and OTC medications including dose and frequency; they should bring the list to every visit.
- **Use generic, single-pill combination products and once-daily medications where possible** to simplify the regimen and potentially decrease copays and/or costs.
- **When the patient is on three medications or more, consider divided dosing (AM/PM).** Increasing evidence links sleep-time blood pressure and incidence of CV disease.[HER]

TABLE 4: Medications used to control high blood pressure (part 1 of 3)

Medication type	Medication name generic (brand)	Start dose (mg/daily)	Daily range (mg)	Tier, cost*	Notes
ACE inhibitors (ACE-Is)	**lisinopril** (Prinivil, Zestril)	10	10–80	Tier 1, $	• **ACE-I/ARB contraindications:** – **Pregnancy** (contraception recommended during therapy for women of reproductive age as can cause fetal toxicity)[MER2] – Bilateral renal artery stenosis • **ACE-I/ARB side effects:** – **Cough (dry, hacking):** Occurs in 5%–20% of patients treated with an ACE-I; cough is much less common with ARBs. Cough usually resolves a few days after stopping therapy, but resolution can take up to 4 weeks. – **Decrease in eGFR:** A rise in serum creatinine usually begins a few days after starting ACE-I/ARB or increasing the dose. Check sCr and/or eGFR within 2–3 weeks of starting or dose change, particularly in patients with chronic kidney disease. – **Hypotension:** Avoid starting ACE-I or ARB if patient is volume depleted; start at low dose to minimize first-dose hypotension. ARBs have higher rates of hypotensive symptoms. – **Hyperkalemia:** For patients with kidney disease, reduce dietary potassium and monitor potassium carefully. Discontinue ACE-I/ARB if potassium is >5.5 mmol/L. – **Angioedema:** This rare complication (0.1% to 0.7% of ACE-I-treated patients) is potentially fatal. If swelling of mouth, tongue, pharynx, and eyelids occurs, discontinue ACE-I or ARB; symptoms usually resolve in 24–48 hours. Protect the airway; tongue swelling can cause asphyxiation. • **Other notes:** Do not combine an ACE-I and ARB. Begin with an ACE-I and transition to an ARB if the ACE-I is not tolerated.
	benazepril (Lotensin)	10	10–80	Tier 1, $	
	captopril (Capoten)	25, two to three times	75–450	Tier 1, $	
	enalapril (Vasotec)	5	2.5–40	Tier 1, $	
	fosinopril (Monopril)	10	10–80	Tier 1, $	
	moexipril (Univasc)	7.5	7.5–60	Tier 1, $	
	perindopril (Aceon)	4	4–16	Tier 1, $	
	quinapril (Accupril)	10	10–80	Tier 1, $	
	ramipril (Altace)	2.5	2.5–20	Tier 1, $	
	trandolapril (Mavik)	1	1–8	Tier 1, $	
Angiotensin receptor blockers (ARBs)	**losartan** (Cozaar)	50	50–100	Tier 1, $	
	azilsartan (Edarbi)	80	80	Tier 3, $$$$	
	candesartan (Atacand)	16	8–32	Tier 1, $$	
	eprosartan (Teveten)	600	400–800	Tier 1, $$$	
	irbesartan (Avapro)	150	150–300	Tier 1, $$	
	olmesartan (Benicar)	20	20–40	Tier 1, $$$$	
	telmisartan (Micardis)	40	20–80	Tier 1, $$$$	
	valsartan (Diovan)	80	80–320	Tier 1, $$$	

* **SelectHealth Tier and Cost:**

Tier 1 = $ 10 copay; Tier 2 = $ 30 copay to 25% coinsurance; Tier 3 = $ 70 copay to 50% coinsurance (based on SelectMed 2017 benefit design; designs may differ). For the most recent SelectHealth formulary information, visit selecthealth.org/pharmacy or call **800-538-5038**.

Cost is based on 30-day average wholesale price (AWP) (not copay) for regular dose and on generic unless otherwise noted. Key to cost symbols: $ = $1 to $50; $$ = $51 to $100; $$$ = $101 to $150; $$$$ = $151 to $300.

TABLE 4: Medications used to control high blood pressure (part 2 of 3)

Medication type		Medication name generic (brand)	Starting dose (mg/daily)	Daily range (mg)	Tier, cost*	Notes
Calcium Channel Blockers (CCBs)	DHP	**amlodipine** (Norvasc)	5	2.5–10	Tier 1, $	• **General:** Common side effects related to vasodilation: Headache, flushing, ankle edema. • **Non-DHP meds:** Can lead to bradycardia if combined with beta blockers, especially when used with digoxin. • **Amlodipine and verapamil:** Can increase statin concentrations and risk of myopathy. Do not use amlodipine with more than 20 mg daily simvastatin. Do not use verapamil with more than 10 mg daily simvastatin. • **Amlodipine:** Monitor for peripheral edema; consider a reduced starting dose of 2.5 mg daily in elderly patients. • **Verapamil:** Can cause constipation.
		felodipine ER (Plendil)	2.5	2.5–20	Tier 1, $	
		isradipine (Dynacirc CR)	5	0.5–20	Tier 1, $	
		nifedipine ER (Adalat CC, Procardia XL)	30	30–120	Tier 1, $$	
	Non-DHP	diltiazem (Cardizem, Cartia, Dilacor, etc.)	Sustained-release: 120, twice Extended-release: 120, once	120–540	Tier 1, $ (SR) Tier 1, $$ (ER)	
		verapamil (Calan, Isoptin)	IR: 80, three times ER/SR: 180	240–480 180–480	Tier 1, $	
Thiazide diuretics		**hydrochlorothiazide (HCTZ)** (Hydrodiuril)	12.5	12.5–50	Tier 1, $	• **Side effects:** Hypokalemia is the most common side effect; thiazide diuretics can also cause fluid and electrolyte abnormalities.
		chlorthalidone (Thalitone)	12.5	12.5–100	Tier 1, $	
		metolazone (Zaroxolyn)	2.5	2.5–20	Tier 1, $$	
ACE-I/ARB + HCTZ combo pills		**lisinopril/HCTZ**	20/12.5	20/12.5–40/25	Tier 1, $	• **General:** While other ACE-I/ARB + diuretic combination options are on the market, these are recommended in algorithm 1. • **Side effects:** See notes on individual medications.
		losartan/HCTZ	50/12.5	50/12.5 to 100/25	Tier 1, $	
Beta blockers		**carvedilol** (Coreg)	6.25, twice	6.25–50	Tier 1, $$	• **General:** – Side effects include fatigue, diminished exercise ability, weight gain, and worsening of insulin sensitivity. – Monitor heart rate to assure it remains >55 BPM. Can lead to bradycardia if combined with calcium non-DHP channel blockers, especially when used with digoxin. • **Carvedilol:** Enhances insulin sensitivity. • **Heart failure with reduced ejection fraction** (HFrEF)**:** Choose **ONLY** these medications: – **Carvedilol**: 25 mg twice daily if patient <85 kg; 50 mg twice daily if ≥85 kg – **Metoprolol ER:** 200 mg, once daily
		atenolol (Tenormin)	50	50–100	Tier 1, $	
		bisoprolol (Zebeta)	2.5	2.5–20	Tier 1, $	
		labetalol (Trandate)	100, twice	200–800	Tier 1, $	
		metoprolol (Lopressor)	100	100–450	Tier 1, $	
		metoprolol succinate ER (Toprol XL)	25	100–400	Tier 1, $	
		nadolol (Corgard)	40	40–320	Tier 1, $$	
		nebivolol (Bystolic)	5	5–40	Tier 2, $$$	
		propranolol (Inderal)	40 twice	80–640	Tier 1, $	
Aldosterone receptor antagonist (ARA)		eplerenone (Inspra)	50, in single dose	50–100	Tier 1, $$$	• **Monitoring:** Monitor potassium and serum creatinine in patients with kidney disease. • **Side effects:** Spironolactone may induce gynecomastia in up to 10% of patients or cause occasional menstrual irregularities or impotence. Eplerenone may have lower gynecomastia effects.
		spironolactone (Aldactone)	50 to 100, in single or divided doses	50–400	Tier 1, $	

* **SelectHealth Tier and Cost:**

Tier 1 = $10 copay; Tier 2 = $30 copay to 25% coinsurance; Tier 3 = $70 copay to 50% coinsurance (based on SelectMed 2017 benefit design; designs may differ). For the most recent SelectHealth formulary information, visit selecthealth.org/pharmacy or call **800-538-5038**.

Cost is based on 30-day average wholesale price (AWP) (not copay) for regular dose and on generic unless otherwise noted. Key to cost symbols: $ = $1 to $50; $$ = $51 to $100; $$$ = $101 to $150; $$$$ = $151 to $300.

TABLE 4: Medications used to control high blood pressure (part 3 of 3)

Medication type	Medication name generic (brand)	Start dose (mg / daily)	Daily range (mg)	Tier, cost*	Notes
Vasodilators	hydralazine (Apresoline)	10 mg, four times	40–300, in divided doses	Tier 1, $	• **Hydralazine:** Side effects include chest pain and tachycardia. • **Minoxidil:** Side effects include fluid retention and hirsutism.
	minoxidil (Loniten)	5	10–100	Tier 1, $	
Central-acting agents	clonidine (Catapres)	Oral: 0.1, twice Patch: 0.1 mg	Oral: 0.2 –2.4, in divided doses Patch: 0.1–0.6	Tier 1, $	• **Clonidine:** Side effects include hypotension, dry mouth, dizziness, sedation, fatigue; abrupt discontinuation may result in withdrawal symptoms (agitation, tremor, headache, rapid rise in blood pressure). • **Guanfacine:** Side effects include constipation, dry mouth, dizziness, somnolence; abrupt withdrawal may result in rebound hypertension. • **Methyldopa:** Consider for hypertension in pregnancy. Monitor LFTs. Side effects include dizziness and impotence.
	guanfacine (Tenex)	1, at bedtime	1–3	Tier 1, $	
	methyldopa (Aldomet)	500, in divided doses	500–3000, in divided doses	Tier 1, $	
Loop diuretics	bumetanide (Bumex)	0.5	0.5–2	Tier 1, $	• **General:** May cause fluid and other electrolyte abnormalities. • **Furosemide:** May titrate by increasing 20–40 mg at 6-hour to 8-hour intervals. • **Torsemide:** May titrate by doubling the dose.
	furosemide (Lasix)	20	20–80	Tier 1, $	
	torsemide (Demadex)	20	20–200	Tier 1, $	
Alpha blockers	doxazosin (Cardura)	1	1–16	Tier 1, $	• **Side effects:** Leg edema and orthostasis are commonly reported. • **Notes:** Consider giving prazosin and terazosin at bedtime on initiation.
	prazosin (Minipress)	1	1–20	Tier 1, $	
	terazosin (Hytrin)	1	1–20	Tier 1, $	
Direct renin inhibitor	**Aliskiren is NOT recommended,** particularly in combination with an ACE-I or an ARB.				

* **SelectHealth Tier and Cost:**

Tier 1 = $ 10 copay; Tier 2 = $ 30 copay to 25 % coinsurance; Tier 3 = $ 70 copay to 50 % coinsurance (based on SelectMed 2017 benefit design; designs may differ). For the most recent SelectHealth formulary information, visit selecthealth.org/pharmacy or call **800-538-5038**.

Cost is based on 30-day average wholesale price (AWP) (not copay) for regular dose and on generic unless otherwise noted. Key to cost symbols: $ = $1 to $50; $$ = $51 to $100; $$$ = $101 to $150; $$$$ = $151 to $300.

PATIENT CRITERIA

A patient is included on the Hypertension Registry if he/she:

- Has high BP listed as a problem in the EMR problem list
- Has ever been coded for hypertension in an outpatient setting
- Is age 18 to 85
- Was not pregnant during the previous 12 months
- Does not have end-stage renal disease

REPORT QUESTIONS

Reports are updated daily and are available to Intermountain-employed physicians through the report portal. For questions about your report, please contact the Primary Care Clinical Program Data Manager (contact information can be found at the Primary Care Clinical Program home page on intermountainphysician.org).

MEASUREMENT AND REPORTING

High blood pressure quality measure

The main quality measure for most publicly related groups, such as HEDIS and STARS, is the **percentage of patients aged 18 to 85 years who have a diagnosis of HBP and whose BP was adequately controlled** per the following metrics:

- For patients aged 18 to 59 years, BP of < 140 / < 90 mmHg.
- For patients aged 60 to 85 years, BP of < 150 / < 90 mmHg.
- For patients 18 and older with diabetes BP of <140 / < 90 mmHg.

The HBP Population View report and HBP Patient Management report will be modified in 2018 to include a filter to support management of patients according to the new ACC / AHA Guidelines.

Registry

A database of patients diagnosed with high blood pressure is maintained by the Primary Care Clinical Program (see sidebar for inclusion criteria) to support analysis and reporting. It contains clinical data including BP, medications prescribed, comorbidities, etc. Data are obtained from insurance claims, billing records, and electronic medical records.

Reports

Using the database, two main reports are produced to guide and inform clinical staff and leadership:

- **High BP Patient Management report.** This report is designed to support clinical staff in following the recommendations outlined in this CPM. It groups patients into categories, including those with uncontrolled BP who are due for follow up contact and those with controlled BP who are due for routine follow up. Additionally, users can view lists of patients with elevated BP readings but no diagnosis of high BP as well as patients with suspected high BP.
- **High BP Population View report.** This report focuses on the percent of patients diagnosed with high BP whose BP is in control. The report allows comparison of the BP management within the Intermountain Healthcare system as well as with other groups nationally, leading to more coordinated and accountable team-based care. The report can be sorted by region, clinic, and provider.

  This report also allows users to view other quality metrics related to management of High BP, including:

  - Percent of patients with uncontrolled high BP who have been contacted in the last three weeks (rapid cycling).
  - Patients who have been contacted in the last 15 months.
  - Patients with high BP who have an anti-hypertensive prescription.
  - Patients who have received lifestyle / wellness counseling.

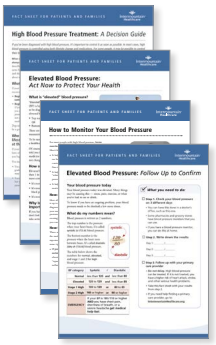
Both reports are updated daily.

RESOURCES AND REFERENCES

Patient resources

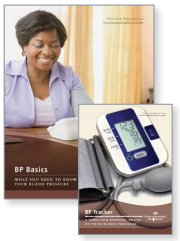
Clinicians can order Intermountain patient education booklets and fact sheets for distribution to their patients.

- Log in to IntermountainPhysician.org/PEN, and search for the item number or title in the appropriate area.
- **In iCentra**, search for Intermountain items in the patient education module.
- Use iPrintStore.org, Intermountain's online library and print center.



Intermountain fact sheets:

- *High Blood Pressure Treatment: A Decision Guide*
- *Elevated Blood Pressure*
- *How to Monitor Your Blood Pressure*
- *High Blood Pressue: Follow up to confirm*



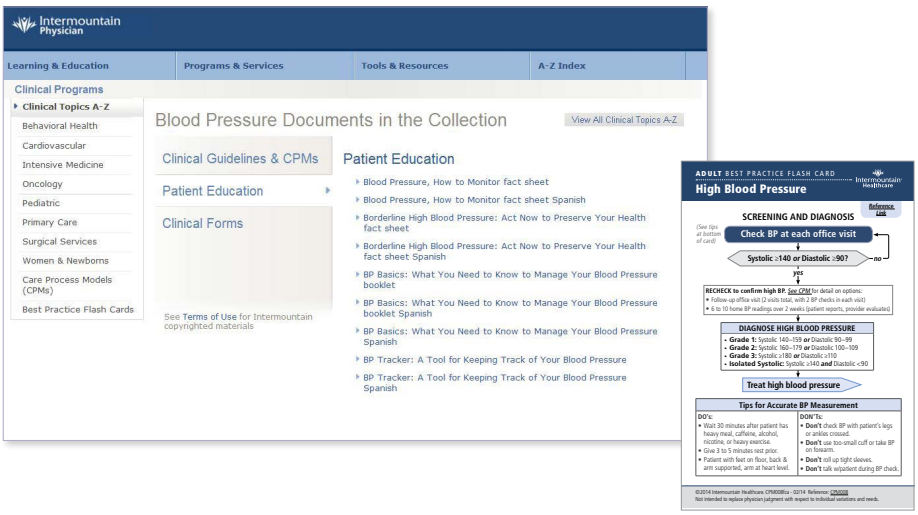
Patient Information:

An array of booklets, trackers, and fact sheets to help, including:

- *BP Basics*
- *BP Tracker*

Provider resources

To find this CPM and its flash card, clinicians can go to intermountainphysician.org/clinicalprograms, and select "Blood Pressure" from the topic list on the right side of the screen.



Related care process models can also be found at intermountainphysician.org/clinicalprograms and include:

- *Management of Chronic Kidney Disease CPM*
- *Outpatient Management of Adult Diabetes Mellitus CPM*
- *Diabetes Prevention Program 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 Mark R. Greenwood, MD, Medical Director of Intermountain's Primary Care Clinical Program (markr.greenwood@imail.org).

References

ADA American Diabetes Association. Standards of medical care in diabetes-2018. *Diabetes Care.* 2018 Jan;41(Suppl 1):S152-S153.

AHA Go AS, Bauman M, King SM, et al. An effective approach to high blood pressure control: A science advisory from the American Heart Association, the American College of Cardiology, and the Centers for Disease Control and Prevention. *Hypertension.* 2014;63(4):878-885.

AMA American Medical Group Foundation. Measure Up Pressure Down Web site. http://www.measureuppressuredown.com/. Accessed March 9 , 2016.

CDC1 Centers for Disease Control and Prevention, US Department of Health and Human Services. The Million Hearts Campaign. Available at millionhearts.hhs.gov. Accessed January 2, 2018.

CDC2 Centers for Disease Control and Prevention, National Center for Health Statistics. *High Blood Pressure Fact Sheet.* 2016. Available at: cdc.gov/dhdsp/data_statistics/fact_sheets/fs_bloodpressure.htm. Accessed January 2, 2018.

COCH Glynn LG, Murphy AW, Smith SM, Schroeder K, Fahey T. Interventions used to improve control of blood pressure in patients with hypertension. *Cochrane Database Syst Rev.* 2010;(3):CD005182.

HAN Handler J, Zhao Y, Egan BM. Impact of the number of blood pressure measurements on blood pressure classification in U.S. adults: NHANES 1999 – 2008. *J Clin Hypertens* (Greenwich) 2012;14(11):751-759.

HANS Hansen ML, Gunn PW, Kaelber DC. Underdiagnosis of hypertension in children and adolescents. *JAMA.* 2007;298(8):874-879.

HER Hermida RC, Ayala DE, Mojón A, Fernández JR. Influence of time of day of blood pressure-lowering treatment on cardiovascular risk in hypertensive patients with type 2 diabetes. *Diabetes Care.* 2011 Jun;34(6):1270-1276

JAM James PA, Oparil S, Carter BL, et al. 2014 Evidence-based guideline for the management of high blood pressure in adults: Report from the panel members appointed to the Eighth Joint National Committee (JNC 8). *JAMA.* 2014;311(5):507-520.

JAY Jay M, Gillespie C, Schlair S, Sherman S, Kalet A. Physicians' use of the 5As in counseling obese patients: Is the quality of counseling associated with patients' motivation and intention to lose weight? *BMC Health Serv Res.* 2010;10:159.

MAN Mancia G, Fagard R, Narkiewicz K, et al; Task Force Members. 2013 ESH/ESC guidelines for the management of arterial hypertension: The Task Force for the Management of Arterial Hypertension of the European Society of Hypertension (ESH) and of the European Society of Cardiology (ESC). *J Hypertens.* 2013;31(7):1281-1357.

MER1 Merai R, Siegel C, Rakotz M, et al. CDC grand rounds: A public health approach to detect and control hypertension. *MMWR Morb Mortal Wkly Rep.* 2016;65(45):1261-1264.

MER2 Prinivil® [package insert]. Whitehouse Station, NU: Merck Sharp & Dohme Corporation; 2013.

NAT National High Blood Pressure Education Program Working Group on High Blood Pressure in Children and Adolescents. The fourth report on the diagnosis, evaluation, and treatment of high blood pressure in children and adolescents. *Pediatrics.* 2004 Aug;114(2 Suppl 4th Report):555-576

ORR Orrow G, Kinmonth AL, Sanderson S, Sutton S. Effectiveness of physical activity promotion based in primary care: Systematic review and meta-analysis of randomised controlled trials. *BMJ.* 2012 Mar. 26;344:e1389.

REB Reboussin DM, Allen NB, Griswold ME, et al. Systematic Review for the 2017 ACC / AHA / AAPA / ABC / ACPM / AGS / APhA / ASH / ASPC / NMA / PCNA guideline for the prevention, detection, evaluation, and management of high blood pressure in adults: A report of the American College of Cardiology/American Heart Association Task Force on Clinical Practice Guidelines. *J Am Coll Cardiol.* 2017 Nov 7. pii: S0735-1097(17)41517-41518.

WEB Weber MA, Schiffrin EL, White WB, et al. Clinical practice guidelines for the management of hypertension in the community: A statement by the American Society of Hypertension and the International Society of Hypertension. *J Hypertens.* 2014;32(1):3-15.

YUS Yusuf S1, Hawken S, Ounpuu S, et al. Effect of potentially modifiable risk factors associated with myocardial infarction in 52 countries (the INTERHEART study): Case-control study. *Lancet.* 2004;364(9438):937-952.

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