

# Hypertension

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# Introduction

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- Board certified cardiologist.

# Disclosures

No financial disclosures

# Outline

- Hypertension-overview
- 2017 ACC/AHA guidelines

# Objectives

- Describe the importance of understanding clinical practice guidelines and application to individual patient treatment.
- Outline a plan for assessing patients for hypertension.
- Identify one change you can make in your clinical or public health practice.

# CDC STATS

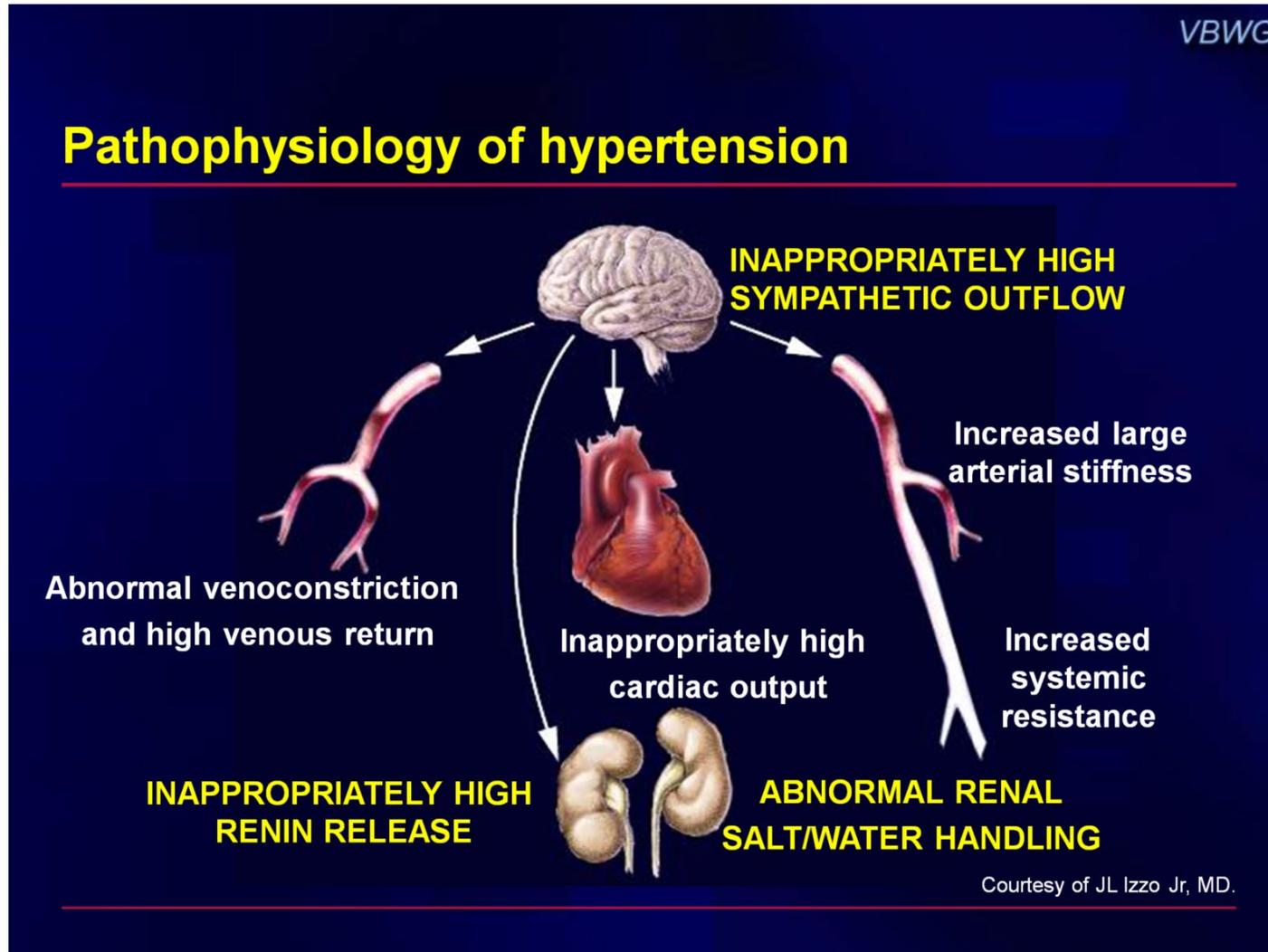
- Having hypertension puts you at risk for [heart disease](#) and [stroke](#), which are leading causes of death in the United States.<sup>2</sup>
- In 2018, nearly half a million deaths in the United States included hypertension as a primary or contributing cause.<sup>2</sup>
- Nearly half of adults in the United States (108 million, or 45%) have hypertension defined as a systolic blood pressure  $\geq 130$  mm Hg or a diastolic blood pressure  $\geq 80$  mm Hg or are taking medication for hypertension.<sup>3</sup>
- Only about 1 in 4 adults (24%) with hypertension have their condition under control.<sup>3</sup>
- About half of adults (45%) with uncontrolled hypertension have a blood pressure of 140/90 mm Hg or higher. This includes 37 million U.S. adults.<sup>3</sup>
- About 30 million adults who are recommended to take medication may need it to be prescribed and to start taking it. Almost two out of three of this group (19 million) have a blood pressure of 140/90 mm Hg or higher.<sup>3</sup>
- High blood pressure was a primary or contributing cause of death for more than 494,873 people in the United States in 2018.<sup>2</sup>
- High blood pressure costs the United States about \$131 billion each year, averaged over 12 years from 2003 to 2014.<sup>4</sup>

# What is hypertension?

## High blood pressure

- The force exerted against the blood vessels as blood is being pumped from the heart to the body.  $\text{Cardiac output} \times \text{total vascular resistance}$ .
- Factors affecting blood pressure include the amount of blood being pumped, the strength of the heart pushing the blood out, the resistance of the vessels carrying the blood, and the width (flow) of the vessels.

# Pathophysiology of Hypertension



# Pathogenesis of HTN

## **Increased cardiac output**

- Stress
  - Sympathetic activation
- Hypervolemia
  - Renal artery stenosis
  - Renal disease
  - Hyperaldosteronism
  - Hypersecretion of ADH

## **Increased systemic vascular resistance**

- Atherosclerosis
- Renal artery disease
- Thyroid dysfunction
- Diabetes
  - Endothelial damage
- Stress
  - Sympathetic activation

# Guidelines—Which One is Right?

The image displays several overlapping PDF windows from Adobe Acrobat Pro, illustrating different clinical guidelines for hypertension and cardiovascular disease management. The windows are:

- Top Left:** "2014 ACC AHA Science Advisory Effective Approach to High Blood Pressure.pdf". The page shows a "CLINICAL ALERT" and the title "An Effective Approach to High Blood Pressure Control". It is a science advisory from the American Heart Association and the American College of Cardiology.
- Top Right:** "Canadian HTN guidelines.pdf". The page shows a logo for the Canadian Society of Hypertension.
- Middle Left:** "ADA SOC 9 Cardiovascular Risk.pdf". The page shows the title "9. Cardiovascular Disease and Risk Management: Standards of Medical Care in Diabetes—2018" from *Diabetes Care*.
- Middle Center:** "HTN CPG 2017.pdf". The page shows the title "2017 ACC/AHA/AACVPP Guideline for the Management of High Blood Pressure in Adults".
- Middle Right:** "JNC 8 Guidelines for the Management of High Blood Pressure.pdf". The page shows the title "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)".

The Windows taskbar at the bottom shows the system time as 1:34 PM on 1/8/2018.

# Guidelines—Which One is Right? (con't)



# Target for Systolic and Diastolic Blood Pressures Followed by Evidence Grade

Guideline	SBP target	DBP target	Rationale
JNC 8 (2014)	<140mmHg (grade E)	<90mmHg (grade E)	SBP target raised b/c “no RCTs have addressed whether treatment to SBP goal <140 compared with a higher goal improved health outcomes in adults with diabetes. DBP target raised b/c “there are no good or fair quality RCTs with mortality as a primary or secondary outcomes that compared a DBP goal of lower than 90 with a lower goal”.
ADA (2013-2017)	<140mmHg (grade A) <130mmHg (grade C)	<90mmHg (grade A) <80mmHg (grade C)	SBP target raised b/c “the evidence that SBP >140 is harmful is irrefutable but for some patients lower SBP targets closer to 130 are appropriate. DBP target raised b/c “strong evidence from RCT’s supports DBP of <90. Further “a DBP <80 may still be appropriate for pts with long life expectancy, CKD, CVD or additional risk factors.
Hypertension Canada (2017) and Diabetes Canada (2013)	<130mmHg (grade C)	<80mmHg (grade A) (grade B)	SBP target maintained: moving target to <140 may result in an increase in strokes based on the results from ACCORD-BP and meta-analysis of RCT’s DBP target maintained based on the HOT trial and the normotensive ABCD trial.
European Society of Hypertension (2013)	<140mmHg (level A)	<85mmHg (level A)	SBP target raised “there is no clear evidence of benefits in general from initiating tx at SBP levels <140 nor is there evidence of benefits from aiming at targets <130”. Supportive evidence against lowering SBP <130 comes from the ACCORD. DBP target raised b/c a “diastolic BP target between 80-85 is supported by the results of the HOT and UKPDS studies”.

# Randomized Controlled Trials of Intensive Versus Standard Hypertension Treatment Strategies

**Table 9.1—Randomized controlled trials of intensive versus standard hypertension treatment strategies**

Clinical trial	Population	Intensive	Standard	Outcomes
ACCORD BP (16)	4,733 participants with T2D aged 40–79 years with prior evidence of CVD or multiple cardiovascular risk factors	Systolic blood pressure target: <120 mmHg Achieved (mean) systolic/diastolic: 119.3/64.4 mmHg	Systolic blood pressure target: 130–140 mmHg Achieved (mean) systolic/diastolic: 133.5/70.5 mmHg	<ul style="list-style-type: none"> <li>• No benefit in primary end point: composite of nonfatal MI, nonfatal stroke, and CVD death</li> <li>• Stroke risk reduced 41% with intensive control, not sustained through follow-up beyond the period of active treatment</li> <li>• Adverse events more common in intensive group, particularly elevated serum creatinine and electrolyte abnormalities</li> </ul>
ADVANCE BP (17)	11,140 participants with T2D aged 55 years and older with prior evidence of CVD or multiple cardiovascular risk factors	Intervention: a single-pill, fixed-dose combination of perindopril and indapamide Achieved (mean) systolic/diastolic: 136/73 mmHg	Control: placebo Achieved (mean) systolic/diastolic: 141.6/75.2 mmHg	<ul style="list-style-type: none"> <li>• Intervention reduced risk of primary composite end point of major macrovascular and microvascular events (9%), death from any cause (14%), and death from CVD (18%)</li> <li>• 6-year observational follow-up found reduction in risk of death in intervention group attenuated but still significant (142)</li> </ul>
HOT (143)	18,790 participants, including 1,501 with diabetes	Diastolic blood pressure target: ≤80 mmHg	Diastolic blood pressure target: ≤90 mmHg	<ul style="list-style-type: none"> <li>• In the overall trial, there was no cardiovascular benefit with more intensive targets</li> <li>• In the subpopulation with diabetes, an intensive diastolic target was associated with a significantly reduced risk (51%) of CVD events</li> </ul>
SPRINT (144)	9,361 participants without diabetes	Systolic blood pressure target: <120 mmHg Achieved (mean): 121.4 mmHg	Systolic blood pressure target: <140 mmHg Achieved (mean): 136.2 mmHg	<ul style="list-style-type: none"> <li>• Intensive systolic blood pressure target lowered risk of the primary composite outcome 25% (MI, ACS, stroke, heart failure, and death due to CVD)</li> <li>• Intensive target reduced risk of death 27%</li> <li>• Intensive therapy increased risks of electrolyte abnormalities and AKI</li> </ul>

CVD, cardiovascular disease; T2D, type 2 diabetes. Data from this table can also be found in the ADA position statement “Diabetes and Hypertension” (5).

# Guidelines that Made Headlines in the National News

USA TODAY

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### New health guidelines say you might have high blood pressure

Kim Palmer, Special for USA TODAY Published 4:19 p.m. ET Nov. 13, 2017 | Updated 7:58 a.m. ET Nov. 14, 2017

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About half of U.S. adults are now considered to have high blood pressure under new guidelines

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By GENA KOLATA 2017, 13, 2017

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### Half of US adults have high blood pressure in new guidelines

By ANAHEIM, Calif. | Associated Press

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# ACC 2017 Summary Table

Class	SBP	DBP	10yr ASCVD Risk <10%	10yr ASCVD Risk ≥10%	ASCVD secondary prevention
<b>Normal</b>	<120 mmHg	<b>and</b> <80 mmHg	Reassess 1 year	Lifestyle modification	Lifestyle modification
<b>Elevated</b>	120-129 mmHg	<b>and</b> <80 mmHg	Non-pharmacological intervention  Reassess 3-6 months	Non-pharmacological intervention  Reassess 3-6 months	Non-pharmacological intervention  Reassess 3-6 months
<b>Stage 1</b>	130-139 mmHg	<b>or</b> 80-89 mmHg	Non-pharmacological intervention  Reassess 3-6 months	Medical therapy and Non-pharmacological intervention  Reassess 1 month	Medical therapy and Non- pharmacological intervention  Reassess 1 month
<b>Stage 2</b>	≥140 mmHg	<b>or</b> ≥90 mmHg	Medical therapy and Non- pharmacological intervention  Reassess 1 month	Medical therapy and Non-pharmacological intervention  Reassess 1 month	Medical therapy and Non- pharmacological intervention  Reassess 1 month

# Guideline Recommendations

- Review 2018 ADA Standards of Care and 2017 ACC/AHA Hypertension guidelines.
  - Definition
  - Measurement
  - Lifestyle modification
  - Pharmacological treatment

# Definition of High BP

COR	LOE	Recommendation for Definition of High BP
I	B-NR	BP should be categorized as normal, elevated, or stage 1 or 2 hypertension to prevent and treat high BP.

# Categories of BP in Adults

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

\*Individuals with SBP and DBP in 2 categories should be designated to the higher BP category.

# Corresponding Values of Systolic BP/Diastolic BP for Clinic, Home, (HBPM), Daytime, Nighttime, and 24-Hour Ambulatory (ABPM) Measurements

<b>Clinic</b>	<b>HBPM</b>	<b>Daytime ABPM</b>	<b>Nighttime ABPM</b>	<b>24-Hour ABPM</b>
120/80	120/80	120/80	100/65	115/75
130/80	130/80	130/80	110/65	125/75
140/90	135/85	135/80	120/70	130/80
160/100	145/90	145/90	140/85	145/90

# Accurate Measurement of BP in the Office

COR	LOE	Recommendation for Accurate Measurement of BP in the Office
I	C-EO	For diagnosis and management of high BP, proper methods are recommended for accurate measurement and documentation of BP.

# Checklist for Accurate Measurement of BP

## Key Steps for Proper BP Measurements

Step 1: Properly prepare the patient.

Step 2: Use proper technique for BP measurements.

Step 3: Take the proper measurements needed for diagnosis and treatment of elevated BP/hypertension.

Step 4: Properly document accurate BP readings.

Step 5: Average the readings.

Step 6: Provide BP readings to patient.

# Selection Criteria for BP Cuff Size for Measurement of BP in Adults

Arm Circumference	Usual Cuff Size
22–26 cm	Small adult
27–34 cm	Adult
35–44 cm	Large adult
45–52 cm	Adult thigh

# Out-of-Office and Self-Monitoring of BP

COR	LOE	Recommendation for Out-of-Office and Self-Monitoring of BP
I	A <sup>SR</sup>	Out-of-office BP measurements are recommended to confirm the diagnosis of hypertension and for titration of BP-lowering medication, in conjunction with telehealth counseling or clinical interventions.

SR indicates systematic review

# Detection of White Coat Hypertension or Masked Hypertension in Patients Not on Drug Therapy

## Detection of White Coat Hypertension or Masked Hypertension in Patients Not on Drug Therapy

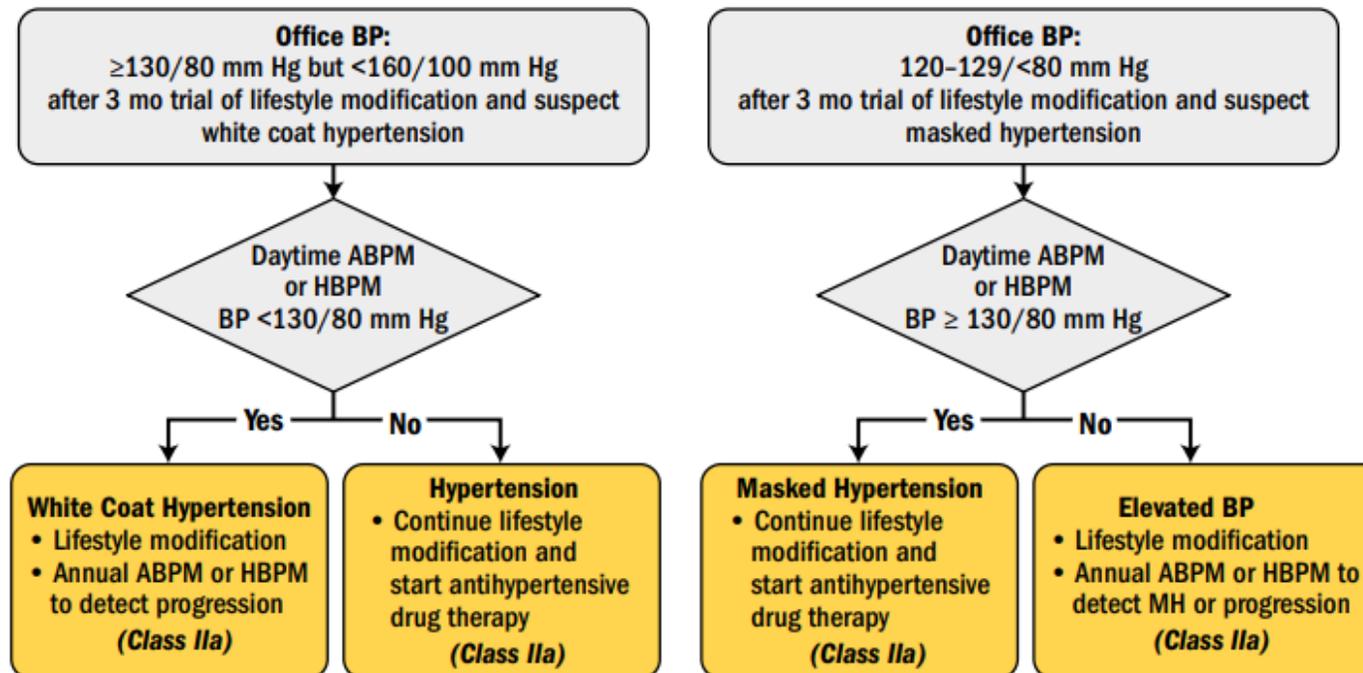


Figure 1

# Detection of White Coat Hypertension or Masked Hypertension in Patients on Drug Therapy

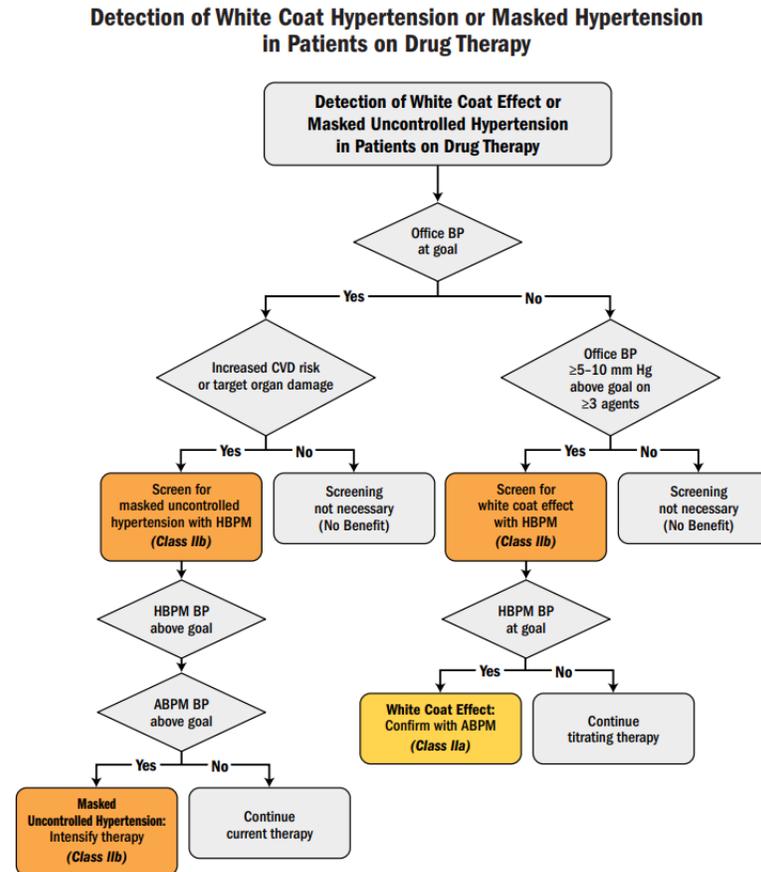


Figure 2

# Screening for Secondary Hypertension

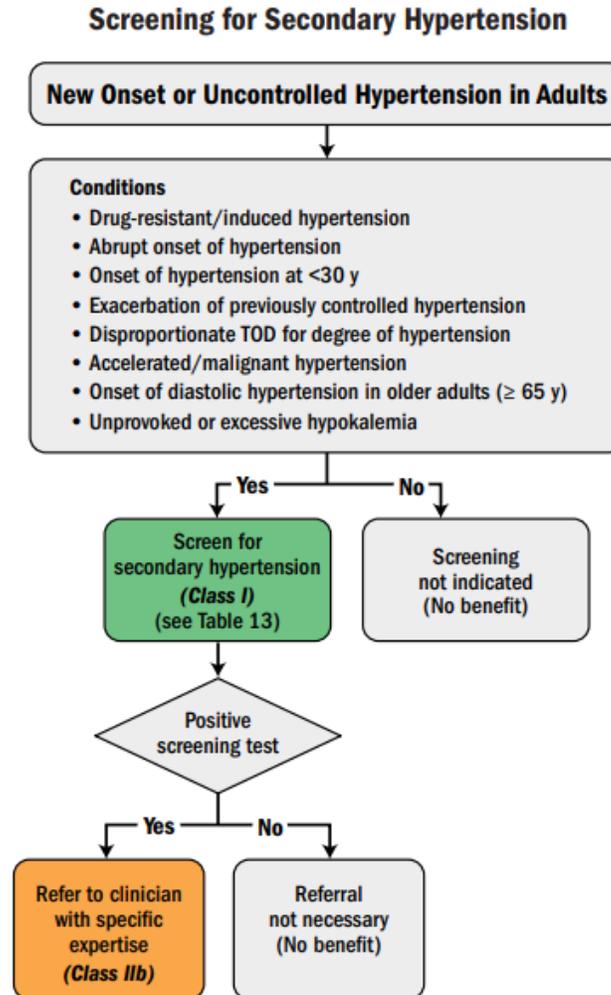


Figure 3

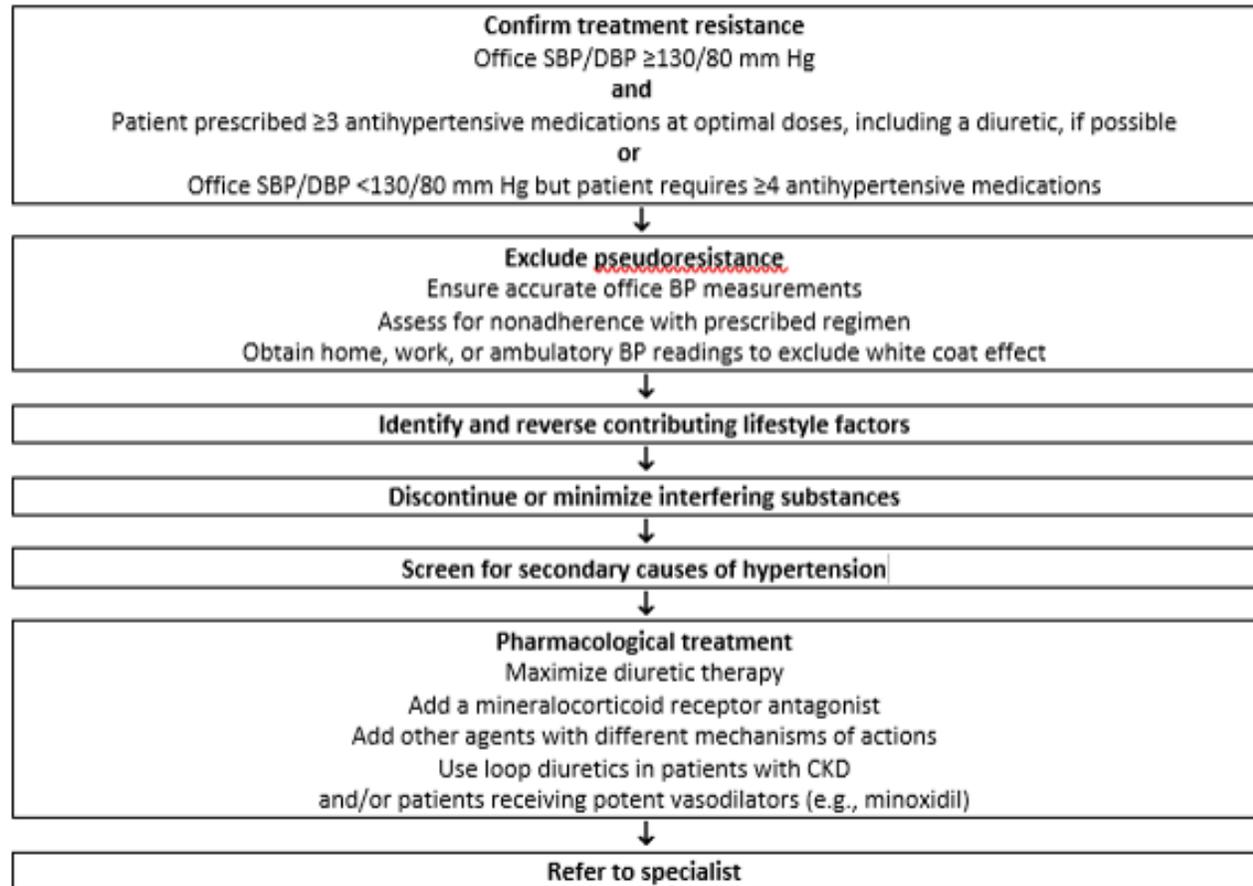
# Basic and Optional Laboratory Tests for Primary Hypertension

<b>Basic Testing</b>	Fasting blood glucose*
<b>Basic Testing</b>	Complete Blood Count
<b>Basic Testing</b>	Lipid profile
<b>Basic Testing</b>	Serum creatinine with eGFR*
<b>Basic Testing</b>	Serum sodium, potassium, calcium*
<b>Basic Testing</b>	Thyroid-stimulating hormone
<b>Basic Testing</b>	Urinalysis
<b>Basic Testing</b>	Electrocardiogram
<b>Optional Testing</b>	Echocardiogram
<b>Optional Testing</b>	Uric acid
<b>Optional Testing</b>	Urinary albumin to creatinine ratio

\*May be included in a comprehensive metabolic panel

# Resistant Hypertension: Diagnosis, Evaluation, and Treatment

Figure 10. Resistant Hypertension: Diagnosis, Evaluation, and Treatment



BP indicates blood pressure; CKD, chronic kidney disease; DBP, diastolic blood pressure; eGFR, estimated glomerular filtration rate; NSAIDs, nonsteroidal anti-inflammatory drugs; and SBP, systolic blood pressure.

Adapted with permission from Calhoun et al.

# Best Proven Nonpharmacological Interventions for Prevention and Treatment of Hypertension\*

Intervention	Nonpharmacological Intervention	Dose	Approximate Impact on SBP: Hypertension	Approximate Impact on SBP: Normotension
Weight loss	Weight/body fat	Best goal is ideal body weight, but aim for at least a 1-kg reduction in body weight for most adults who are overweight. Expect about 1 mm Hg for every 1-kg reduction in body weight.	-5 mm Hg	-2/3 mm Hg
Healthy diet	DASH dietary pattern	Consume a diet rich in fruits, vegetables, whole grains, and low-fat dairy products, with reduced content of saturated and total fat.	-11 mm Hg	-3 mm Hg
Reduced intake of dietary sodium	Dietary sodium	Optimal goal is <1500 mg/d, but aim for at least a 1000-mg/d reduction in most adults.	-5/6 mm Hg	-2/3 mm Hg
Enhanced intake of dietary potassium	Dietary potassium	Aim for 3500–5000 mg/d, preferably by consumption of a diet rich in potassium.	-4/5 mm Hg	-2 mm Hg

\*Type, dose, and expected impact on BP in adults with a normal BP and with hypertension.

DASH indicates Dietary Approaches to Stop Hypertension; and SBP, systolic blood pressure.

Resources: Your Guide to Lowering Your Blood Pressure With DASH—How Do I Make the DASH?

Available at: <https://www.nhlbi.nih.gov/health/resources/heart/hbp-dash-how-to>.

Top 10 Dash Diet Tips. Available at: <https://dashdiet.org/dash-diet-tips.html>

# Best Proven Nonpharmacological Interventions for Prevention and Treatment of Hypertension\* (cont.)

Intervention	Nonpharmacological Intervention	Dose	Approximate Impact on SBP: Hypertension	Approximate Impact on SBP: Normotension
Physical activity	Aerobic	<ul style="list-style-type: none"> <li>● 90–150 min/wk</li> <li>● 65%–75% heart rate reserve</li> </ul>	-5/8 mm Hg	-2/4 mm Hg
Physical activity	Dynamic resistance	<ul style="list-style-type: none"> <li>● 90–150 min/wk</li> <li>● 50%–80% 1 rep maximum</li> <li>● 6 exercises, 3 sets/exercise, 10 repetitions/set</li> </ul>	-4 mm Hg	-2 mm Hg
Physical activity	Isometric resistance	<ul style="list-style-type: none"> <li>● 4 × 2 min (hand grip), 1 min rest between exercises, 30%–40% maximum voluntary contraction, 3 sessions/wk</li> <li>● 8–10 wk</li> </ul>	-5 mm Hg	-4 mm Hg
Moderation in alcohol intake	Alcohol consumption	<p>In individuals who drink alcohol, reduce alcohol<sup>†</sup> to:</p> <ul style="list-style-type: none"> <li>● Men: ≤2 drinks daily</li> <li>● Women: ≤1 drink daily</li> </ul>	-4 mm Hg	-3 mm

# Hypertension/BP Control: Recommendations (3)

## Lifestyle Intervention

- For patients with BP >120/80, lifestyle intervention consists of weight loss if overweight or obese; a Dietary Approaches to Stop Hypertension-style dietary pattern including reducing sodium and increasing potassium intake; moderation of alcohol intake; and increased physical activity. **B**

# BP Goal for Patients With Hypertension

COR	LOE	Recommendations for BP Goal for Patients With Hypertension
I	SBP: B-R <sup>SR</sup>	For adults with confirmed hypertension and known CVD or 10-year ASCVD event risk of 10% or higher a BP target of less than 130/80 mm Hg is recommended.
I	DBP: C- EO	For adults with confirmed hypertension and known CVD or 10-year ASCVD event risk of 10% or higher a BP target of less than 130/80 mm Hg is recommended.
IIb	SBP: B-NR	For adults with confirmed hypertension, without additional markers of increased CVD risk, a BP target of less than 130/80 mm Hg may be reasonable.
IIb	DBP: C- EO	For adults with confirmed hypertension, without additional markers of increased CVD risk, a BP target of less than 130/80 mm Hg may be reasonable.

# BP Thresholds for and Goals of Pharmacologic Therapy in Patients with Hypertension According to Clinical Conditions

## General

Clinical Condition(s)	BP Threshold mm Hg	BP Goal mm Hg
Clinical CVD or 10 year ASCVD risk $\geq$ 10%	$\geq$ 130-80	<130/80
No clinical CVD or 10 year ASCVD risk <10%	$\geq$ 140/90	<130/80
Older persons ( $\geq$ 65 years of age; non-institutionalized, ambulatory, community-living adults)	$\geq$ 130 (SBP)	<130 (SBP)

## Specific Conditions

Clinical Condition(s)	BP Threshold mm Hg	BP Goal mm Hg
Diabetes mellitus	$\geq$ 130-80	<130/80
Chronic kidney disease	$\geq$ 130-80	<130/80
Chronic kidney disease post-renal transplantation	$\geq$ 130-80	<130/80
Heart failure	$\geq$ 130-80	<130/80
Stable ischemic heart disease	$\geq$ 130-80	<130/80
Secondary stroke prevention	$\geq$ 140/90	<130/80
Peripheral arterial disease	$\geq$ 130-80	<130/80

# Hypertension/BP Control: Recommendations (2)

## Treatment Goals

- Most people with diabetes and hypertension should be treated to a systolic BP goal of <140 mmHg and a diastolic BP goal of <90 mmHg. **A**
- Lower systolic and diastolic BP targets, such as 130/80 mmHg, may be appropriate for individuals at high risk of CVD, if they can be achieved without undue treatment burden. **C**
- In pregnant patients with diabetes and preexisting hypertension who are treated with antihypertensive therapy, BP targets of 120-160/80-105 mmHg are suggested in the interest of optimizing long-term maternal health and minimizing impaired fetal growth. **E**

# Choice of Initial Medication

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

SR indicates systematic review.

# Hypertension/BP Control: Recommendations (5)

## Pharmacologic Interventions

- Treatment for hypertension should include drug classes demonstrated to reduce CV events in patients with diabetes: **A**
  - ACE Inhibitors
  - Angiotensin receptor blockers (ARBs)
  - Thiazide-like diuretics
  - Dihydropyridine calcium channel blockers

# Choice of Initial Monotherapy Versus Initial Combination Drug Therapy

COR	LOE	Recommendations for Choice of Initial Monotherapy Versus Initial Combination Drug Therapy*
I	C-EO	Initiation of antihypertensive drug therapy with 2 first-line agents of different classes, either as separate agents or in a fixed-dose combination, is recommended in adults with stage 2 hypertension and an average BP more than 20/10 mm Hg above their BP target.
IIa	C-EO	Initiation of antihypertensive drug therapy with a single antihypertensive drug is reasonable in adults with stage 1 hypertension and BP goal <130/80 mm Hg with dosage titration and sequential addition of other agents to achieve the BP target.

# Hypertension/BP Control: Recommendations (4)

## Pharmacologic Interventions

- Patients with confirmed office-based blood pressure  $\geq 140/90$  mmHg should, in addition to lifestyle therapy, have prompt initiation and timely titration of pharmacologic therapy to achieve BP goals. **A**
- Patients with confirmed office-based blood pressure  $\geq 160/100$  mmHg should, in addition to lifestyle therapy, have prompt initiation and timely titration of two drugs or a single-pill combination of drugs demonstrated to reduce CV events in patients with diabetes. **A**

# Hypertension/BP Control: Recommendations (6)

## Pharmacologic Interventions

- Multiple-drug therapy is generally required to achieve BP targets. However, combinations of ACE inhibitors and ARBs and combinations of ACE inhibitors or ARBs with direct renin inhibitors should not be used. **A**

# Hypertension/BP Control: Recommendations (7)

## Pharmacologic Interventions

- An ACE inhibitor or ARB, at the maximumly tolerated dose indicated for BP treatment, is the recommended first-line treatment for hypertension in patients with diabetes and urinary albumin-to-creatinine ratio  $\geq 300$  mg/g creatinine **A** or 30-299 mg/g creatinine **B**. If one class is not tolerated, the other should be substituted. **B**
- For patients treated with an ACE inhibitor, ARB, or diuretic, serum creatinine/estimated glomerular filtrated rate and serum potassium levels should be monitored at least annually. **B**

# Diabetes Mellitus

COR	LOE	Recommendations for Treatment of Hypertension in Patients With DM
I	SBP: B-R <sup>SR</sup>	In adults with DM and hypertension, antihypertensive drug treatment should be initiated at a BP of 130/80 mm Hg or higher with a treatment goal of less than 130/80 mm Hg.
I	DBP: C-EO	In adults with DM and hypertension, antihypertensive drug treatment should be initiated at a BP of 130/80 mm Hg or higher with a treatment goal of less than 130/80 mm Hg.
I	A <sup>SR</sup>	In adults with DM and hypertension, all first-line classes of antihypertensive agents (i.e., diuretics, ACE inhibitors, ARBs, and CCBs) are useful and effective.
IIb	B-NR	In adults with DM and hypertension, ACE inhibitors or ARBs may be considered in the presence of albuminuria.

# Hypertension/BP Control: Recommendations (8)

## Resistant Hypertension

- Patients with hypertension who are not meeting BP targets on three classes of antihypertensive medications (including a diuretic) should be considered for mineralocorticoid receptor antagonist therapy. **A**

Cardiovascular Disease and Risk Management:

*Standards of Medical Care in Diabetes - 2018. Diabetes Care 2018; 41 (Suppl. 1): S86-S104*

# Case 1 (slide 1)

- 43-year-old female with newly diagnosed T2D for routine f/u. No complaints.
- PMHX: Gestational DM, Asthma
- PSHX: Appy, C-section
- FHX: Father had high blood pressure and heart problems died age 60. Mother has heart problems and T2D.
- SHX: Works as a cashier. Drinks ETOH on weekends. Smokes tobacco when she drinks ETOH. No drugs. No routine exercise.

# Case 1 (slide 2)

- Meds: Metformin 500mg BID, Simvastatin 40mg daily, Calcium supplement
- Allergies: PCN
- PE: Height-5'5" Weight-180lbs BMI- 30 BP: 145/89 P: 82
- Exam: unremarkable
- Labs: HbA1C: 6.8 previous 7.3, TC 180, HDL 45, LDL 135, all other labs within normal limits
- CVD Risk is 7.3% based on ASCVD risk calculator

## Case 1 (slide 3)

What would you do?

- Initiate non-pharmacologic therapy and medical therapy.
- Reassess 1 month and optimize as needed.

## Case 1 (slide 4)

- BP 135/80
- CVD risk is now 6.3%
- What do you do now?
- Manage with non-pharmacologic therapy and reassess 3–6 months

## Case 1 (slide 5)

- Lipid profile: TC 230, HDL 40, LDL 180
- BP 135/80
- CVD risk is 11.8%
- What now?

## Case 1 (slide 6)

- Initiate combination of non-pharmacologic therapy **and** medical therapy with follow up in 1 month
- Consider increase in statin.

# CVD Risk Factors Common in Patients With Hypertension

Modifiable Risk Factors*	Relatively Fixed Risk Factors†
<ul style="list-style-type: none"> <li>• Current cigarette smoking, secondhand smoking</li> <li>• Diabetes mellitus</li> <li>• Dyslipidemia/hypercholesterolemia</li> <li>• Overweight/obesity</li> <li>• Physical inactivity/low fitness</li> <li>• Unhealthy diet</li> </ul>	<ul style="list-style-type: none"> <li>• CKD</li> <li>• Family history</li> <li>• Increased age</li> <li>• Low socioeconomic/educational status</li> <li>• Male sex</li> <li>• Obstructive sleep apnea</li> <li>• Psychosocial stress</li> </ul>

\*Factors that can be changed and, if changed, may reduce CVD risk.

†Factors that are difficult to change (CKD, low socioeconomic/educational status, obstructive sleep apnea, cannot be changed (family history, increased age, male sex), or, if changed through the use of current intervention techniques, may not reduce CVD risk (psychosocial stress).

CKD indicates chronic kidney disease; and CVD, cardiovascular disease.

## Case 2 (slide 1)

- 69-year-old male with T2D presents for routine evaluation. c/o “not feeling good.” Pain in is knees and arms.
- PHX: HTN, CKD stage 2, COPD, BPH, Osteoarthritis
- PSHX: TKR x 2, hernia repair
- FHX: Mother and Father both deceased. “They had it all.”
- SHX: Retired mechanic, lives alone near his son and daughter, stopped smoking age 49. Walks “as much as I can.” No routine exercise.

## Case 2 (slide 2)

- Meds: Metformin 1000mg BID, Glipizide 10mg BID, ASA 81mg daily, Lisinopril 20mg BID, Atorvastatin 80mg daily, tamsulosin, tiotropium, albuterol, fluticasone
- PE: HT 5'8", WT 220lbs, BMI 33.4, BP 137/89, P 58
- Exam: unremarkable
- Labs: GFR 60, HbA1C 8.9, TC 120, HDL 35, LDL 65
- CVD risk is 35.8%

# Case 2 (slide 3)

What do you do?

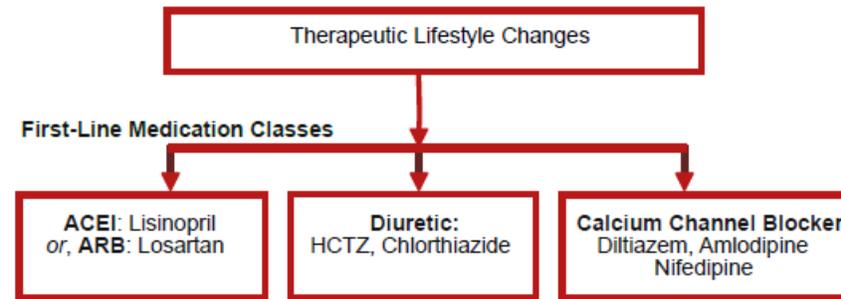
# Treatment Target Options

BP	Consider <130/80	<140/90	Consider <150/90
<b>Factors to Consider</b>	<ul style="list-style-type: none"> <li>• Younger</li> <li>• Healthier</li> <li>• Low risk for hypertension</li> <li>• Higher cardiovascular disease risk*</li> <li>• Target is achievable without burdensome side effects</li> </ul>	<ul style="list-style-type: none"> <li>• <b>Most Patients</b></li> </ul>	<ul style="list-style-type: none"> <li>• Older</li> <li>• Multiple advanced comorbidities</li> <li>• High risk for hypertension</li> <li>• Polypharmacy</li> <li>• Lower targets are unachievable due to side effects</li> </ul>

\*High CVD risk is a 10-year atherosclerotic cardiovascular event risk of 10% or higher based on the 2013 ACC/AHA pooled cohort equation risk calculator.

# Hypertension Therapy in Type 2 Diabetes

## Hypertension Therapy in Type 2 Diabetes



*Consider ACEI or ARB as initial medication for patients with Chronic Kidney Disease  
Do not use an ACE Inhibitor and ARB together in the same patient.*

**If BP not at goal in one month, consider titrating dose up and/or adding medication from a different class above.** Utilize these 3 classes before considering additional medication classes.

### Consider Additional Medication Classes

If BP not at goal or unable to tolerate the first-line medication classes above, consider adding medications from additional drug classes. Base selection on individual patient indications.

**Mineralocorticoid**  
Spironolactone

**Beta Blocker**  
Metoprolol, Atenolol

**Alpha Blocker**  
Prazosin, Doxazosin

# Summary

- Individualize patient treatment.
- Confirm accurate blood pressure measurements, especially if starting or changing medications.
- Use home blood pressure monitoring when possible.

Questions?

Thank you!