



# Hypertension Update

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## Overview

- **Background**
- **Diagnosis**
- **Management**
- **Guideline Comparison**

## **Background**

- **Importance**

- In 2020, hypertension was the leading cause of death and disability-adjusted life years worldwide (WHO).
- In the US, second only to cigarettes as preventable cause of death
- 25% of cardiovascular events attributable to hypertension in ARIC

Whelton PK et al. 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. Hypertension 2017.

## **Background**

- **Importance**

- Half with hypertension do not have adequate control

Whelton PK et al. 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. Hypertension 2017.

## Background

- **Prevalence**
  - 32% under JNC-8/ current ACP/AAFP, ISH
  - 46% under recent AHA/ACC

Whelton PK et al. 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. *Hypertension* 2017.

Kovell LC et al. US Hypertension Management Guidelines: A Review of the recent Past and Recommendations for the Future. *Journal of the American Heart Association*. 2015;4:e002315, originally published December 7, 2015

Unger T, Borghi C, Charchar F, Khan NA, Poulter NR, Prabhakaran D, Ramirez A, Schlaich M, Stergiou GS, Tomaszewski M, Wainford RD, Williams B, Schutte AE. 2020 International Society of Hypertension Global Hypertension Practice Guidelines. *Hypertension*. 2020 Jun;75(6):1334-1357. doi: 10.1161/HYPERTENSIONAHA.120.15026. Epub 2020 May 6. PMID: 32370572.

## Background

- **Complex & Interdependent relationship between modifiable & fixed risk factors**
  - **Modifiable**
    - Cigarette smoke exposure
    - Diabetes
    - Dyslipidemia
    - Obesity
    - Lack of physical activity
    - Poor diet
  - **Fixed**
    - Male
    - Family History
    - Low SES
    - OSA
    - Stress
    - Chronic Kidney disease
    - Age

Berry JD, Dyer A, Cai X, et al. Lifetime risks of cardiovascular disease. *N Engl J Med*. 2012;366:321-9

## Diagnosis

- **Who to screen?**
  - **USPSTF 2021 Statement:**
  - **“The USPSTF recommends screening for hypertension in adults 18 years or older with office blood pressure measurement (OBPM). The USPSTF recommends obtaining blood pressure measurements outside of the clinical setting for diagnostic confirmation before starting treatment.”**

US Preventive Services Task Force. Screening for Hypertension in Adults: US Preventive Services Task Force Reaffirmation Recommendation Statement. *JAMA*. 2021;325(16):1650–1656. doi:10.1001/jama.2021.4987

## Diagnosis

- **Proper Blood Pressure Assessment**
  - **1: Patient preparation**

Whelton PK et al. 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. Hypertension 2017.

# Diagnosis

- **Proper Blood Pressure Assessment**
  - 1: Patient preparation
  - 2: Proper technique

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# Diagnosis

- **Proper Blood Pressure Assessment**
  - 1: Patient preparation
  - 2: Proper technique
  - 3: Proper measurements

Whelton PK et al. 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. Hypertension 2017.

## **Diagnosis**

- **Proper Blood Pressure Assessment**
  - **1: Patient preparation**
  - **2: Proper technique**
  - **3: Proper measurements**
  - **4: Good documentation**

**Whelton PK et al. 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. Hypertension 2017.**

## **Diagnosis**

- **Proper Blood Pressure Assessment**
  - **1: Patient preparation**
  - **2: Proper technique**
  - **3: Proper measurements**
  - **4: Good documentation**
  - **5: Average readings**

**Whelton PK et al. 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. Hypertension 2017.**

## **Diagnosis**

- **Proper Blood Pressure Assessment**
  - **1: Patient preparation**
  - **2: Proper technique**
  - **3: Proper measurements**
  - **4: Good documentation**
  - **5: Average readings**
  - **6: Give patient the numbers**

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## **Diagnosis**

- **Definitions (AHA/ACC):**
  - **->Normal <120/80mmHg**
  - **->Elevated blood pressure: 120-129mmHg/<80mmHg**
  - **->Stage 1 HTN: 130-139mmHg or diastolic 80-89mmHg**
  - **->Stage 2 HTN: 140mmHg or greater systolic, 90mmHg or greater diastolic**

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## Diagnosis

- **Other methods:**
- **Ambulatory Blood Pressure Monitoring**
  - ->24-hour mean of 125/75mmHg or more
  - ->Awake mean of 130/80mmHg or more
  - ->Asleep mean of 110/65mmHg or more

Whelton PK et al. 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. Hypertension 2017.

Siu AL. Screening for high blood pressure in adults: U.S. Preventive Services Task Force recommendation statement. Ann Intern Med. 2015;163:778-86.

Agarwal R, Bills JE, Hecht TJW, et al. Role of home blood pressure monitoring in overcoming therapeutic inertia and improving hypertension control: a systematic review and meta-analysis. Hypertension. 2011;57:29-38.

## Diagnosis

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Pickering TG, Miller NH, Ogedegbe G, et al. Call to action on use and reimbursement for home blood pressure monitoring: a joint scientific statement from the American Heart Association, American Society of Hypertension, and Preventive Cardiovascular Nurses Association. Hypertension. 2008;52:10-29.



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## Diagnosis

- **“What’s more important, the top number or the bottom number?”**
  - **Under age 50: diastolic matters more**

**Taylor BC et al. Impact of diastolic and systolic blood pressure on mortality: implications for the definition of “normal.” J Gen Intern Med. 2011 Jul;26(7):685-90.**

**Franklin SS et al. Does the relation of blood pressure to coronary heart disease risk change with aging? The Framingham Heart Study. Circulation. 2001;103(9):1245.**

## Diagnosis

- **“What’s more important, the top number or the bottom number?”**
  - Under age 50: diastolic matters more
  - Over age 50: systolic/pulse pressure is greater predictor of events

Taylor BC et al. Impact of diastolic and systolic blood pressure on mortality: implications for the definition of “normal.” J Gen Intern Med. 2011 Jul;26(7):685-90.

Franklin SS et al. Does the relation of blood pressure to coronary heart disease risk change with aging? The Framingham Heart Study. Circulation. 2001;103(9):1245.

## Diagnosis

- **Clinical Evaluation-History**
  - Organ damage
  - Risk factors
  - Lifestyle
  - Medications
  - Substance abuse

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# Diagnosis

- **Clinical Evaluation-Physical Exam**
  - End-organ damage
  - Fundoscopic exam

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# Diagnosis

- **Clinical Evaluation-Lab Testing**
  - Electrolytes with calcium and creatinine
  - Fasting glucose
  - Urinalysis
  - Complete Blood Count
  - Thyroid testing-TSH
  - Lipids
  - Electrocardiogram
  - Use labs & clinic data to calculate 10-year ASCVD risk (ACC/AHA)

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Chobanian AV et al. The Seventh Report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure: the JNC 7 report. JAMA. 2003;289(19):2560.

# Diagnosis

- **Clinical Evaluation-Lab Testing**
  - Additional depending on circumstance:
    - Urine albumin to creatinine ratio
    - Echocardiogram
    - Secondary Hypertension

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Chobanian AV et al. The Seventh Report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure: the JNC 7 report. JAMA. 2003;289(19):2560.

# Diagnosis

- **Risk Factors**
  - Primary
  - Secondary

Whelton PK et al. 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. Hypertension 2017.

# Diagnosis

## • Primary Risk Factors

- Family history-about 30% of population variation is due to genetic factors, and twice as common if at least 1 parent has it
- Age
- Sodium intake
- Obesity
- Physical activity level
- Race
- Alcohol
- Kidney mass

Whelton PK et al. 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. Hypertension 2017.

Staessen JA et al. Essential Hypertension. Lancet. 2003;361(9369):1629.

# Diagnosis

## • Secondary Risk Factors

- |                           |                              |
|---------------------------|------------------------------|
| • Oral contraceptives     | • Anti-angiogenesis          |
| • NSAIDs                  | • Tyrosine Kinase inhibitors |
| • Antidepressants         | • Illegal drugs              |
| • Corticosteroids         | • Kidney disease             |
| • Decongestants           | • Hyperaldosteronism         |
| • Weight-loss medications | • Renovascular               |
| • Antacids with sodium    | • Obstructive Sleep Apnea    |
| • Erythropoietin          | • Pheochromocytoma           |
| • Cyclosporine/tacrolimus | • Cushing's syndrome         |
| • Stimulants              | • Endocrine disorders        |
| • Atypical antipsychotics | • Coarctation of the aorta   |

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UpToDate.com. Overview of Hypertension in adults. Retrieved April 4, 2018.

# Diagnosis

- **Complications**
  - **Left ventricular hypertrophy**
  - **Heart Failure**
  - **Stroke-ischemic & hemorrhagic**
  - **Coronary Artery Disease**
  - **Chronic Kidney Disease/End-Stage Renal Disease**

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# Management

- **Lifestyle**
- **Medications**

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# Management

- **Lifestyle**

- Salt restriction--~5mmHg systolic/2.5mmHg diastolic
- Increased potassium intake via diet
- Weight loss--~1mmHg/lb lost
- DASH diet: combination of low-salt, high potassium, magnesium, calcium, protein, fiber, low fat/cholesterol, reduced by 6mmHg systolic/4mmHg diastolic
- Exercise: 3-4x40minutes for 12 weeks can get 4-6/3mmHg
- Limit daily alcohol intake-2 or fewer for men, 1 or fewer for women

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Eckel RH et al. 2013 AHA/ACC guideline on lifestyle management to reduce cardiovascular risk: a report of the American College of Cardiology/American Heart Association Task Force on Practice Guidelines. J Am Coll Cardiol. 2014;63(25 Pt B):2960.

# Management

- **Medication**

- Effective on outcomes

Whelton PK et al. 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. Hypertension 2017.

# Management

- **Medication-where to start?**

Whelton PK et al. 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. Hypertension 2017.

# Management

- **Medication-where to start?**
  - **Thiazide diuretics**
  - **Long-acting calcium channel blockers eg amlodipine (CCB)**
  - **Angiotensin converting enzyme inhibitors (ACE-I)**
  - **Angiotensin receptor blockers (ARB)**

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# Management

- **Special cases:**
  - **Black patients-best evidence for starting with thiazide or CCB**
  - **Diabetic nephropathy or any chronic kidney disease with proteinuria-ACE-I/ARB**
  - **Don't start with a beta blocker anymore, unless they have coronary artery disease or systolic heart failure**

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# Management

- **Special cases:**
  - **Ischemic Heart Disease**
  - **Heart Failure**
  - **Chronic Kidney Disease**
  - **Renal Transplant**
  - **Secondary Stroke Prevention**
  - **Pregnancy**
  - **Hypertensive crisis**
  - **Cognitive Decline**
  - **Sexual Side Effects**
  - **Major surgery**

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# Management

- **Sequential Management**
  - 15mmHg+ above goal: start with 2 agents
  - 2 is not enough: go to 3 (ACE-I/ARB, thiazide, CCB)
  - 3 is not enough: “drug-resistant hypertension)
  - 4 drugs+: resistant hypertension

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## Guideline Comparison: Definition

	<b>AHA/ACC</b>	<b>ACP/AAFP</b>
<b>&gt;150/90mmHg</b>	Stage II	
<b>&gt;140/90mmHg</b>	Stage II	
<b>130-139/80-89mmHg</b>	Stage I	
<b>120-129/&lt;80mmHg</b>	Elevated	
<b>&lt;120/80mmHg</b>	Normal	

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## Guideline Comparison: Definition

	<b>AHA/ACC</b>	<b>ACP/AAFP</b>
>150/90mmHg	Stage II	
>140/90mmHg	Stage II	
130-139/80-89mmHg	Stage I	Does not specifically define hypertension/ prehypertension
120-129/<80mmHg	Elevated	
<120/80mmHg	Normal	

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## Guideline Comparison: Treatment

	<b>AHA/ACC</b>	<b>ACP/AAFP</b>
<b>&gt;150/90mmHg</b>		
<b>&gt;140/90mmHg</b>		
<b>130-139/80-89mmHg</b>		
<b>120-129/&lt;80mmHg</b>		
<b>&lt;120/80mmHg</b>		

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Qaseem et al. Pharmacologic Treatment of Hypertension in Adults Aged 60 Years or Older to Higher Versus Lower Blood Pressure Targets: A Clinica Practice Guideline From the American College of Physicians and the American Academy of Family Physicians. Ann Intern Med. 2017;166(6):430-437.

## Guideline Comparison: Treatment

	<b>AHA/ACC</b>	<b>ACP/AAFP</b>
<b>&gt;150/90mmHg</b>		
<b>&gt;140/90mmHg</b>		
<b>130-139/80-89mmHg</b>		
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<b>&lt;120/80mmHg</b>	<b>Screening</b>	<b>Screening</b>

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## Guideline Comparison: Treatment

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<b>&gt;150/90mmHg</b>		
<b>&gt;140/90mmHg</b>		
<b>130-139/80-89mmHg</b>		
<b>120-129/&lt;80mmHg</b>	<b>Close monitoring</b>	<b>Close monitoring</b>
<b>&lt;120/80mmHg</b>	<b>Screening</b>	<b>Screening</b>

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	<b>AHA/ACC</b>	<b>ACP/AAFP</b>
<b>&gt;150/90mmHg</b>		
<b>&gt;140/90mmHg</b>		
<b>130-139/80-89mmHg</b>	<b>Lifestyle measures, maybe medication</b>	<b>Lifestyle measures</b>
<b>120-129/&lt;80mmHg</b>	<b>Close monitoring</b>	<b>Close monitoring</b>
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## Guideline Comparison: Treatment

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<b>&gt;140/90mmHg</b>	<b>Medication</b>	<b>Lifestyle measures, maybe medication</b>
<b>130-139/80-89mmHg</b>	<b>Lifestyle measures, maybe medication</b>	<b>Lifestyle measures</b>
<b>120-129/&lt;80mmHg</b>	<b>Close monitoring</b>	<b>Close monitoring</b>
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## **Conclusion**

- **Hypertension is prevalent**
- **Consequences are severe**
- **Proper diagnosis is key**
- **Intervention is effective**
- **Guidelines are a guide**