

# Lowering Your Blood Pressure

Yogitha Potini, MD MPH

Internal Medicine Associates of Boulder

303-223-6407



# What is Hypertension?

- Hypertension = High Blood Pressure
- Force of circulating blood pushing against arteries
- Normal: 120/80
  - Elevated 121-129/81-89
  - Hypertension 130+/90+



## A SNAPSHOT: BLOOD PRESSURE IN THE U.S.

Make Control Your Goal

High blood pressure is a major risk factor for heart disease and stroke, the first and fourth leading causes of death for all Americans.

### HIGH BLOOD PRESSURE BASICS

**1 IN 3**  
American adults have high blood pressure



High blood pressure contributes to  
**~1,000 DEATHS/DAY**



When your blood pressure is high:

You are **4x** more likely to die from a stroke



You are **3x** more likely to die from heart disease



69% of people who have a first heart attack...



77% of people who have a first stroke...



74% of people with chronic heart failure...

**HAVE HIGH BLOOD PRESSURE**

Annual estimated costs associated with high blood pressure:

**\$51 BILLION**

**\$47.5 BILLION**  
in direct medical expenses

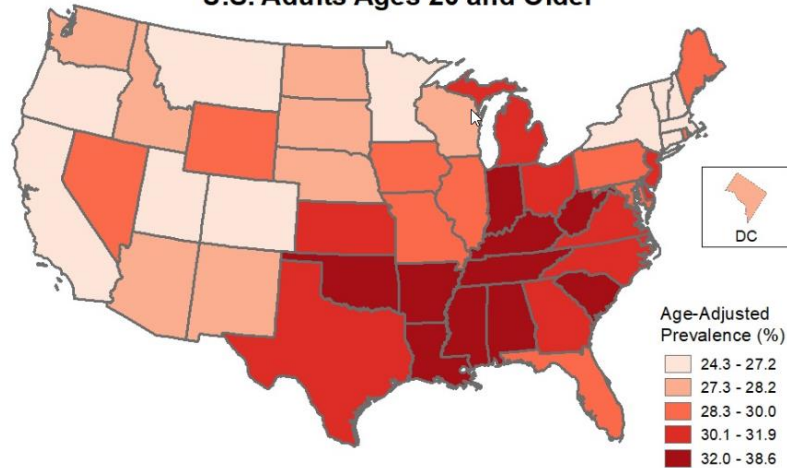


# Epidemiology

- About 75 million Americans have hypertension
  - Only about half of these people are well-controlled
- 1 in 5 US Adults do not know they have hypertension
- 7 out of 10 adults with hypertension use medications



## Prevalence of Hypertension, 2017 U.S. Adults Ages 20 and Older



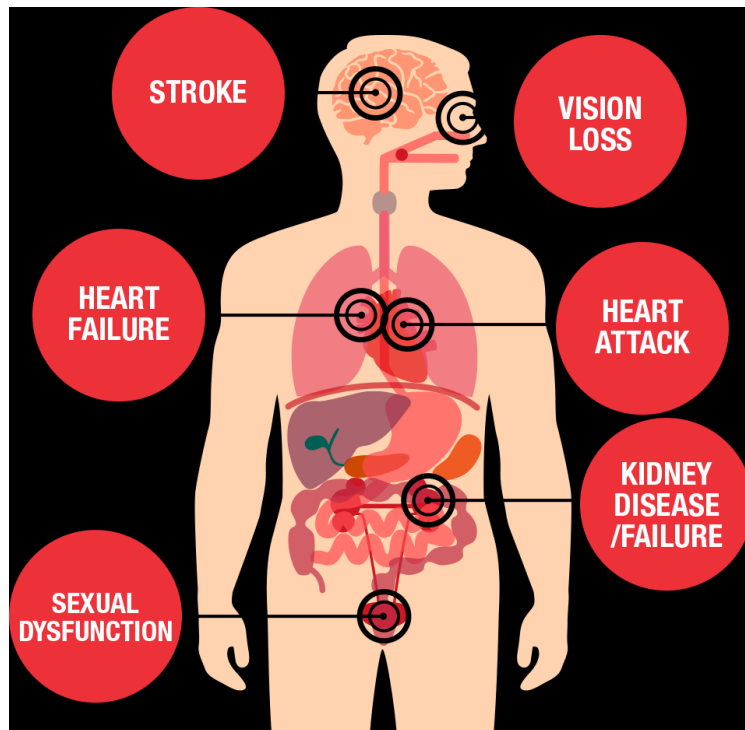
Data Source:  
BRFSS - Behavioral Risk Factor Surveillance System, CDC.

Self-report: "Have you ever been told by a doctor, nurse, or other health care professional that you have high blood pressure?"  
Excludes women who reported being told only during pregnancy and respondents who reported they had been told that their blood pressure was borderline high or pre-hypertensive.

Source: [Behavioral Risk Factor Surveillance System](#)

## Pathophysiology

- Systolic vs. Diastolic blood pressure
- How to calculate blood pressure
  - Cardiac Output vs. Peripheral Resistance
- What else plays a role?
  - Kidneys
  - Nervous System
  - Hormones



## Risks of High Blood Pressure

- "The silent killer"
- Heart
  - Heart disease
  - Congestive heart failure
- Kidney Disease
- Stroke
- Eye disease

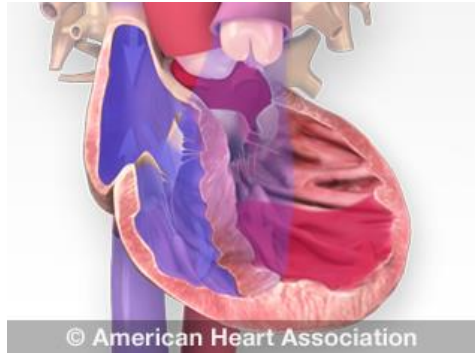
## Heart Disease

### Heart Attack

- Hardening of arteries, can cause blockages
- Decreased blood flow to heart
- Chest pain, shortness of breath
- Death

### Congestive Heart Failure

- Most common cause of heart failure
- Decreased function of heart
- Shortness of breath, swelling
- Death



## Kidney Disease

- Chronic kidney disease
  - Hypertension
  - Diabetes
- Reduced filtration
  - Build up of fluid, salts, toxins
- Worsening blood pressure control
- Eventual dialysis vs. transplant

## Stroke

- Ischemic vs. Hemorrhagic
- Weakened arteries
  - Less blood flow to brain
- Symptoms
  - Weakness/paralysis
  - Speech changes
  - Difficulty walking

## Eye Disease

Normal Retina



Hypertensive Retina



## What causes high blood pressure?

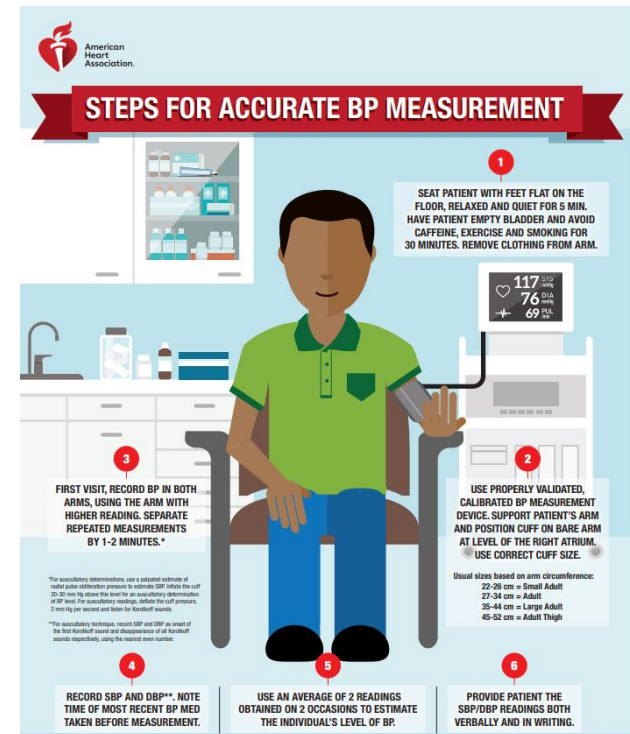
- Genetics
- High salt intake
- Overweight/Obesity
- Fitness
- Alcohol
- Smoking
- Age
- Race
- Medications

## Diagnosis

- Screening
- In office
- Home monitoring
- Ambulatory Blood Pressure monitors
- Keep a log!

## Secondary Causes

- 95-98% is primary “essential” hypertension
- Further testing
  - Under age 30
  - Sudden worsening of controlled blood pressure
  - Drug-resistant
- Sleep Apnea



**STEPS FOR ACCURATE BP MEASUREMENT**

**1** SEAT PATIENT WITH FEET FLAT ON THE FLOOR, RELAXED AND QUIET FOR 5 MIN. HAVE PATIENT EMPTY BLADDER AND AVOID CAFFEINE, EXERCISE AND SMOKING FOR 30 MINUTES. REMOVE CLOTHING FROM ARM.

**2** USE PROPERLY VALIDATED, CALIBRATED BP MEASUREMENT DEVICE. SUPPORT PATIENT'S ARM AND POSITION CUFF ON BARE ARM AT LEVEL OF THE RIGHT ATRIUM. USE CORRECT CUFF SIZE.

**3** FIRST VISIT, RECORD BP IN BOTH ARMS, USING THE ARM WITH HIGHER READING. SEPARATE REPEATED MEASUREMENTS BY 1-2 MINUTES.\*

**4** RECORD SBP AND DBP\*\*. NOTE TIME OF MOST RECENT BP MED TAKEN BEFORE MEASUREMENT.

**5** USE AN AVERAGE OF 2 READINGS OBTAINED ON 2 OCCASIONS TO ESTIMATE THE INDIVIDUAL'S LEVEL OF BP.

**6** PROVIDE PATIENT THE SBP/DBP READINGS BOTH VERBALLY AND IN WRITING.

Usual sizes based on arm circumference:  
22-26 cm = Small Adult  
27-34 cm = Adult  
35-44 cm = Large Adult  
45-52 cm = Adult Thigh

\*For auscultatory determination, use a palpated estimate of initial pulse obliteration pressure to estimate SBP within the cuff 20-30 mm Hg above the level for an auscultatory determination of BP level. For auscultatory readings, utilize the cuff pressure 2 mm Hg per second and listen for Korotkoff sounds.

\*\*The auscultatory technique: Listen SBP and DBP as onset of the first Korotkoff sound and disappearance of all Korotkoff sounds respectively, using the highest even number.

# Lifestyle Modifications

- Diet
- Exercise
- Weight loss
- Decrease alcohol consumption
- QUIT SMOKING

**Table 15. Best Proven Nonpharmacological Interventions for Prevention and Treatment of Hypertension\***

Nonpharmacological Intervention	Dose	Approximate Impact on SBP			
		Hypertension	Normotension	Reference	
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	S6.2-1
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	S6.2-6, S6.2-7
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	S6.2-9, S6.2-10
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	S6.2-13
Physical activity	Aerobic	90-150 min/wk/65%-75% heart rate reserve	-5/8 mm Hg	-2/4 mm Hg	S6.2-18, S6.2-22
	Dynamic resistance	90-150 min/wk/50%-80% 1 rep maximum/6 exercises, 3 sets/exercise, 10 repetitions/set	-4 mm Hg	-2 mm Hg	S6.2-18
	Isometric resistance	4 x 2 min (hand grip), 1 min rest between exercises, 30%-40% maximum voluntary contraction, 3 sessions/wk/8-10 wk	-5 mm Hg	-4 mm Hg	S6.2-19, S6.2-31
Moderation in alcohol intake	Alcohol consumption	In individuals who drink alcohol, reduce alcohol† to: Men: ≤2 drinks daily Women: ≤1 drink daily	-4 mm Hg	-3 mm Hg	S6.2-22-S6.2-24

## DASH DIET

- DASH = Dietary Approaches to Stop Hypertension
- 1500mg – 2300mg sodium per day
- Limit saturated and trans fats
- Whole grains
- Fruits & Vegetables
- Low fat dairy

## Exercise

- 150 minutes of moderate aerobic activity
- OR
- 75 minutes of vigorous aerobic activity
- Strength training twice a week
- Reduce sitting time
- High intensity intervals

## First Line Medications

- ACE-Inhibitors or ARBs
- Calcium Channel Blockers
- Diuretics

## ACE Inhibitors

- Ex: Lisinopril, Enalapril, Ramipril
- Preferred if you have diabetes
- Side Effects:
  - Cough
  - Angioedema
- Related to angiotensin II receptor blockers
  - Losartan, valsartan, Irbesartan
- Bloodwork monitoring

## Diuretics

- Ex: Hydrochlorothiazide, chlorthalidone
- Side Effects:
  - Potential for metabolic derangements
- Bloodwork monitoring

## Calcium Channel Blockers

- Ex: Amlodipine, nifedipine
- Side Effects
  - Swelling
  - Palpitations
- If you have known significant heart disease, may want to avoid.

## What about Beta Blockers?

- Ex: Metoprolol, carvedilol,
- Preferred if you have known heart disease
  - History of heart attack
  - Congestive heart failure
  - Atrial fibrillation
- Side effects
  - Lower heart rate
  - Orthostatic hypotension

## Are there other medications?

- Hydralazine
- Clonidine
- Doxazosin/Terazosin
- Methyldopa

## Alternative therapies

- Yoga
- Meditation
- Deep Breathing
- Acupuncture
- Essential Oils

## Takeaways

- Get screened
- Keep a log
- Diet/Exercise
- Partner with your PCP

# References

- <https://www.heart.org/en/health-topics/high-blood-pressure/high-blood-pressure-toolkit-resources>
- <https://www.heart.org/en/health-topics/high-blood-pressure/health-threats-from-high-blood-pressure>
- Nwankwo T, Yoon SS, Burt V, Gu Q. Hypertension among adults in the US: National Health and Nutrition Examination Survey, 2011-2012. NCHS Data Brief, No. 133. Hyattsville, MD: National Center for Health Statistics, Centers for Disease Control and Prevention, US Dept of Health and Human Services; 2013.
- 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. doi:10.1001/jama.2013.284427
- <https://www.cdc.gov/bloodpressure/facts.htm>
- Merai R, Siegel C, Rakotz M, Basch P, Wright J, Wong B; DHSC, Thorpe P. CDC Grand Rounds: A Public Health Approach to Detect and Control Hypertension. *MMWR Morb Mortal Wkly Rep*. 2016 Nov 18;65(45):1261-1264
- Beevers G, Lip GY, O'Brien E. ABC of hypertension: The pathophysiology of hypertension. *BMJ*. 2001;322(7291):912-916. doi:10.1136/bmj.322.7291.912
- Vasan RS, Beiser A, Seshadri S, et al. Residual lifetime risk for developing hypertension in middle-aged women and men: the Framingham Heart Study. *JAMA*. 2002;287(10):1003-1010.
- Go AS, Mozaffarian D, Roger VL, et al; the American Heart Association Statistics Committee and Stroke Statistics Subcommittee. Heart disease and stroke statistics—2013 update: a report from the American Heart Association. *Circulation*. 2013;127:e6-245.
- National High Blood Pressure Education Program. *The Seventh Report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure Cdc-pdf[PDF-223K]External*. Bethesda, MD: National Heart, Lung, and Blood Institute; 2003.
- National Heart, Lung, and Blood Institute. Your Guide to Lowering Your Blood Pressure With DASH. NIH Pub No 06-4082. Bethesda, MD: National Heart, Lung, and Blood Institute; 2006.
- <https://millionhearts.hhs.gov/>
- <https://www.mayoclinic.org/healthy-lifestyle/nutrition-and-healthy-eating/in-depth/dash-diet/art-20048456>
- George Bakris, Waleed Ali, Gianfranco Parati. *J Am Coll Cardiol*. 2019 Jun, 73 (23) 3018-3026.
- Whelton PK, Carey RM, Aronow WS, Casey DE Jr, Collins KJ, Dennison Himmelfarb C, DePalma SM, Gidding S, Jamerson KA, Jones DW, MacLaughlin EJ, Muntner P, Ovbigele B, Smith SC Jr, Spencer CC, Stafford RS, Taler SJ, Thomas RJ, Williams KA Sr, Williamson JD, Wright JT Jr. 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* 2018;71:e127-248.
- <https://imagebank.asrs.org/file/5160/hypertensive-retinopathy-grade-iv-os>
- Physical Activity Guidelines for Americans. 2nd ed. U.S. Department of Health and Human Services. <https://health.gov/paguidelines/second-edition>. Accessed Dec. 4, 2018.



# Questions??



# Thank you!

Yogitha Potini, MD MPH  
Internal Medicine Associates of Boulder  
303-223-6407

