


**HYPERTENSION GUIDELINES:
BEING "NORMAL" JUST GOT HARDER**

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Bryan Heart Fall Nursing Conference
Lincoln, Nebraska USA
October 13, 2018




DISCLOSURES

- None



OBJECTIVES

- Hypertension Background
 - Pathophysiology of Hypertension
- Why Do We Care About Hypertension?
- JNC 8 Hypertension Guidelines?
- What do Nurses Need to Know in Treating Hypertension
- Consequences of Hypertension
- Non-Pharmacologic Treatments of Hypertension
- New Things on the Horizon
- Case Studies



BACKGROUND OF HYPERTENSION

- William Harvey described the circulatory system in his Book "De motu cordis" in 1628
- English Clergyman Stephen Hales was the first to publish on the measurement of blood pressure in 1733 (on a horse)
- Known as **HARD PULSE DISEASE**
 - Blood letting and leaches (Hippocrates and Yellow Emperor of China)



- **Thiazides** were the first medication to treat Hypertension 1950s
- Initial guidelines began in 1977 for hypertension
- **Joint National Committee on Prevention, Detection, Evaluation and Treatment of High Blood Pressure** began developing reports to summarize High Blood Pressure treatment strategies

JNC 8 Published: 2014
 AHA HTN guidelines Published: 2017

Category	Systolic	Diastolic
Normal	<120	<80
Prehypertension	120-139	80-89
Hypertension, Stage 1	140-159	90-99
Hypertension, Stage 2	≥160	≥100

NHLBI (2003) <https://www.nhlbi.nih.gov/files/docs/guidelines/phyocard.pdf>





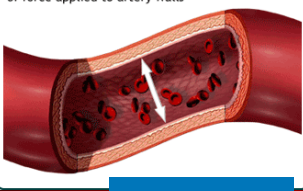
BUSY!

COMPLICATED!



PATHOPHYSIOLOGY OF HYPERTENSION


Blood pressure is the measurement of force applied to artery walls



- Pathophysiology not completely known
- Renal or Adrenal Disease
- Salt Intake
- Obesity
- Insulin Resistance
- RAAS
- Sympathetic Nervous System (fight or flight)
- Smoking

- Genetics
- Endothelial Dysfunction
- Low Birth Weight
- Intrauterine Nutrition
- Neurovascular Anomalies

Beavers, Lip & O'Brien (2001). *BMJ* 322(7291), 912-916




WHY DO WE CARE ABOUT HYPERTENSION?

75 Million Americans have Hypertension

Pre-hypertension and Diabetes raises the risk of Hypertension

High Blood Pressure has costed \$48.6 Billion each year



NEARLY 1 IN 3
PEOPLE HAS HIGH BLOOD PRESSURE.


Source: National Health and Medical Research Council, 2011

CONSEQUENCES:
Stroke
Heart Disease
Heart Failure
Kidney Disease
Blindness


48.6 Billion in Numbers

48,600,000,000


CDC (2016). http://www.cdc.gov/od/odp/ohrt/clinical/ohrt/ohrt_bloodpressure.htm



Prevalence of Hypertension, 2011 U.S. Adults Ages 20 and Older (Percentage)



CDC (2016). http://www.cdc.gov/od/odp/ohrt/clinical/ohrt/ohrt_bloodpressure.htm



JNC 8 GUIDELINES



Table 1. Classification of BP*

Category	BP
Normal	<120/80 mm Hg
Elevated	120-129/ <80 mm Hg
Stage 1 hypertension	130-139/ 80-89 mm Hg
Stage 2 hypertension	≥140/90 mm Hg

BP = blood pressure.

*Based on accurate measurements and average of at least 2 readings on at least 2 occasions.

No True Definition;
But attempting to
Simplify

Patients have one month to
get under control before
adding another med

Carey, R. M. & Whelton, P. K. (2017). JACC: Heart Failure



MEDICATION OPTIONS FOR HYPERTENSION MANAGEMENT

Drug Class	Agents (Examples)	Comments
Diuretics	Thiazide (e.g., hydrochlorothiazide) 12.5-25 mg, chlorthalidone 12.5-25 mg, furosemide 20-40 mg, acetazolamide 250-500 mg, osimertinib 25 mg, indapamide 1.5 mg, spironolone 25 mg, eplerenone 25 mg, torsemide 5-20 mg, bumetanide 0.5-2 mg, furosemide 20-40 mg, acetazolamide 250-500 mg	Diuretics are indicated for hypertension, especially in patients with heart failure, chronic kidney disease, or metabolic syndrome. Thiazide diuretics are preferred for hypertension. Loop diuretics are preferred for heart failure. Osmotic diuretics are used for acute intracranial hypertension. Carbonic dehydratase inhibitors are used for glaucoma and altitude sickness.
ACE Inhibitors	Lisinopril 10-20 mg, ramipril 5-10 mg, enalapril 5-20 mg, lisinopril 10-20 mg, ramipril 5-10 mg, enalapril 5-20 mg, lisinopril 10-20 mg, ramipril 5-10 mg, enalapril 5-20 mg, lisinopril 10-20 mg, ramipril 5-10 mg, enalapril 5-20 mg	ACE inhibitors are indicated for hypertension, heart failure, and myocardial infarction. They are preferred for patients with heart failure and diabetes. Lisinopril is preferred for patients with heart failure and diabetes.
Angiotensin Receptor Blockers	Losartan 50-100 mg, valsartan 80-160 mg, olmesartan 20-40 mg, losartan 50-100 mg, valsartan 80-160 mg, olmesartan 20-40 mg, losartan 50-100 mg, valsartan 80-160 mg, olmesartan 20-40 mg	Angiotensin receptor blockers are indicated for hypertension, heart failure, and myocardial infarction. They are preferred for patients with heart failure and diabetes. Losartan is preferred for patients with heart failure and diabetes.
Calcium Channel Blockers	Amlodipine 5-10 mg, diltiazem 120-360 mg, verapamil 120-480 mg, amlodipine 5-10 mg, diltiazem 120-360 mg, verapamil 120-480 mg, amlodipine 5-10 mg, diltiazem 120-360 mg, verapamil 120-480 mg	Calcium channel blockers are indicated for hypertension, heart failure, and myocardial infarction. They are preferred for patients with heart failure and diabetes. Amlodipine is preferred for patients with heart failure and diabetes.
Beta Blockers	Carvedilol 6.25-25 mg, metoprolol 25-100 mg, atenolol 50-100 mg, carvedilol 6.25-25 mg, metoprolol 25-100 mg, atenolol 50-100 mg, carvedilol 6.25-25 mg, metoprolol 25-100 mg, atenolol 50-100 mg	Beta blockers are indicated for hypertension, heart failure, and myocardial infarction. They are preferred for patients with heart failure and diabetes. Carvedilol is preferred for patients with heart failure and diabetes.
Alpha-1 Blockers	Doxazosin 2-8 mg, terazosin 1-20 mg, doxazosin 2-8 mg, terazosin 1-20 mg, doxazosin 2-8 mg, terazosin 1-20 mg, doxazosin 2-8 mg, terazosin 1-20 mg	Alpha-1 blockers are indicated for hypertension, heart failure, and myocardial infarction. They are preferred for patients with heart failure and diabetes. Doxazosin is preferred for patients with heart failure and diabetes.
Central-acting Agents	Clonidine 0.1-0.6 mg, guanfacine 2-4 mg, clonidine 0.1-0.6 mg, guanfacine 2-4 mg, clonidine 0.1-0.6 mg, guanfacine 2-4 mg	Central-acting agents are indicated for hypertension, heart failure, and myocardial infarction. They are preferred for patients with heart failure and diabetes. Clonidine is preferred for patients with heart failure and diabetes.
Direct Vasodilators	Mineralocorticoid Receptor Antagonists (MRA): spironolone 25 mg, eplerenone 25 mg, mineralocorticoid Receptor Antagonists (MRA): spironolone 25 mg, eplerenone 25 mg	Direct vasodilators are indicated for hypertension, heart failure, and myocardial infarction. They are preferred for patients with heart failure and diabetes. Mineralocorticoid receptor antagonists are preferred for patients with heart failure and diabetes.

Carey, R. M. & Whelton, P. K. (2017). JACC: Heart Failure



NURSING IMPLICATIONS FOR HYPERTENSION

Know Your Drugs

Beta Blockers
ACE-I's
ARB's
ARNI's
Diuretics
Thiazides
CCB's
Others

Know Your Side Effects

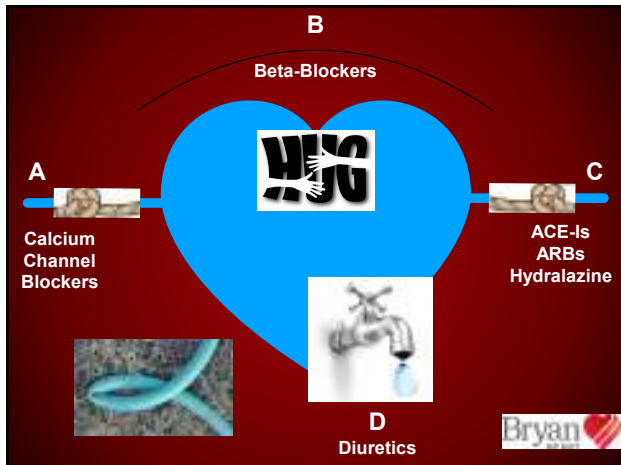
- Lightheadedness
- Low Blood Pressures
- Increased Diuresis
- Cough
- Increased Creatinine
- Bradycardia

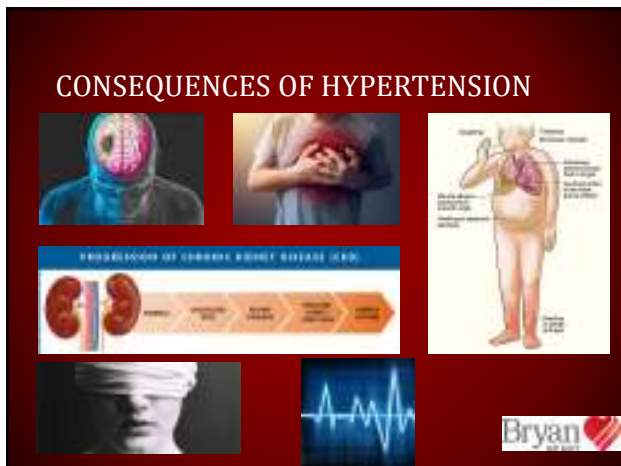
Know Symptoms

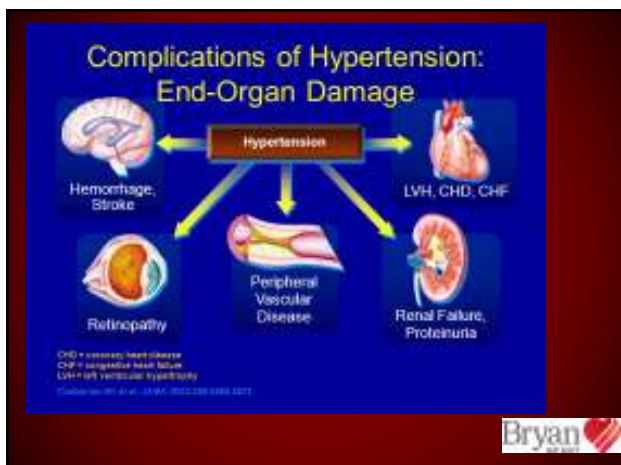
Headache
Epistaxis
Shortness of Breath
Visual Changes
Cognitive Changes
NO SYMPTOMS

Assess Blood Pressure and Heart Rate BEFORE giving medications
Control Pain
Promote De-Stress Situations
Promote and Encourage alternative ways to help with pain and stress









NON-PHARMACOLOGIC TREATMENTS FOR HYPERTENSION

Recommendations to reduce a BP and/or CV risk factor:

BP target	Recommendation
Moderate alcohol intake	Limit to 20-30 g/day men, 20-30 g/day women
Reduce sodium, fat, low fiber diets intake	Less than 2300 mg/day
Stop smoking	Stop smoking

Risk Factor Modification:

- Stop Smoking
- Fruits and Veggies
- Exercise
- Low Cholesterol/ Low Fat Diet

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NEW TREATMENTS ON THE HORIZON

SPRYAL study: Renal Vein Denervation
10 point Blood Pressure difference

- 80 patients
- ABSENCE of anti-hypertensives
- International Study
- SBP >150, <180
- Change in 24 hour blood pressure at 3
- Renal Denervation was successful

Townsend, et al (2017). Lancet. 390(10106), 2160-2170. doi: [https://doi.org/10.1016/S0140-6736\(17\)32261-X](https://doi.org/10.1016/S0140-6736(17)32261-X)

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NEW TREATMENTS ON THE HORIZON

CALM2 Trial: Carotid Artery Microsensor Study

Metaus HD System

Accurate readings 24/7
Non-invasive (no needles or catheters)
Easy to use (attach to neck)
Data sharing (syncs to smartphone)

Key Benefits:

- ACCURATE**: Accurate readings 24/7 (non-invasive)
- NON-INVASIVE**: No needles or catheters
- EASY TO USE**: Attach to neck
- DATA SHARING**: Syncs to smartphone

Au, J. (2018) *Exp Physiol*. 103.1, 141-152.
Vascular Dynamics (2018). <https://www.vascularitydynamics.com>

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CASE STUDY #1

- 48 year old African American Male
- Recent Stress test for "chest tightness" of which was normal
 - Also had echo that was essentially normal except "Left Ventricular Hypertrophy" was noted
- Presented to the Emergency Room due to "crushing chest pain"
- EKG showed left bundle branch block
 - Presumed Acute STEMI unless proven otherwise
- Straight to cath lab for Coronary Artery investigation
 - Normal Coronaries
- Went to cath lab holding-Echo performed
 - Echo Tech called me and said we have a problem
 - CT Chest revealed an Aortic Dissection and was actively bleeding into the layers of his aorta
- Emergent OR and was fixed
 - Developed Resp Failure but was able to awaken and follow commands
 - Lived through but quite debilitated before going to rehabilitation



CONCLUSIONS

- **Hypertension is common and considered the silent killer for a reason**
- **KNOW your symptoms**
- **KNOW your drugs**
- **KNOW your side effects**
- **Use NON-pharmacologic methods**
- **Think outside of the box**
- **Follow your gut instinct**



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