Hypertension 2012

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"BEFORE I GIVE YOU THE BILL, DO YOU SUFFER FROM HEART TROUBLE, HIGH BLOOD PRESSURE, OR SUDDEN SHOCK SYNDROME ?"

Introduction

- No conflict of interest nor pharmaceutical affiliations
- Private practice 13 years prior to SUHS
- Experience dealing with HTN and other chronic medical conditions

Overview

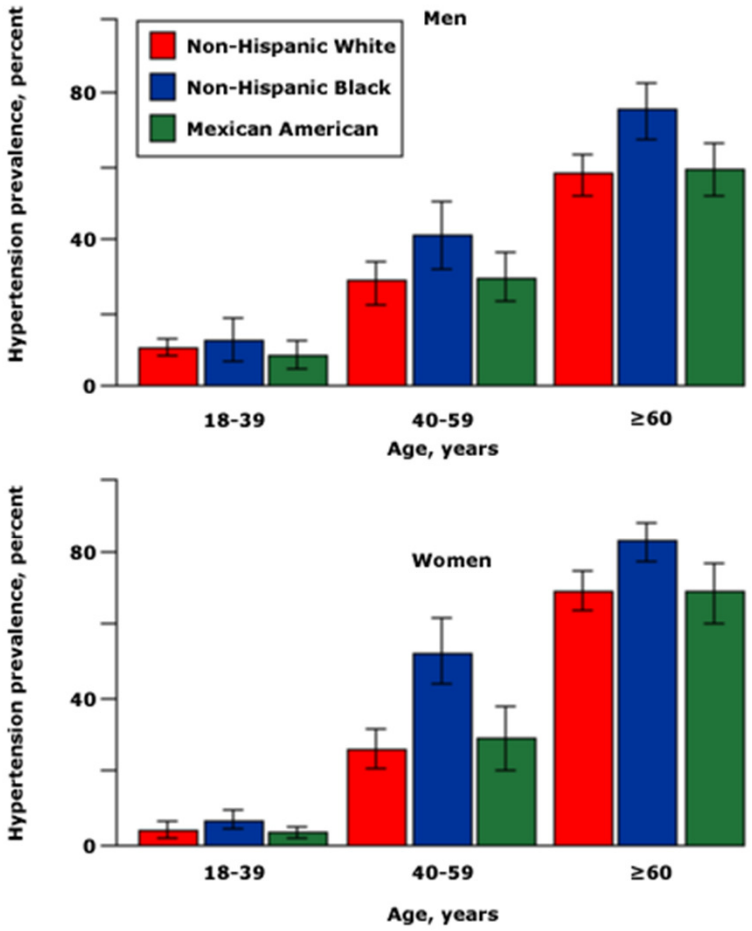
- Why is controlling HTN important?
- JNC-7 (7th Report from the Joint National Committee on Prevention)
- Diagnosis
- Evaluation
- Medications
- Goals
- Case Presentations

Hypertension

- 1:5 young adults age 24-32 have HTN
- ½ aren't aware
- Those aware, only 50% are controlled
- HTN is the most common reason for heart attack and stroke

"You've got the blood pressure of a teenager – who lives on junk food, TV and the computer."

Prevalence of hypertension in the United States



Prevalence of hypertension in men (upper graph) and women (lower graph) according to age and race/ethnicity in the United States from the NHAHES survey. Hypertension occurs earlier and more frequently in non-Hispanic blacks.

Data from: Egan BM, Zhao Y, Axon RN. JAMA 2010; 303:2043.

Trends in the awareness, treatment, and control of high blood pressure in adults in the United States

	NHANES II 1976-1980	NHANES III 1988-1991	NHANES III 1991-1994	NHANES 1999-2000	NHANES 2007-2008
Awareness	51	73	68	70	81
Treatment	31	55	54	59	72
Control*	10	29	27	34	50

The data are for adults age 18 to 74 years of age with a systolic pressure ≥140 mmHg and/or a diastolic pressure ≥90 mmHg.
* Control is defined as a systolic pressure below 140 mmHg and a diastolic pressure below 90 mmHg.
Adapted from: The Seventh Report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure, JAMA 2003; 289:2560, and from US Trends in Prevalence, Awareness, Treatment, and Control of Hypertension 1988-2008, JAMA 2010; 303:2043.

Reference Card From the

Seventh Report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure (JNC 7)

EVALUATION

Classification of Blood Pressure (BP)*

Category	SBP mmHg		DBP mmHg
Normal	<120	and	<80
Prehypertension	120–139	or	80–89
Hypertension, Stage 1	140–159	or	90–99
Hypertension, Stage 2	≥160	or	≥100

* See *Blood Pressure Measurement Techniques* (reverse side)
Key: SBP = systolic blood pressure DBP = diastolic blood pressure

Diagnostic Workup of Hypertension

- Assess risk factors and comorbidities.
- Reveal identifiable causes of hypertension.
- Assess presence of target organ damage.
- Conduct history and physical examination.
- Obtain laboratory tests: urinalysis, blood glucose, hematocrit and lipid panel, serum potassium, creatinine, and calcium. Optional: urinary albumin/creatinine ratio.
- Obtain electrocardiogram.

Assess for Major Cardiovascular Disease (CVD) Risk Factors

- Hypertension
- Obesity (body mass index ≥30 kg/m^2)
- Dyslipidemia
- Diabetes mellitus
- Cigarette smoking
- Physical inactivity
- Microalbuminuria, estimated glomerular filtration rate <60 mL/min
- Age (>55 for men, >65 for women)
- Family history of premature CVD (men age <55, women age <65)

Assess for Identifiable Causes of Hypertension

- Sleep apnea
- Drug induced/related
- Chronic kidney disease
- Primary aldosteronism
- Renovascular disease
- Cushing's syndrome or steroid therapy
- Pheochromocytoma
- Coarctation of aorta
- Thyroid/parathyroid disease

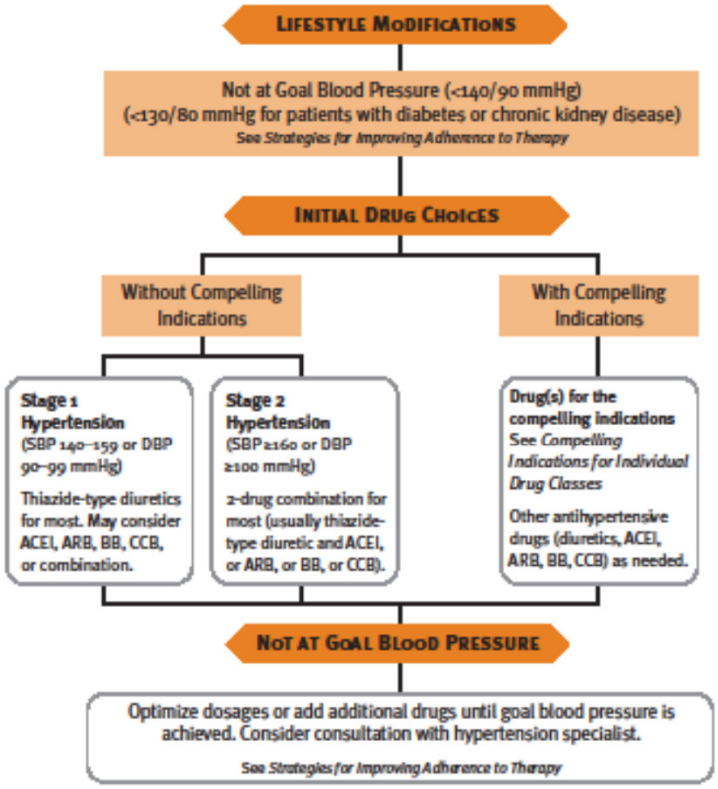
U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES
National Institutes of Health
National Heart, Lung, and Blood Institute

TREATMENT

Principles of Hypertension Treatment

- Treat to BP <140/90 mmHg or BP <130/80 mmHg in patients with diabetes or chronic kidney disease.
- Majority of patients will require two medications to reach goal.

Algorithm for Treatment of Hypertension



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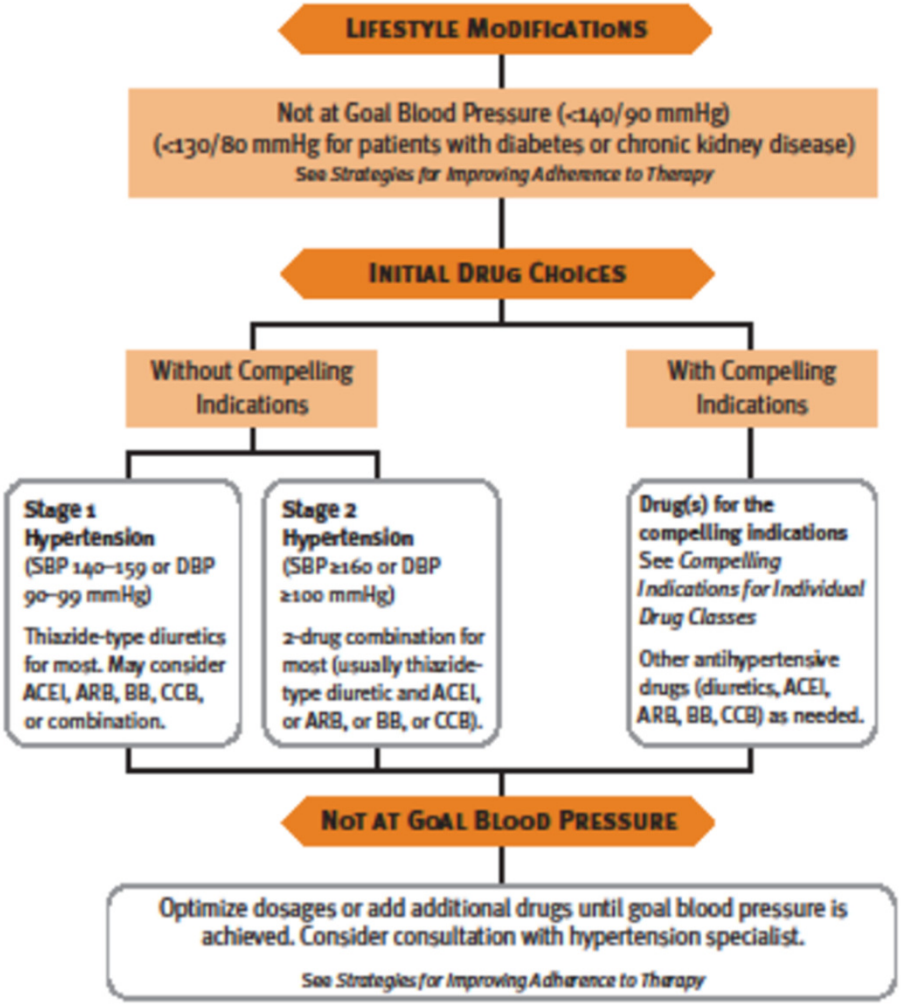


Blood Pressure Measurement Techniques	
Method	**Notes**
In-office	Two readings, 5 minutes apart, sitting in chair. Confirm elevated reading in contralateral arm.
Ambulatory BP monitoring	Indicated for evaluation of "white coat hypertension." Absence of 10–20 percent BP decrease during sleep may indicate increased CVD risk.
Patient self-check	Provides information on response to therapy. May help improve adherence to therapy and is useful for evaluating "white coat hypertension."

Essential (Primary) HTN

- Poorly understood
- Risk factors:
  - Parents with HTN
  - More common and more severe in blacks
  - Excess sodium intake
  - Excess EtOH
  - Obesity, weight gain, decreased physical activity
  - Dyslipidemia

Secondary HTN-College Age

- 12-18 y.o. 10-15% have a secondary cause
- 19-39 y.o. 5% have a secondary cause

Secondary HTN

- Identifiable cause
  - Kidney Disease (parenchymal, fibromuscular dysplasia)
  - OCP/HRT-Estrogen
  - Drugs (NSAID's, SNRI's, Amphetamines, Decongestasnts, Steroids, Illicit)
  - Pheochromocytoma
  - Cushing's syndrome
  - Endocrine disorders (thyroid, parathyroid)
  - Obstructive sleep apnea
  - Coarctation of aorta

HTN is quantitatively the major risk factor of premature CAD (more than cigarette smoking, dyslipidemia or diabetes).

- Attributes to CHF
- LVH
- Ischemic Stroke
- Intracranial hemorrhage
- Chronic kidney disease

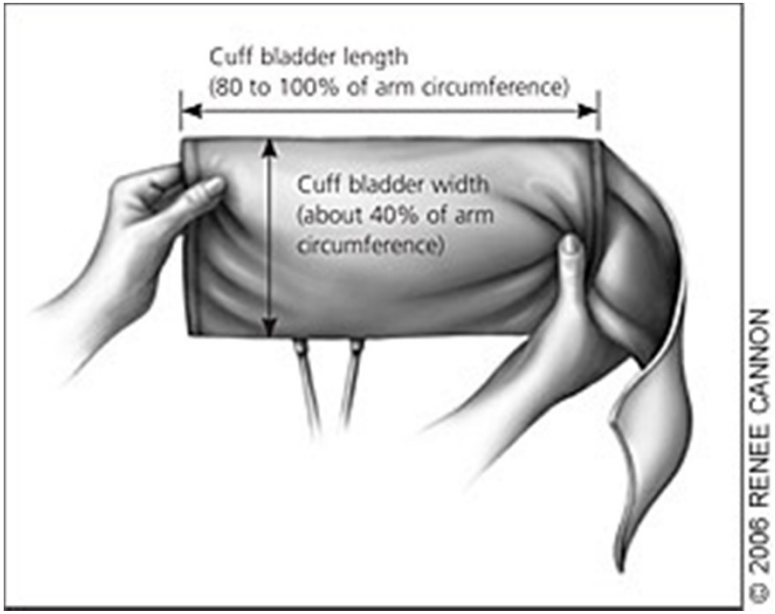
Complications

Diagnosis

- USPSTF recommends screening
  - q 2 years if normal
  - Yearly if prehypertension
  - Appropriate technique

Guidelines for the measurement of blood pressure to diagnose and treat hypertension

Patient conditions
Posture
Initially, check for postural changes by taking readings after five minutes supine, then immediately and two minutes after standing - this is particularly important in patients over age 65, diabetics, or those taking antihypertensive drugs
Sitting pressures are recommended for routine follow-up; the patient should sit quietly with the back supported for five minutes and the arm supported at the level of the heart
Circumstances
No caffeine during the hour preceding the reading and no smoking during the preceding 30 minutes
No exogenous adrenergic stimulants, such as phenylephrine in decongestants or eye drops for pupillary dilatation
A quiet, warm setting
Home readings should be taken upon varying circumstances
Equipment
Cuff size
The length of the bladder should be 80 percent and the width of the bladder should be at least 40 percent of the circumference of the upper arm
Manometer
Aneroid gauges should be calibrated every six months against a mercury manometer
Technique
Number of readings
Take at least two readings on each visit, separated by as much time as possible; if readings vary by more than 5 mmHg, take additional reading until two consecutive readings are close
For the diagnosis of hypertension, take three readings at least one week apart
Initially, take blood pressure in both arms; if pressures differ, use the higher arm
If the arm pressure is elevated, take the pressure in one leg, particularly in patients under age 30
Performance
Inflate the bladder quickly to 20 mmHg above the systolic pressure as estimated from loss of radial pulse
Deflate the bladder 3 mmHg per second
Record the Korotkoff phase V (disappearance) as the diastolic pressure except in children in whom use of phase IV (muffling) may be preferable
If the Korotkoff sounds are weak, have the patient raise the arm, open and close the hand five to ten times, and then inflate the bladder quickly
Recordings
Note the pressure, patient position, arm, and cuff size: eg, 140/90, seated, right arm, large adult cuff



Evaluation

- Once HTN diagnosed, what evaluation should the patient undergo?
  - Extent of end organ damage
  - Patient's overall C.V. risk status
  - Rule out secondary causes

Evaluation

- Physical exam (eyes, carotids, JVD, lungs, heart, abdomen, extremities)
- Labs (Hct, glucose, creatinine (eGFR), K+, calcium, lipids)
- EKG
- Microalbuminuria or Urine dip

Benefits of Treatment

- Treating vs. Placebo
  - 20-25% relative risk reduction in heart failure and MI
  - 30-40% relative risk reduction in stroke

Classification and management of blood pressure for adults aged 18 years or older

BP classification	Systolic BP mmHg*		Diastolic BP mmHg*	Management*		
				Lifestyle modification	Initial drug therapy	
					Without compelling indication	With compelling indications•
Normal	<120	and	<80	Encourage		
Prehypertension	120-139	or	80-89	Yes	No antihypertensive drug indicated	Drug(s) for the compelling indicationsΔ
Stage 1 hypertension	140-159	or	90-99	Yes	Thiazide-type diuretics for most; may consider ACE inhibitor, ARB, beta blocker, CCB, or combination	Drug(s) for the compelling indications; other anti-hypertensive drugs (diuretics, ACE inhibitor, ARB, beta blocker, CCB) as needed
Stage 2 hypertension	≥160	or	≥100	Yes	2-drug combination for most (usually thiazide-type diuretic and ACE inhibitor or ARB or beta blocker or CCB)◇	Drug(s) for the compelling indications; other antihypertensive drugs (diuretics, ACE inhibitor, ARB, beta blocker, CCB) as needed

ACE: angiotensin-converting enzyme; ARB: angiotensin-receptor blocker; BP: blood pressure; CCB: calcium channel blocker.
* Treatment determined by highest BP category.
Δ Treat patients with chronic kidney disease or diabetes to BP goal of less than 130/80 mmHg. Other compelling indications include disorders such as heart failure, post-myocardial infarction, and atrial fibrillation in which particular antihypertensive drugs are warranted independent of BP.
◇ Initial combined therapy should be used cautiously in those at risk for orthostatic hypotension.
Adapted from The Seventh Report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure, JAMA 2003; 289:2560.

'All I'm saying is you should cut down a bit !'

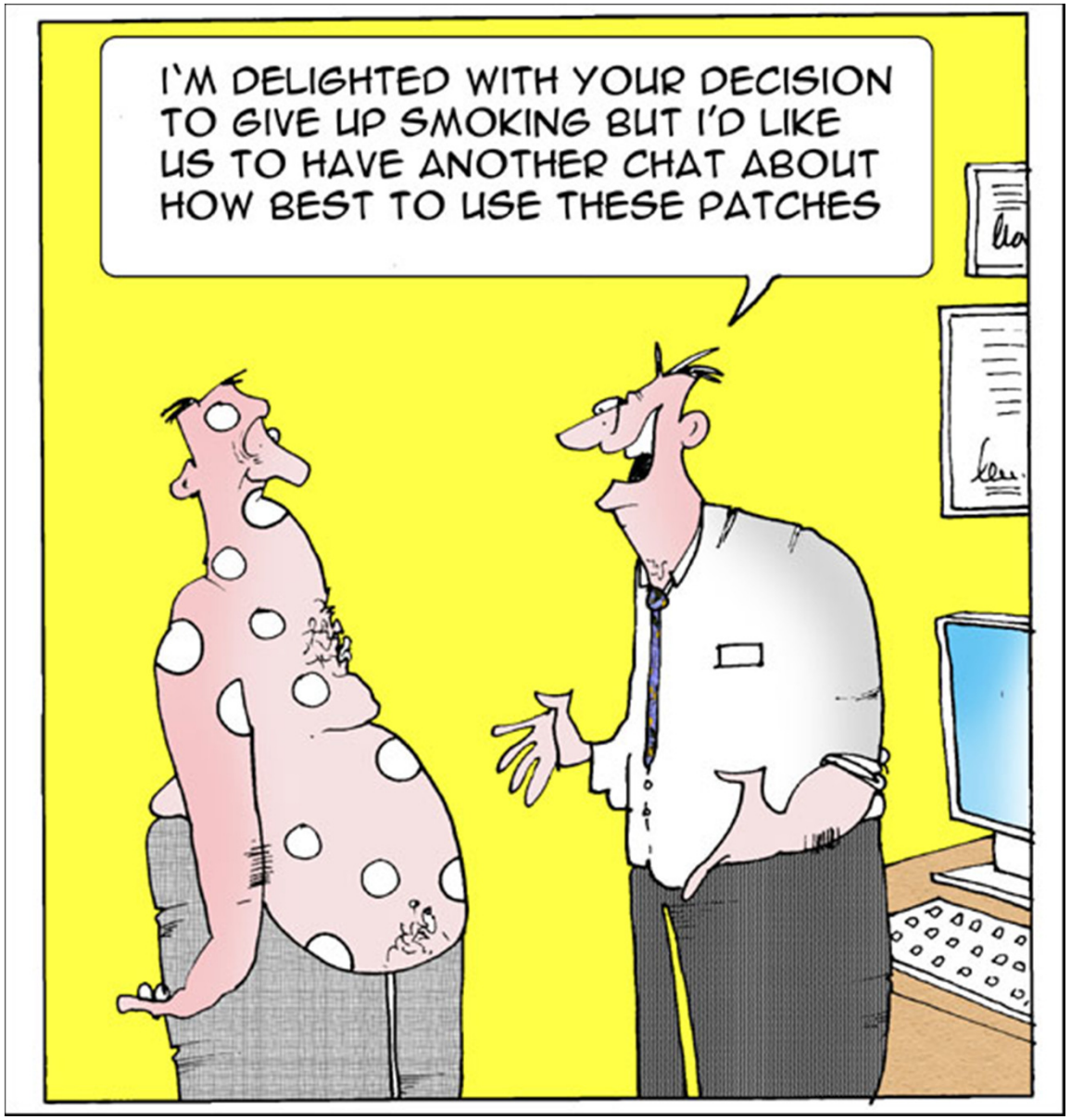
Lifestyle modifications in the management of hypertension

Modification	Recommendation	Approximate systolic BP reduction, range*
Weight reduction	Maintain normal body weight (BMI, 18.5 to 24.9 kg/m2)	5-20 mmHg per 10-kg weight loss
Adopt DASH eating plan	Consume a diet rich in fruits, vegetables, and low-fat dairy products with a reduced content of saturated and total fat	8 to 14 mmHg
Dietary sodium reduction	Reduce dietary sodium intake to no more than 100 meq/day (2.4 g sodium or 6 g sodium chloride)	2 to 8 mmHg
Physical activity	Engage in regular aerobic physical activity such as brisk walking (at least 30 minutes per day, most days of the week)	4 to 9 mmHg
Moderation of alcohol consumption	Limit consumption to no more than 2 drinks per day in most men and no more than 1 drink per day in women and lighter-weight persons	2 to 4 mmHg

For overall cardiovascular risk reduction, stop smoking. The effects of implementing these modifications are dose and time dependent and could be higher for some individuals; they are not all additive.

BMI: body mass index; BP: blood pressure; DASH: Dietary Approaches to Stop Hypertension.

Reproduced from: The Seventh Report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure. Available at http://www.nhlbi.nih.gov/guidelines/hypertension/jnc7full.pdf.



Considerations for individualizing antihypertensive therapy

Indication	Antihypertensive drugs
Compelling indications (major improvement in outcome independent of blood pressure)	
Systolic heart failure	ACE inhibitor or ARB, beta blocker, diuretic, aldosterone antagonist*
Post-myocardial infarction	ACE inhibitor, beta blocker, aldosterone antagonist
Proteinuric chronic renal failure	ACE inhibitor and/or ARB
High coronary disease risk	Diuretic (ALLHAT), perhaps ACE inhibitor (HOPE)
Diabetes mellitus (no proteinuria)	Diuretic (ALLHAT), perhaps ACE inhibitor (HOPE)
Angina pectoris	Beta blocker, calcium channel blocker
Atrial fibrillation rate control	Beta blocker, nondihydropyridine calcium channel blocker
Atrial flutter rate control	Beta blocker, nondihydropyridine calcium channel blocker
Likely to have a favorable effect on symptoms in comorbid conditions	
Benign prostatic hypertrophy	Alpha blocker
Essential tremor	Beta blocker (noncardioselective)
Hyperthyroidism	Beta blocker
Migraine	Beta blocker, calcium channel blocker
Osteoporosis	Thiazide diuretic
Perioperative hypertension	Beta blocker
Raynaud's syndrome	Dihydropyridine calcium channel blocker
Contraindications	
Angioedema	ACE inhibitor
Bronchospastic disease	Beta blocker
Depression	Reserpine
Liver disease	Methyldopa
Pregnancy	ACE inhibitor, ARB (includes women likely to become pregnant)
Second or third degree heart block	Beta blocker, nondihydropyridine calcium channel blocker
May have adverse effect on comorbid conditions	
Depression	Beta blocker, central alpha agonist
Gout	Diuretic
Hyperkalemia	Aldosterone antagonist, ACE inhibitor, ARB
Hyponatremia	Thiazide diuretic
Renovascular disease	ACE inhibitor or ARB

* A survival benefit from an aldosterone antagonist has only been demonstrated in patients with advanced heart failure; in patients with less severe disease, an aldosterone antagonist is primarily given for hypokalemia

Adapted from The Seventh Report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure, JAMA 2003; 289:2560.

Goal

- <140/90

"What fits your busy schedule better, exercising one hour a day or being dead 24 hours a day?"

Drug Classes

- The following drug classes have good outcome data:
  - Thiazide diuretics
  - Calcium channel blockers
  - ACE inhibitors
  - ARB’s

- Intoloerance
- Strong indication for another class (beta-blockers for recent MI).

- Other classes:
  - Alpha blockers
  - Direct vasodilators
  - Central sympatholytics

Reasons not to use 4 classes

Mary Johnson is a 39 year old African American woman who presents today for a routine check up. She has no specific complaints.

Past Medical History – None. Vaccinations are up to date.

Medications – None.

Gynecologic History – Menarche age 12. No history of menstrual irregularities. Menses every 28 days and has normal flow for 4 days. Last period was two weeks ago. She is gravida 2 para 2 having two children via normal spontaneous vaginal deliveries in the past. No history of STIs. Pap smears and breast exams are all normal in past years. She uses condoms only as contraception.

Past Surgical History – None

Social History – She speaks English. Married to her husband and 2 children (all of whom are your patients). She works as a banking department manager. She is sexually active with her husband only. She drinks 2 glasses of wine on weekends. She has never smoked. Denies any drug use. Has good emotional support from her family and her parents live nearby (and they are also your patients).

Family History – Father has blood pressure and cholesterol problems. Mother is overweight but generally healthy. Sister is healthy. No other problems reported.

ROS – Completely negative

Vital Signs - BP 145/80 | P 73 | R 20 | T 98.6 | Weight 190 | Height 5 feet 8 inches | Waist circumference 35 inches | BMI 28.9

What is the definition of hypertension? (Choose the one best answer)

A) Systolic blood pressure greater than 150 or diastolic blood pressure greater than 80.

B) Systolic blood pressure greater than 130 or diastolic blood pressure greater than 80.

C) Systolic blood pressure greater than 140 or diastolic blood pressure greater than 80.

D) Systolic blood pressure greater than 140 or diastolic blood pressure greater than 90.

E) Systolic blood pressure greater than 130 or diastolic blood pressure greater than 70.

How many elevated blood pressure measurements do you have to get from your patient, Mary Johnson, before you can diagnose her with “hypertension”?(Choose the one best answer)

A) One elevated measurement, on any arm, at one visit.

B) At least two elevated measurements, one in each arm, on one visit.

C) At least two elevated measurements, one in each arm, should be made on 2 or more visits.

D) At least two elevated measurements, on any arm, should be made on 2 or more visits.

E) At least two elevated measurements, one in each arm, should be made on 3 or more visits.

You have brought back your patient, Mary Johnson, for a second appointment to evaluate her blood pressure. From her first visit, she had a blood pressure of 145/80 in both arms taken 2 minutes apart. The rest of her physical exam was negative. Today, you repeat the blood pressures and get 148/ 79 in the left arm and 148/80 in the right arm. How do you diagnose and classify Mary Johnson's blood pressures? (Choose the one best answer)

A) Mary Johnson is not hypertensive.

B) Mary Johnson is prehypertensive.

C) Mary Johnson is diagnosed with Stage 1 Hypertension.

D) Mary Johnson is diagnosed with Stagee 2 Hypertension.

E) Mary Johnson cannot be diagnosed at this second visit.

You have made the new diagnoses of Stage 1 Essential Hypertension in your patient Mary Johnson. What initial laboratory testing would you order in the office as per JNC 7 standards regarding essential hypertension? (Choose all that apply)

A) Electrocardiogram
B) Thyroid function tests
C) Urinalysis
D) Echocardiogram
E) Blood glucose
F) Blood hematocrit
G) Renal artery sonography
H) Serum potassium (K)
I) Serum creatinine (or the corresponding estimated GFR)
J) Serum calcium (Ca)
K) Serum chloride (Cl)
L) Serum cortisol
M) Random serum total cholesterol
N) Fasting serum cholesterol panel (total cholesterol, LDL, HDL, triglyceride)
O) MRI of the abdomen
P) Measurement of urinary albumin excretion or albumin/creatinine ratio
Q) Complete blood count (CBCs)
R) Complete liver enzyme panel (LFTs)
S) Chest X-ray
T) Serum sodium (Na)

Mary Johnson recently diagnosed with asymptomatic Stage 1 Hypertension returns for follow-up. Her initial laboratory tests were all within normal limits. You have counseled her on lifestyle modifications and are now ready to start drug therapy.

What would you recommend as initial drug treatment in Mary Johnson? (Choose the one best answer)

A) ACE inhibitor.
B) Thiazide diuretic
C) Beta Blocer
D) Calcium Channel Blocker
E) ARB (Angiotensin Receptor Blocker)

Follow Up and Monitoring

Patients should return for monthly follow up and adjustment of medications until the BP goal is reached.

More frequent visits for stage 2 hypertension or with complicating co-morbid conditions.

Serum potassium and creatinine should be monitored 1–2 times per year.

After blood pressure is at goal and stable, follow up visits at 3- to 6-month intervals.

Although not mentioned in JNC 7, consideration should be given to periodic rechecking fasting cholesterol panels and glucose, and possibly urine microalbumin if initial surveillance was negative.