

New Guidelines for Hypertension from the Lens of PA/LTC Medicine

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**ACC/AHA 2017 HTN guidelines:
New Definitions**

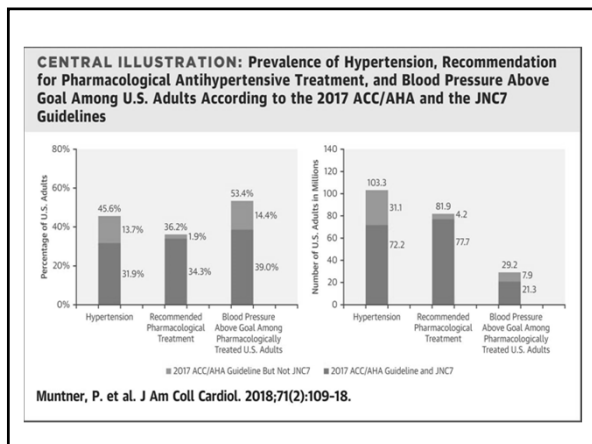
- **The definitions of HTN have changed:**
Normal < 120/80 mmHg
- **Elevated BP (previously normal): 120-129/<80 mmHg**
- **Stage 1 HTN (previously pre-HTN): 130-139/ 80-89 mmHg**
- **Stage 2 HTN: ≥ 140 or ≥ 90 mmHg**

Weiss et al., 2017; Muntner et al., 2018; Carey et al., 2018; Bakris et al. 2018; Samieri et al., 2018

Pharmacologic RX and follow-up

- **Stage 1: Non-pharm Rx and reassess in 3-6 mo**
- **Stage 1 + ASCVD risk >10%: Rx with meds; follow-up in 1 month**
- **Stage 2: Rx with meds from 2 drug classes; followup in 1 month**

Weiss et al., 2017; Muntner et al., 2018; Carey et al., 2018; Alexander et al., 2018; Bakris et al. 2018; Samieri et al., 2018; Papadakis et al., 2018



Question #1:

Consequences of HTN may include:

- a) LVH or LA enlargement
- b) Atrial fibrillation, CVA, TIA
- c) AMI, Elevated BNP, HF
- d) All of the above

Question #2:

True or False:

Hypertension occurs more often in persons over 65 yrs of age, and more often in older men vs older women

- a) True
- b) False

Question #3:

Treatment of Hypertension may include:

- a) Lifestyle modification
- b) Raising the afterload
- c) Increasing the preload
- d) All of the above

Question #4:

When should inotropic agents be considered in treating Hypertension?

- a) When beta blockers cannot be tolerated
- b) When the heart rate needs to be increased
- c) Inotropic agents are not indicated in Hypertension

Case Presentation

84 yo woman, independent, at home, with HTN, was D/C'd from hosp for pneumon to PA-LTC; she had new onset AF, and was dc'd on amiod 100 bid, digoxin 0.125 mg/d, diltiazem CD 240 mg, warfarin, colace.

PE - Pale, thin, BP 108/58mmHg, pulse reg, 58/min, RR 14/min, afebrile;
 JVD - negative;
 Chest -reduced BS at bases;
 CVS - reg rhythm, S2 loud, 2/6 SEM;
 Abdomen -benign;
 Ext- Trace ankle edema, pulses 2+ bilat;
 Neuro- A & O x 3; No focal deficits. Power 4/5 bilat, mild sarcopenia.

Pertinent labs: H/H 10.5/32, normal WBCs. Chemistry normal. BNP was 155.
 Phys Therapy not able to motivate her. She walked 10 feet and c/o SOB.

What should we do next?

Why is Hypertension (HTN) important?

- HTN in >50% of HF cases, 70% of AMIs and 80% of CVAs; the prevalence continues to rise, esp in the elderly
- HTN's prevalence increases with advancing age, much more in women vs men over age 65 yrs,
- HTN increases risks of CV disease, systemic inflammation & endothelial dysfunction,
- Multiple clinical drug trials have reached a positive outcome for HTN and comorbidities; However,
- HTN Rx may have benefits &/or harms in frail elderly

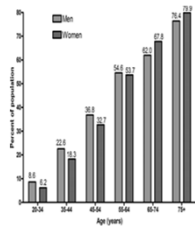
Wei, 1992; Buford, 2016; Weiss et al., 2017; Weisner et al., 2018; Samieri et al., 2018

Observations

1. Why are seniors so vulnerable to hemodynamic decompensation after stress of any kind?
2. Why are seniors so prone to develop HTN and HF?
 - a) ?Disease (CAD, ASCVD, DM, A fib, valvular, thyroid, infection, renal)
 - b) ?Aging (↓ endothelial, coronary, &/or beta-adrenergic response, or ↑ relaxation time, vascular & myocardial stiffness, pulse pressure, conduction delay)

Wei, '92, 2004; Bak et al., '98; Kirapko et al., 2001; Athar et al., 2010; Zhang et al., 2012, 2015; Buford et al., 2016; Karis, 2018

Observations



- HTN, TIA and CVA increase with age;
- LVH, AMI and HF increase with age;

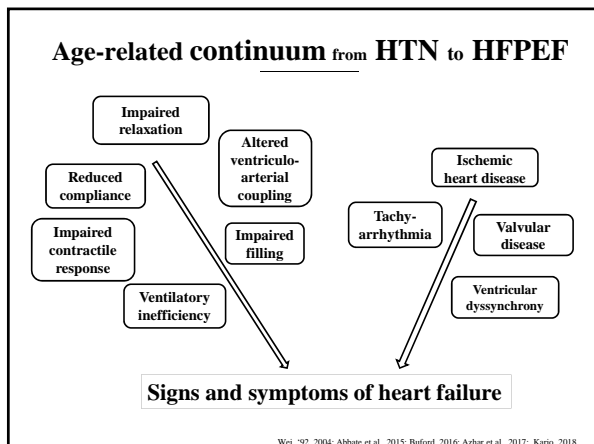
- Q: Common mechanisms?**
- 1) Chronic, low-grade inflammation;
 - 2) Increased cellular oxidative stress;
 - 3) Vascular endothelial dysfunction

Table 2. ADJUSTED ODD RATIOS (AOR) FOR CHF WITH PRESERVED SYSTOLIC FUNCTION

Independent Risk Factor	Adjusted OR	95% CI	P Value
Left ventricular hypertrophy	2.6	1.8-3.8	.001
Gender (women)	2.5	1.8-3.4	.001
Hypertension	1.6	1.1-2.3	.002
Age (10 y) ^a	1.2	1.1-1.4	.003
Diabetes	0.6	0.4-0.9	.004
Mitral regurgitation	0.4	0.3-0.5	.001
CAD	0.3	0.2-0.5	.001

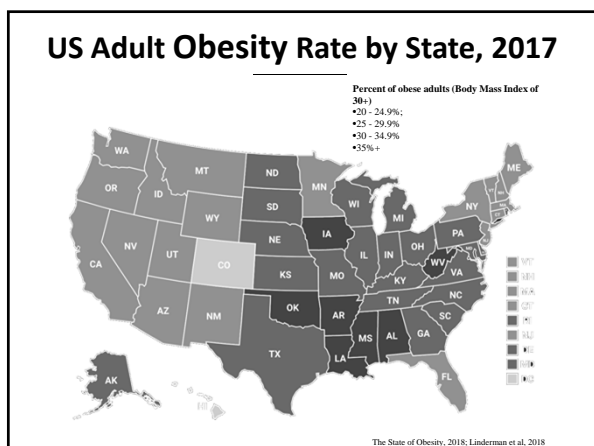
^aThis table with the age is stratified for <1 decade (10 years) treatment in age, age >= 10 years with 10% more likely to have CHF with preserved systolic function compared with 10% more after adjusting for other factors

Wei, '92, 2004; Bak et al., '98; Sammel et al., '99; Kirapko et al., 2001; Athar et al., 2010; Zhang et al., 2012, 2015; Buford et al., 2016; Athar et al., 2017



- ### Secondary HTN
- New onset HTN despite 3 meds
 - HTN uncontrolled
 - Target organ damage
 - Diastolic HTN in elderly
 - Hypokalemia
 - Other causes of secondary HTN: Obesity, OSA, renovascular, drugs, Cushings, pheochromocytoma, hyperaldosteronism

Samsel et al., 1999; Weiss et al., 2017; Muntner et al., 2018; Carey et al., 2018; Alexander et al., 2018; Bakris et al., 2018



Drugs that may contribute to HTN

- Etoh
- Corticosteroids
- Erythropoetin-stimulating drugs
- Herbal supplements (e.g., ephedra)
- NSAIDS
- Stimulants (e.g., caffeine)
- Sympathomimetics

Weiss et al., 2017; Muntner et al., 2018; Carey et al., 2018; Alexander et al., 2018; Bakris et al., 2018

Signs & Symptoms of HTN

- HTN, often asymptomatic, is the "silent killer"
- If BP over 180/120 but no symptoms, it's a HTN Urgency; if with symptoms, it's a HTN Emergency
- Symptoms of BP >180/120:
headaches, back pain, facial flushing, nosebleeds, numbness, weakness, anxiety, dyspnea, vision changes
- If headache, may need to go to ED for IV Rx


Non-pharmacologic treatment

- Weight loss (~ 1 mmHg for each kg)
- DASH-type diet (11 mmHg)
- Supplement low Na, K
- Exercise (aerobic or dynamic)
- Reduce Etoh intake
- Reduce stress
- Meditation

Weiss et al., 2017; Muntner et al., 2018; Carey et al., 2018; Alexander et al., 2018; Bakris et al., 2018; Samieri et al., 2018

Nutritional needs change with age

Feed the body, mind and soul with 5 colors on the plate

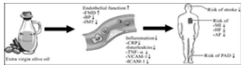


1. **Aging may be associated with:**
 - reduced appetite,
 - inadequate protein intake and inappropriate low caloric intake with weight loss;
 - Decreased energy requ'mts ~8% /decade , 55 -75;
2. **Lean muscle mass is lost at ~ 1% per yr, after age 30 yrs;**
3. **Muscle fibers gradually decrease in size and number.**
4. **Sarcopenia, in > 50% of those > age 80yrs, increases disability & healthcare costs;**

Williams, 2012; Ritchie et al., 2014; Collino et al., 2014; Coker et al., 2015; Athar et al., 2017

Dietary Recommendations

- **Water:** The body's water content declines with age; dehydration often. Should drink daily 0.5 – 1.0 oz of water for every 2 lbs weight.
- **Protein:** Needed for immune system, muscle mass & strength, etc. Daily protein intake should be 0.50-.70 gm/lb.
- **Vitamin D & Calcium:** most elderly need vita D. Should take daily vitamin D of > 800 IU with calc supp > 600mg.
- **Nutritionally-dense:** vegetables & fruits; Protein-rich (beans, leg-umes, meat, fish, eggs and dairy products); Whole grains (brown rice; oats & whole grain cereals); Healthy Fats (nut butters, nuts, seeds, olive oil, fish oil).





Williams, 2012; Beattie et al., 2012; Ritchie et al., 2014; Smeets et al., 2017; Tanaka 2018

BP Thresholds for and Goals of Pharmacological Therapy in Patients With Hypertension According to Clinical Conditions

Clinical Condition(s)	BP Threshold, mm Hg	BP Goal, mm Hg
General		
Clinical CVD or 10-year ASCVD risk ≥10%	≥130/80	<130/80
No clinical CVD and 10-year ASCVD risk <10%	≥140/90	<130/80
Older persons (≥65 years of age; noninstitutionalized, ambulatory, community-living adults)	≥130 (SBP)	<130 (SBP)
Specific comorbidities		
Diabetes mellitus	≥130/80	<130/80
Chronic kidney disease	≥130/80	<130/80
Chronic kidney disease after renal transplantation	≥130/80	<130/80
Heart failure	≥130/80	<130/80
Stable ischemic heart disease	≥130/80	<130/80
Secondary stroke prevention	≥140/90	<130/80
Secondary stroke prevention (lacunar)	≥130/80	<130/80
Peripheral arterial disease	≥130/80	<130/80

ASCVD indicates atherosclerotic cardiovascular disease; BP, blood pressure; CVD, cardiovascular disease; and SBP, systolic blood pressure.

Balancing the risks of HTN Rx in elderly

Population	Blood Pressure Goal, mm Hg		
	Age <50 y	Age 50-74 y	Age ≥75 y
General population	<120/80	<130 ^b	<140 ^c
High-risk population ^a	<130	<130 in presence of CVD or increased CVD risk or chronic kidney disease ^b <140 in presence of type 2 diabetes ^c	<140 ^c

^a Presence of cardiovascular disease (CVD) or increased CVD risk, chronic kidney disease, or diabetes.
^b Treat initially to systolic blood pressure of <140 mm Hg. If treatment is well tolerated, proceed to target goal of <130 mm Hg.
^c Treat to target systolic blood pressure goal of <140 mm Hg. If treatment is well tolerated, proceed to lower target of <130 mm Hg.

Annex and Wei, 2009; Weiss, et al., 2017; Basile et al., 2017; Nachitz, 2018; Abell et al, 2018

Even mild HTN increases Dementia risk later

Figure 1 Threshold association of systolic blood pressure^{mmHg} at age 50 (A), 60 (B), and 70 years (C) with dementia. Systolic blood pressure was modelled by both full restricted cubic splines with four age-specific Harrell knots in a Cox regression model adjusted for age, sex, education, ethnicity, marital status, and occupational position. Hazard ratios calculated with systolic blood pressure 100mmHg as reference.

Figure 2 Multi-state models for the role of hypertension at age 50 in transition to cardiovascular disease (stroke or coronary heart disease) and dementia. Role of hypertension (systolic blood pressure ≥130 mmHg) at age 50 years in the risk of transitions from: (A) healthy state to incident cardiovascular disease; (B) cardiovascular disease (stroke or coronary heart disease) to incident dementia; (C) healthy to incident dementia in those free of cardiovascular disease (stroke or coronary heart disease). Analyses with age as time-scale and adjusted for sex, education, ethnicity, marital status at age 50, occupation position at age 50, and birth cohort.

Abell et al., 2018; Samieri et al., 2018; Murray et al., 2018

Hypertension Linked to Early Brain Changes

Brain MRI fiber-tracking reveals white matter alterations in hypertensive patients without damage under conventional neuroimaging

This approach could identify patients at initial stages of brain damage and could gain benefit of therapies aimed at limiting the transition to dementia and neurodegeneration.

A Reconstruction of mean white matter tracts. **B** Tracts with impaired diffusivity in HT.

- Anterior Thalamo Radiation
- Superior Longitudinal Fasciculus
- Fornix Mirror

Camevale et al., 2018

Medications for HTN Rx

Persons younger than 55 years and not black

Persons aged 55 years or older or black

Step 1 → A (for younger) / C¹ (for older/black)

Step 2 → A + C

Step 3 → A + C + D

Step 4 → Resistant hypertension
A + C + D = consider alpha-blocker or diuretic² or alpha- or beta-blocker³
Consider seeking expert advice

A, ACE inhibitor or ARB; C, calcium-channel blocker; D, diuretic, thiazide-like.

¹A CCB is preferred, but consider a thiazide-like diuretic if a CCB is not tolerated or the person has edema, evidence of heart failure, or a high risk of heart failure.

²Consider a low dose of spironolactone or higher doses of a thiazide-like diuretic.

³Consider an alpha- or beta-blocker if further diuretic therapy is not tolerated, or is contraindicated or ineffective.

Source: Maxine A. Papadakis, Stephen J. McPhee, Michael W. Rabow
Current Medical Diagnosis & Treatment 2019
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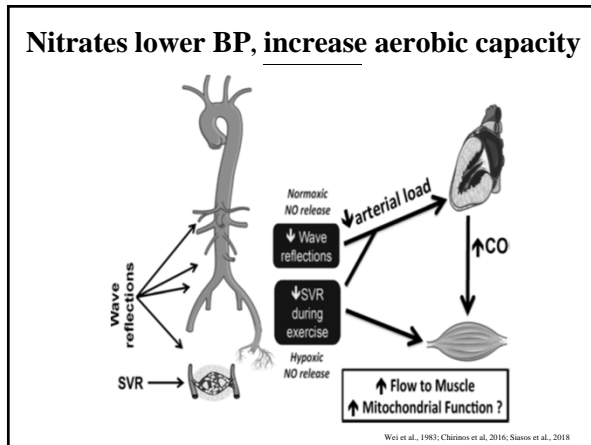
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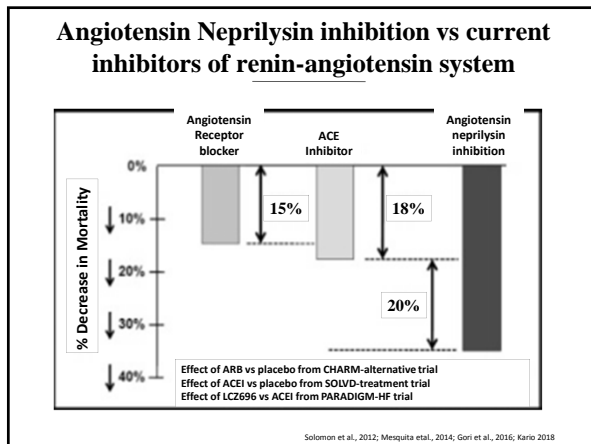
Stage 1 or Stage 2 HTN:

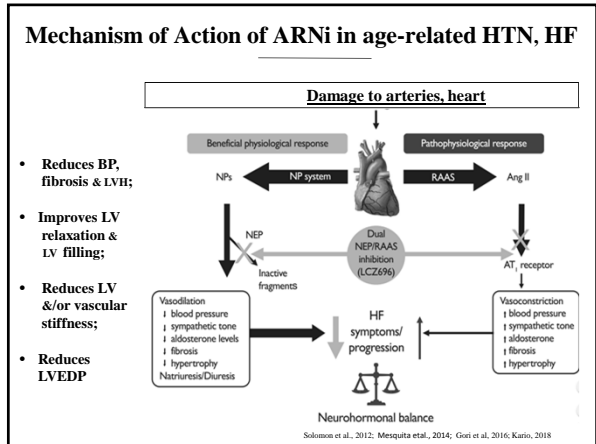
a) ACEI or ARB, CCB, &/or Diuretic

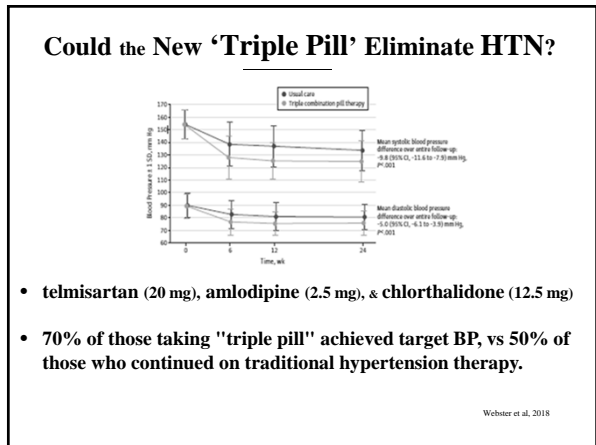
**b) Resistant HTN:
ACEI or ARB, CCB, &/or Diuretic, &/or AB, BB nitrate, ARNI**

**c) Prevent fibrosis -
Spironolactone, ACEI, ARNI**

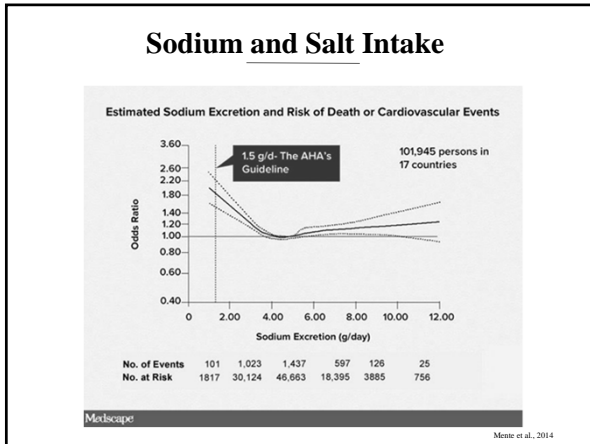


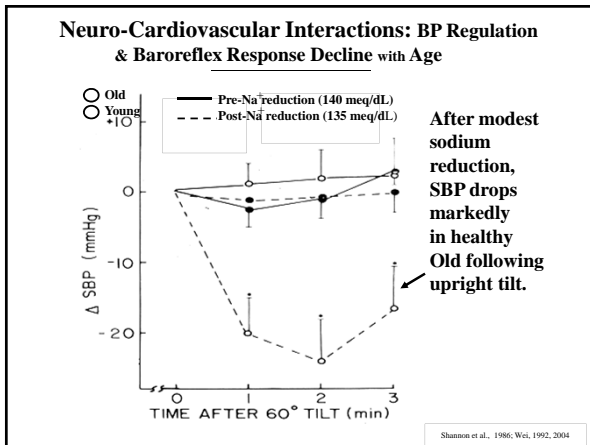






- ### Reducing HTN & HF Hosp Readmissions From Skilled Nursing Facilities
- Follow-up provider visit in 1-3 days after AH discharge;
 - Daily morning weights;
 - Surveillance and early treatment for:
 - Weight gain or loss of 3 lbs in 1 day or 5 lbs in 1 week
 - Heart failure exacerbation; hypotension,
 - Infections: Respiratory; Urinary tract; Sepsis
 - Electrolyte imbalance
 - Depression
 - Poor physical health
 - Poor cognitive health
 - Insufficient nutrition or unintentional weight loss
- Allen et al., 2011; Aguilar et al., 2011; Blecker et al., 2012; Wysocki et al., 2014; Unroe et al., 2015, 2018





Case Presentation

An 84 yo woman, independent, at home, with HTN, was D/C'd from hospital for pneumonia to the PA-LTC facility; She had new onset AF and is now on amiodarone 100 bid, digoxin 0.125 mg/d, diltiazem CD 240 mg, warfarin, & Colace.

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Pertinent labs: H/H 10.5/32, normal WBCs. Chemistry normal. BNP was 155.
 Phys T not able to motivate her. She walked 10 feet and c/o SOB.

What should we do next?

ACC/AHA 2017 HTN guidelines:
Key points

- Get accurate BP measurements
- New BP classification system
- Lower BP targets for on-going management
- Decision making to include CV risk
- Improve BP control, refocus on lifestyle counseling

Prevention of HTN

Lifestyle: Exercise, Diet & Weight mgmt



Sleep well, Eat well & Move well

Wei, 2004; Van Veldhuisen et al., 2013; Meyer et al., 2013; Abbate et al., 2015; Shah et al., 2016; Ashur et al., 2017

