THE GUIDELINES WAR

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Disclosures

Sondra DePalma

- Writing Committee member of the 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
- Advisory Group member of Target:BP™ (AHA/AMA initiative)
- No financial relationships with industry

Kim Zuber, PAC

- None

Objectives

- Review recent HTN guidelines: ACC/AHA & KDIGO
- Using a patient case model, discuss perspectives in HTN management for cardiology and nephrology patients
- Review evidence-based prescribing guidelines for the treatment of HTN, as well as contradictions and adverse effects of antihypertensive medication

The Contestants

ACC/AHA

- Who they are
- How was the research done
- Strengths/weaknesses
- Represented by Sondra

KDIGO

- Who they are
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How to Measure Blood Pressure

ACC/AHA

- A device that is validated and calibrated periodically, using proper technique and correct cuff size, should be used
- An average of 2 to 3 BP measurements on 2 to 3 separate occasions should be obtained
- Out-of-office BP measurement, either with ambulatory BP monitoring (ABPM) or home BP monitoring (HBPM) recommended to confirm diagnosis of hypertension and for titration of BP-lowering medication, and can be used to screen for white coat and masked HTN

How to Measure Blood Pressure

KDIGO

- An automatic cuff is preferable; standardized measurement with an average of 3 readings
- Oscillometric devices can be used to measure BP among patients with atrial fibrillation.
- We suggest that out-of-office BP measurements be used with ambulatory BP monitoring (ABPM) or home BP monitoring (HBPM) to complement standardized office BP readings for the diagnosis and management of high BP.

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What is Normal and Abnormal?

ACC/AHA

BP Category	SBP		DBP
Normal	<120 mm Hg	and	<80 mm Hg
Elevated	120–129 mm Hg	and	<80 mm Hg
Hypertension			
Stage 1	130–139 mm Hg	or	80–89 mm Hg
Stage 2	≥140 mm Hg	or	≥90 mm Hg

What is Normal and Abnormal?

KDIGO

- Any **SBP > 120mmHg** in CKD patient if taken by standardized method
- Any **SBP > 130mmHg** in transplant patient if taken by standardized method
- And **SBP > 50%** normal in a child
- We think everyone has cardiac risk factors

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What is the Goal Blood Pressure

KDIGO

- We suggest that adults with CKD and high BP be treated with a target systolic blood pressure (SBP) of **< 120 mm Hg**
- It is important to standardize BP readings
- Be less aggressive in those with very limited life expectancy or symptomatic postural hypotension due to autonomic neuropathy.
- We have no particular recommendations on diastolic levels except to encourage perfusion of the kidney

What is the Goal Blood Pressure

ACC/AHA

- BP goal with pharmacologic therapy is < 130/80 for all adults with HTN.
- In older adults (≥65 years of age) who have a high burden of comorbidity and limited life expectancy, may be less aggressive based on clinical judgment and patient preference.

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Laboratory Testing

ACC/AHA

Basic and Optional Laboratory Tests for Primary Hypertension

Basic Testing	Fasting blood glucose*
	Complete blood count
	Lipid profile
	Serum creatinine with eGFR*
	Serum sodium, potassium, calcium*
	Thyroid-stimulating hormone
	Urinalysis
	Electrocardiogram
Optional Testing	Echocardiogram
	Uric acid
	Urinary albumin to creatinine ratio

*May be included in a comprehensive metabolic panel

Table 17

Laboratory Testing

KDIGO

- Everyone should have a SCr, UACR and staging
- We are thrilled our cardiology brethren are discovering urine but a little bummed it is optional
- Consider U/S for ADPKD: most common genetic disease, often missed, body habitus/FH/HIGH GFR are clues

Stages of CKD

Composite ranking for relative risks by GFR and albuminuria (KDIGO 2009)			Albuminuria stages, description and range (mg/g)				
			A1		A2	A3	
			Optimal and high-normal		High	Very high and nephrotic	
			<10	10–29	30–299	300–1999	≥2000
GFR stages, description and range (ml/min per 1.73 m²)	G1	High and optimal	>105				
			90–104				
	G2	Mild	75–89				
			60–74				
	G3a	Mild-moderate	45–59				
	G3b	Moderate-severe	30–44				
	G4	Severe	15–29				
	G5	Kidney failure	<15				

KDIGO 2012 Clinical Practice Guideline for the Evaluation and Management of CKD, *Kidney International*, Jan 2013, Vol 3, Issue 1

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Treatment according to CV risk

ACC/AHA

- Nonpharmacologic therapy should be initiated in all persons with BP ≥ 120/80 mm Hg
- Assess for clinical ASCVD or calculate 10-year ASCVD risk in everyone (*ACC/AHA Pooled Cohort Equation* recommended)
- Threshold for initiating BP lowering medication
  - *People with clinical ASCVD or estimated 10-year ASCVD risk ≥ 10% (including people with DM or CKD) - ≥ 130/80 mm Hg (IA)*
  - *No clinical CVD and 10-year ASCVD risk < 10% - ≥ 140/90 mm Hg (IC)*
- Treatment goal with pharmacologic therapy is < 130/80 for all adults with HTN

Treatment according to CV risk

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- We think everyone with CKD has high CV risks and while we don't say not to calculate ASCVD risk, we treat aggressively
- CKD is a CV risk
- We aim for a SBP in the 120s for all CKD patients

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Lifestyle Management-Diet

ACC/AHA

- Healthy diet (such as DASH dietary pattern)
  - *Rich in fruits, vegetables, whole grains, and low-fat dairy products with reduced content of saturated and trans fats*
- Reduced sodium
  - *< 1,500 mg/dL*
- Increased potassium
  - *3,500-5,000 mg/dL (unless contraindicated)*

Lifestyle Management-Diet

KDIGO

- Mediterranean diet with plant protein
- Target salt intake to <90 mmol (<2 g) per day of sodium
- Be cautious with sodium-wasting nephropathy
- DASH-type diet or use of salt substitutes which are rich in K may cause hyperkalemia

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Lifestyle Management

ACC/AHA

- Weight loss (or maintenance of ideal body weight)
- Physical activity
  - *Aerobic, dynamic resistance, and/or isometric resistance*
- Moderation in alcohol
  - *Men ≤2 drinks daily*
  - *Women ≤1 drink daily*

Lifestyle Management-Exercise

KDIGO

- We agree with our cardiology colleagues that exercise is important but we have dropped exercise recommendations to 'suggested' in our most recent guidelines
- So many CKD patients have multiple co-morbidities and/or advanced age
- We encourage walking, biking and household chores

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Medication Management

KDIGO

- We suggest starting ACEi **or** ARB for HTN management in those with/without DM, albuminuria, CKD
- Really, we suggest ACEi/ARB for everyone!!!
- Dose the ACEi or ARB to maximally recommended dose
- Monitor for BP change, SCr and K at 2-4 after initiating ACEi/ARB or after increasing dose
- Decrease/Stop the ACEi/ARB dose if patient is symptomatically hypotensive or with uncontrolled hyperkalemia despite medical treatment

Rose

74 y/o routine visit
PMH: PAD, HL, HTN,
Meds: metoprolol, HCTZ, amlodipine, ASA, atorvastatin
PE: 168/98, home 150-160s
Labs: SCr 1.2mg/dL, UACR 30mg/dL, GFR 56mm/min
Add lisinopril for BP/UACR control

F/U labs 2 weeks later, SCr 2.2mg/dL with K 5.4mEq/L

What is an acceptable rise in SCr starting an ACEi/ARB?

Acceptable rise in SCr is <30%

Medication Management

ACC/AHA

- Primary agents for HTN management include thiazide/thiazide-like diuretics, ACE-I, ARB, and CCB (unless compelling indication for a specific medication).
- Monthly follow-up recommended until goal BP achieved (monitor for medication effects per FDA-recommendations).
- Reminder (as is often overlooked) - Initiation of antihypertensive drug therapy with 2 agents of different classes is recommended with stage 2 HTN and an average BP more than 20/10 mm Hg above their BP target.

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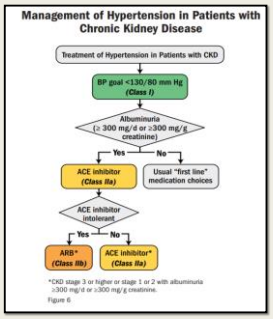
Special Populations: CKD

ACC/AHA



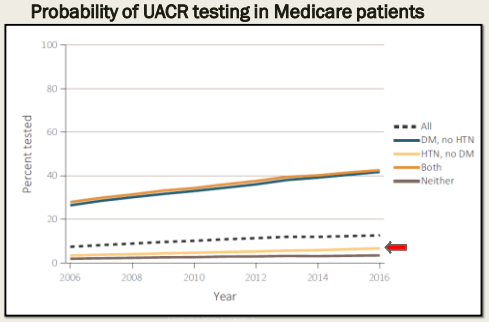
Special Populations: CKD

KDIGO

- We think everyone has kidney disease
- 1 in 3 adults has CKD and 90% do not know
- We thank ACC/AHA for discussing albuminuria but cards rarely orders an UACR
- Our goal SBP is 120mmHg, we have no DBP goal

Probability of UACR testing in Medicare patients

USRDS 2019



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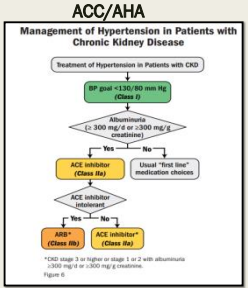

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Special Populations: Heart Failure

ACC/AHA

- Prescribe GDMT

HFrEF

ACE-I/ (or ARB) and evidence-based beta blocker as primary BP-lowering agents

Aldosterone receptor antagonist and angiotensin receptor–neprilysin inhibitor

Avoid nondihydropyridine CCBs

HFpEF

Diuretic preferred agent with signs/symptoms of volume overload

- Loop diuretics preferred in patients with symptomatic HF.

Note: torsemide (compared to furosemide) has increased bioavailability and half-life along with beneficial effects on myocardial fibrosis, neurohormonal axis, and LV structure

Special Populations: Heart Failure

KDIGO

- Cardiorenal Syndrome (CRS) 5 types
  - *Acute: kidney caused*
  - *Chronic: kidney caused*
  - *Acute: heart caused*
  - *Chronic: heart caused*
  - *Bi-directional*
- After you figure out which type of CRS, treatment is the same: diuretics
- SGLT2i offload Na (*AND glucose*), effective diuresis and slow progression of kidney disease
- *New in 2021: SGLT2i are effective in CKD WITHOUT diabetes (off-label as of Feb 2021)*

Special Populations: Heart Failure

ACC/AHA	KDIGO
■ Prescribe GDMT *HFrEF* – *ACE-I/ (or ARB) and evidence-based beta blocker as primary BP-lowering agents* – *Aldosterone receptor antagonist and angiotensin receptor–neprilysin inhibitor* – *Avoid nondihydropyridine CCBs* *HFpEF* – *Diuretic preferred agent with signs/symptoms of volume overload* ■ Loop diuretics preferred in patients with symptomatic HF. *Note: torsemide (compared to furosemide) has increased bioavailability and half-life along with beneficial effects on myocardial fibrosis, neurohormonal axis, and LV structure*	■ Cardiorenal Syndrome (CRS) 5 types – *Acute: kidney caused* – *Chronic: kidney caused* – *Acute: heart caused* – *Chronic: heart caused* – *Bi-directional* ■ After you figure out which type of CRS, treatment is the same: diuretics ■ SGLT2i offload Na (*AND glucose*), effective diuresis and slow progression of kidney disease

Special Populations

ACC/AHA

- Race and Ethnicity
- *Sex-Related Issues (e.g. pregnancy)*
- *Comorbidities (e.g. ischemic heart disease, PAD, DM, AF, valve disease, etc.)*
- *Hypertensive urgency & emergency*

Does not include pediatric/adolescent diagnosis or management

Special Populations

ACC/AHA - Some Examples

- Beta blockers for ischemic heart disease with prior MI, HFrEF, or thoracic aortic disease
- ARBs can be useful for prevention of recurrence of AF
- Women who are planning to become or become pregnant should be transitioned to methyldopa, nifedipine, and/or labetalol during pregnancy (ACE-I, ARB, and directed renin inhibitors contraindicated)
- In black patients with HTN but without CKD (or other compelling indication for a specific medication), initial antihypertensive treatment should include a thiazide-type diuretic and/or CCB
- Asian Americans have a higher incidence of ACE inhibitor–induced cough (not a contraindication)

Special Populations

KDIGO

- Race and Ethnicity
  - We are in the midst of redefining eGFR calculations
  - Is race a biological or social construct?
  - APOL1 gene for HTN
- Kids
  - Treat at 50% above
- Transplant
  - Use CCB first, NOT ACEi/ARB!!

Stump the Chumps

50 y/o female with controlled HTN presents for annual wellness visit
PMH: HTN, stage 3 CKD
FH: Mother with premature ASCVD
Meds: amlodipine

PE: White female in NAD, BP 122/70, HR 64 and regular. No murmurs but presence of an S4 and trace b/l ankle edema.

What would you do?

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PE: White female in NAD, BP 122/70, HR 64 and regular. eGFR – 59. No murmurs but presence of an S4 and trace b/l ankle edema.

What would you do?
- **Obtain HBPM/ABPM to evaluate for Masked HTN**
- **Obtain echocardiogram**
- **Add chlorthalidone – more effective at reducing LVH than BB, CCB, ACE-I, ARB, or alpha blocker**

Diuretics: Contraindications & Considerations

Thiazide and thiazide-type diuretics
- Chlorthalidone preferred based on prolonged half-life and evidence for reduction of CVD
- Monitor for hyponatremia and hypokalemia, and assess uric acid and calcium levels
- Use with caution in patients with history of gout, unless patient on uric acid-lowering therapy
- Reduced efficacy in moderate-severe CKD

Loop diuretics
- Preferred diuretics in patients with symptomatic heart failure
- Monitor for hyponatremia, hypokalemia, hypomagnesemia, and hypochloremia
- Contraindicated in patients with sulfonamide hypersensitivity
- Risk of ototoxicity and other adverse effects

Stump the Chumps: Brian

52 y/o male presents with new onset HTN noted by school nurse after hit in head with baseball (high baseball coach)
PMH: multiple contusions, fractures, DJD bilateral knees
FH: HTN in both brothers, 1 sister, mother, maternal aunts
Meds: ibuprofen, naproxen for knees, hands

PE: African American male in NAD, BP 156/98, HR 82 (ran over after baseball practice), cardiovascular exam essentially normal, no signs of papilledema, trace edema (shins), slightly obtund abdomen with normal bowel sounds, rectal exam deferred

What labs are needed for a diagnosis?

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What labs are needed for a diagnosis?
- **Evaluate for CKD**
- **eGFR 140mm/min, UACR negative**
- **Abdominal U/S shows multiple cysts in both kidneys**

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ADPKD
AGGRESSIVE treatment for HTN
Use ACEi/ARB first
Cover with Statins

HALT-PKD Trial Investigators. Blood pressure in early autosomal dominant polycystic kidney disease. NEJM 2014

Stump the Chumps

38 y/o female with uncontrolled HTN presents for evaluation of resistant hypertension
PMH: HTN, allergic rhinitis
FH: Mother with premature ASCVD and CVA
Meds: lisinopril HCT, amlodipine, fluticasone nasal spray

PE: Female in NAD, BP 152/88, HR 78 and regular. BMI 35. No murmurs or bruits, no abdominal mass, integumentary warm and dry, distal pulses present b/l.

What would you do?

Screening for specific form(s) of secondary hypertension is recommended in adults with resistant hypertension and when clinical indications and physical examination findings suggest a specific cause.

Table 13. Causes of Secondary Hypertension With Clinical Indications and Diagnostic Screening Tests

	Prevalence	Clinical Indications	Physical Examination	Screening Tests	Additional/Confirmatory Tests
Common causes					
Renal parenchymal disease	1%–2%	Urinary tract infections; obstruction; hematuria; urinary frequency and nocturia; analgesic abuse; family history of polycystic kidney disease; elevated serum creatinine; abnormal urinalysis	Abdominal mass (polycystic kidney disease); skin pallor	Renal ultrasound	Tests to evaluate cause of renal disease
Renovascular disease	5%–34%	Resistant hypertension; hypertension of abrupt onset or worsening or increasingly difficult to control; flash pulmonary edema (atherosclerotic); early-onset hypertension, especially in women (fibromuscular hyperplasia)	Abdominal systolic-diastolic bruit; bruits over other arteries (carotid – atherosclerotic or fibromuscular dysplasia); femoral	Renal Duplex Doppler ultrasound; MRA; abdominal CT	Bilateral selective renal intra-arterial angiography
Primary aldosteronism	8%–20%†	Resistant hypertension; hypertension with hypokalemia (spontaneous or diuretic induced); hypertension and muscle cramps or weakness; hypertension and incidentally discovered adrenal mass; hypertension and obstructive sleep apnea; hypertension and family history of early-onset hypertension or stroke	Arrhythmias (with hypokalemia), especially atrial fibrillation	Plasma aldosterone/renin ratio under standardized conditions (correction of hypokalemia and withdrawal of aldosterone antagonists for 4–6 wk)	Oral sodium loading test (with 24-h urine aldosterone) or IV saline infusion test with plasma aldosterone at 4 h of infusion–Adrenal CT scan, adrenal vein sampling.
Obstructive sleep apnea	25%–50%	Resistant hypertension; snoring; RBUI sleep; breathing pauses during sleep; daytime sleepiness	Obesity, Mallampati class III–IV; loss of normal nocturnal BP fall	Berlin Questionnaire; Epworth Sleepiness Score; overnight oximetry	Polysomnography

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PE: Asian male in NAD, BP 152/88, HR 78 and regular. BMI 32. No murmurs or bruits, no abdominal mass, integumentary warm and dry, distal pulses present b/l.

What would you do?
- **Evaluate for secondary causes of HTN**
- **Optimize non-pharmacologic therapy**
- **Start an aldosterone/mineralocorticoid receptor antagonist, consider switching HCTZ to a long-acting thiazide-like diuretic (like chlorthalidone)**

Mineralocorticoid Receptor Antagonists: Contraindications & Considerations

aka spironolactone and eplerenone

- Spironolactone may cause gynecomastia, erectile dysfunction, and menstrual irregularities
- Eplerenone has shorter half-life and should be administered twice daily
- Avoid use with K+ supplements & other K+-sparing diuretics
- Contraindicated in patients with severe and acute kidney injury

Take Away Points:

- How you take a Blood Pressure is just as important as what the reading is
- Cardiac BP goals <130/80
- The new KDIGO Blood Pressure goals for patients with CKD are a systolic BP in the 120s

References

- Kidney Disease: Improving Global Outcomes (KDIGO) Blood Pressure Work Group. KDIGO 2021 Clinical Practice Guideline for the Management of Blood Pressure in Chronic Kidney Disease. Kidney Int. 2021;99(3S):S1–S87
- Whelton PK, Carey RM, Aronow WS, 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. J Am Coll Cardiol. 2018 May, 71 (19) e127–e248