

The Hypertension Guidelines War: Case Studies

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Disclosures

Zuber: I have no relevant relationships with ineligible companies to disclose within the past 24 months

I am presently running for AAPA Secretary/Treasurer

Put a nephrology math geek in charge of AAPA's finances

Szczybor: I have no relevant relationships with ineligible companies to disclose within the past 24 months

While all these stories are true and used with permission, the photos and names are intermixed

Objectives

- 1) Review recent HTN guidelines: ACC/AHA, KDIGO, USPTF
- 2) Using a patient case model, discuss perspectives in HTN management for internal medicine patients
- 3) Review evidence-based prescribing guidelines for the treatment of HTN, as well as contradictions and adverse effects of antihypertensive medications

The Contestants

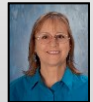
ACC/AHA

- Published 2018
- American College of Cardiology Foundation and the American Heart Association and clinicians
- International research data but FDA approved medications
- Represented by Paul



KDIGO

- Published 2020
- International experts
- Nephrology/Cardiology clinicians, government experts
- International research data
- Represented by Kim

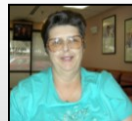


Are you a Kidney or a Heart?

Do you know more about the KDIGO guidelines
Or
Do you know more about the AHA/ACC guidelines

Let's see which organ you identify with....
On to the cases!

Case 1 - Francis



Francis is a 64 y/o female who has been diagnosed with diabetes
PMH: Diabetes, hyperlipidemia
FH: Diabetes in mother
PE: 132/84 (on intake), BMI 26, heart regular, lungs clear, trace edema, pedal exam normal
Labs: A1C 7.5%, UACR 30mg/g, SCr 1.2 (GFR 48ml/min)
Meds: metformin, atorvastatin, ASA

Do you treat her for hypertension?

- A) Yes, she has HTN
- B) No, her BP is acceptable
- C) Yes, she is a high risk patient
- D) No, you need to confirm her readings first

D - Confirm the readings first

ACC/AHA

- Use a device that is validated and calibrated periodically, using proper technique and correct cuff size
- An average of **2 to 3 BP measurements on 2 to 3 separate occasions** should be obtained
- Out-of-office BP measurement, either with **ABPM or 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

KDIGO

- An **automatic cuff** is preferable: standardized measurement with an average of **3 readings** (can be at same visit)
- Oscillometric devices can be used to measure BP among patients with atrial fibrillation
- Out-of-office BP measurements are useful (ABPM) or home BP monitoring (HBPM) to complement standardized office BP readings for the diagnosis and management of high BP

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Automatic cuff, 3 readings done unobserved, Average 130/79

Do you treat her for hypertension?

- A) Yes, she has HTN
- B) No, her BP is acceptable
- C) Yes, but only if she has cardiac risk factors
- D) No, start with lifestyle modifications

B (ACC/AHA - NO) and A (KDIGO - YES)

ACC/AHA

BP Category	SBP	and	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

KDIGO

- Goal is **SBP < 120mmHg** in CKD patient if taken by standardized method
- She has **CKD by UACR** results
- Also, we think everyone has cardiac risk factors

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Does she have any CVD risk factors?

- A) I need to calculate her ASCVD number
- B) DM puts her at high risk
- C) Hyperlipidemia puts her at high risk
- D) She has CKD so at high risk

D (ACC/AHA-ASCVD) and D (KDIGO-CKD)

ACC/AHA

COR	LOE	Recommendations
I	SBP: B-R*	1. For adults with confirmed hypertension and known CVD or 10-year ASCVD event risk of 10% or higher (see Section 8.1.2), a BP target of less than 130/80 mm Hg is recommended. ^{SR,1,5-9&1,5,9}
	DBP: C-EO	
IIb	SBP: B-NR	2. For adults with confirmed hypertension, without additional markers of increased CVD risk, a BP target of less than 130/80 mm Hg may be reasonable. ^{SR,1,5,9&1,5,9}
	DBP: C-EO	

SR indicates systematic review.

KDIGO

- ALL CKD patients have cardiac risk factors
- We don't calculate ASCVD for our patients since CKD makes you automatically high risk
- UACR is 30gm/dL and therefore + CKD
- We think everyone has cardiac risk factors**

Case 2 - Alisha



Alisha is recently diagnosed with hypertension
 She is interested in trying lifestyle modifications first prior to medications
Meds: BCP, OTC MVI
PMH: occ pedal edema
FH: HTN in father
PE: BMI 30, 142/82, lungs clear, RRR, soft, non-tender abdomen, trace edema feet

What laboratory tests are important to order for a HTN work-up?

- A) CMP
- B) UACR
- C) Abdominal U/S
- D) Cardiac cath

A (ACC/AHA-CMP) and B (KDIGO-UACR)

ACC/AHA

Basic and Optional Laboratory Tests for Primary Hypertension

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

*May be included in a comprehensive metabolic panel
Table 17

KDIGO

- It makes us cry to see UA on the cardiac list without the UACR
- Albumin in the urine will occur BEFORE the eGFR drops
- HTN is the 2nd most common cause of ESRD; If HTN hasn't caused your CKD, your CKD will cause HTN
- A trial of 10-year data from LabCorp, nationwide (despite guideline recommendations) ordering an UACR and eGFR ranged from 5-30% in 2018 and >80% were not tested during the 6-year study period even when carrying a diagnosis of DM and/or HTN

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What are suggested lifestyle changes Alisha can implement?

- A) DASH diet
- B) Decrease NaCl in her diet to 1500mg/day
- C) Increase K in her diet
- D) All of the above

D (ACC/AHA-AII) and B (KDIGO-NaCL)

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)

KDIGO

- We agree to limit NaCl and probably would aim even lower than cards
- Mediterranean diet with more plant protein than animal protein.
- OMG!!! No supplementation with K... (Paul Prudhomme)



Case 3 - Brian



52 y/o male presents with new onset HTN noted by school nurse after hit in head with baseball (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 do the guidelines say for management of Brian's HTN?

- A) Due to his race, a thiazide/CCB is better
- B) He needs a CMP and UACR before selecting a medication
- C) He needs a referral to cardiology
- D) He needs a referral to nephrology

A (ACC/AHA-CCB) and B (KDIGO-CMP/UACR)

- 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
- Race and Ethnicity
 - We believe race is a social construct
 - We have dropped race
 - From eGFR calculations
 - From medication choices
 - We do believe in a genetic underpinning
 - APOL1 gene for HTN
- We think everyone may have CKD and so want the labs first....

Case 4 - Sylvester



Sylvester is a 72 y/o male with a history of heart failure. Recently he has been gaining weight, noted pedal edema and SOB. He presents to the ED for evaluation
PMH: hypertension X 8y, HF x 3y, CKD (GFR 48ml/min/1.73m2), hyperlipidemia
Meds: amlodipine 10mg, chlorthalidone 25mg, atorvastatin
PE: BP 160/96, no orthostatic changes, tachypnea, afebrile, 3+ edema to knees, mild confusion regarding when he last took meds

What do the guidelines say for management of Sylvester?

- A) Thiazide diuretics are preferable to loop diuretics
- B) You need to figure out the type of CRS you are dealing with
- C) Torsemide has better bioavailability and a longer half-life
- D) All HF patients should be managed by cardiology

C (ACC/AHA-Torsemede) and B (KDIGO-CRS)

ACC/AHA

- ACE-I/ (or ARB) and evidence-based beta blocker as primary BP-lowering agents
- Aldosterone receptor antagonist and angiotensin receptor–nephrylsin inhibitor
- Avoid non-dihydropyridine CCBs
- Loop diuretics preferred in patients with symptomatic HF
- Torsemede has increased bioavailability and half-life along with beneficial effects on myocardial fibrosis, neurohormonal axis, and LV structure

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**

Case 5 - Bob



Bob is a 72 y/o male referred from his primary care office for management of his HTN. Primary was worried that Bob was too frail for aggressive BP management. Your office does standardized BP readings
PMH: HTN, CKD, HLD
Meds: amlodipine, HCTZ, benazepril, lovastatin
PE: 140/90 (reports home 130-140, 90-100), BMI 29, heart RRR, lungs CTA, no edema
Labs: SCr 2mg/dL (eGFR 35ml/min), 2+ albuminuria on dip

If we accept that both ACC and KDIGO goals are lower than his 140/90, what medications should we adjust?

- A) He is elderly, fragile and his primary is right: he should not be taken lower
- B) Change to a loop diuretic
- C) Change to a different CCB
- D) Add an MRA

A (ACC/AHA-no Rx) and B (KDIGO-Loop)

Recommendations for Treatment of Hypertension in Older Persons References that support recommendations are summarized in Online Data Supplement 54		
COR	LOE	Recommendations
I	A	1. Treatment of hypertension with a SBP treatment goal of less than 130 mm Hg is recommended for noninstitutionalized ambulatory community-dwelling adults (≥65 years of age) with an average SBP of 130 mm Hg or higher. ^{10,13,14}
IIa	C-EO	2. For older adults (≥65 years of age) with hypertension and a high burden of comorbidity and limited life expectancy, clinical judgment, patient preference, and a team-based approach to assess risk/benefit is reasonable for decisions regarding intensity of BP lowering and choice of antihypertensive drugs.

- Loops more effective as kidney function is lost; at eGFR <30ml/min, **MUST** move to loops
- Combo meds do not allow adjustment for changing eGFR
- **CAREFULLY** consider a combo in an older patient IF on his formulary

Diuretics: Contraindications & Considerations

Thiazide and thiazide-type diuretics

- 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 (**eGFR <30ml/min**)
- **Chlorthalidone preferred based on prolonged half-life and evidence for reduction of CVD***

Loop diuretics

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

*Interesting tidbit:
SGLT2i help with excretion of uric crystals decreasing gout attacks...are also a diuretic*

*Chlorthalidone for Hypertension in Advanced Chronic Kidney Disease (CLICK). NEJM, Dec 2021

Take Away Points:

- **How** you take a Blood Pressure is just as important as what the reading is
- ACC/AHA BP goals <130/80
- KDIGO BP goals for patients with CKD are SBP in the 120s, no diastolic goal
- As risk factors for CKD include age, many of your patients may have undiagnosed CKD
- If you look for it, you will find it!!



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



Bonus Case - Roger



Roger is a 58 y/o male who presents as a new patient to your office. He had a living donor kidney transplant (from his brother) 3 years ago, initially followed by the transplant center, but recently moved. Uncomplicated post-transplant course other than intermittent diarrhea he attributes to his medications.

PMH: kidney transplant, hypertension, HLD

Meds: mycophenolate mofetil (MMF), sirolimus, metoprolol, lisinopril, atorvastatin

PE: 132/78, BMI 29, heart RRR, lungs CTA, no edema

Labs: SCr 1.2mg/dL (GFR >60 ml/min)

What is his goal BP?

- A) 130/80
- B) <130/80
- C) 140/80
- D) I have no idea

B (ACC/AHA-<130/90) and A (KDIGO-130/90)

ACC/AHA

Recommendations for Treatment of Hypertension After Renal Transplantation		
References that support recommendations are summarized in Online Data Supplements 39 and 40.		
COR	LOE	Recommendations
IIa	SBP: B-NR	1. After kidney transplantation, it is reasonable to treat patients with hypertension to a BP goal of less than 130/80 mm Hg. ^{99,101-1}
	DBP: C-EO	
IIa	B-R	2. After kidney transplantation, it is reasonable to treat patients with hypertension with a calcium antagonist on the basis of improved GFR and kidney survival. ^{99,101-2}

KDIGO

- A total stay in your lane comment here!!
- Do **NOT** go below **SBP > 130mmHg** in transplant patient if taken by standardized method
- You need to perfuse the kidney and have a greater chance of causing AKI in the graft with hypotension
- We agree with the CCB in transplant