Primary Care Interventions to Optimize Chronic Kidney Disease Care

ACP COLORADO CHAPTER MEETING 2/9/2018

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Objectives:

- **Review diagnosis and etiology of CKD**
- Mange to the three major goals of caring for CKD patients

  HTN, ACE / ARB therapy, CV risk reduction
- Prevent hyperkalemia
- Manage the progression of acidosis with bicarbonate therapy
- Ascertain the correct dose of diuretics in CKD patients

Establish the Diagnosis

- Definition – On 2 separate occasions, > 90 days apart (i.e. to rule out AKI).
- Race specific eGFR < 60 or >= moderate albuminuria (>30)
- Considerations:
  - Risk factors, Confounding factors , Supporting evidence - imaging

Establish the Diagnosis

- Factors that impact creatinine labs and may spuriously impact eGFR
  - Muscle mass - body building, amputations, malnutrition, very high or low BMI
  - Supplements - creatine, high protein diets
  - Aggressive exercise - especially resistance
  - Medications – trimethoprim, cimetidine, NSAIDS
  - Dehydration

Establish an Etiology - Diabetes

- Duration - 10 yrs
- Course - usually indolent
- Proteinuria – typically precedes the decline in eGFR , < 2000 typically
- Hematuria not uncommon – requires evaluation
- Other supporting evidence
  - retinopathy, neuropathy and microalbuminuria (ace/arb may mask)

Establish an Etiology - Hypertension

- Duration - 10 years
- Course - indolent
- Proteinuria - Ma/Cr < 1000 typically
- Hematuria uncommon – requires evaluation
- Other supportive evidence – evidence of poor control historically, CHF, MI, CVA, LVH, atherosclerosis

Establish an Etiology – no HTN or DM

- Consider IGA nephropathy – proteinuria and hematuria
- Consider anatomy (ultrasound)
  - PKD, congenital abnormalities, stones, cancer, hydronephrosis, vascular causes
- Consider prior AKI's
- Consider exposure to renal toxic meds - Nsaids, Lithium
- Consider heavy metal exposures – Lead, Cadmium
- Consider infectious - HIV, Hepatitis C
- Consider nephrology referral

Watch for Red Flags

- Rapid progression (25-30% decline)
- Hematuria and proteinuria
- Severe proteinuria
- Severe hypertension
- When to refer: red flags, gfr < 30, gfr < 45 and etiology unknown

Indications for Dialysis

- Uremic symptoms – usually eGfr approximately 10
  - Anorexia/Nausea/vomiting
  - Metallic taste in the mouth
  - Severe fatigue/insomnia/restless legs
  - Poor mentation
  - Pruritis
- Pericarditis
- Volume overload
  - Dyspnea
- Electrolytes

Determine ESRD and CV risk

Cardiovascular mortality

	ACR <10	ACR 10-29	ACR 30-299	ACR ≥300
eGFR >105	0.9	1.3	2.3	2.1
eGFR 90-105	Ref	1.5	1.7	3.7
eGFR 75-90	1.0	1.3	1.6	3.7
eGFR 60-75	1.1	1.4	2.0	4.1
eGFR 45-60	1.5	2.2	2.8	4.3
eGFR 30-45	2.2	2.7	3.4	5.2
eGFR 15-30	14	7.9	4.8	8.1

Kidney failure (ESRD)

	ACR <10	ACR 10-29	ACR 30-299	ACR ≥300
eGFR >105	Ref	Ref	7.8	18
eGFR 90-105	Ref	Ref	11	20
eGFR 75-90	Ref	Ref	3.8	48
eGFR 60-75	Ref	Ref	7.4	67
eGFR 45-60	5.2	22	40	147
eGFR 30-45	56	74	294	763
eGFR 15-30	433	1044	1056	2286

The definition, classification, and prognosis of chronic kidney disease: a KDIGO controversies conference report. Kidney Int 2011; 80: 17-28; accessed http://www.nature.com/ki/journal/v80/n1/full/ki2010483a.html

Follow Up: Based on risk

Guide to Frequency of Monitoring (number of times per year) by GFR and Albuminuria Category

GFR categories (ml/min/1.73 m²) Description and range				Persistent albuminuria categories Description and range		
				A1	A2	A3
				Normal to mildly increased	Moderately increased	Severely increased
				<30 mg/g <3 mg/mmol	30–300 mg/g 3–30 mg/mmol	>300 mg/g >30mg/mmol
	G1	Normal or high	≥90	1 if CKD	1	2
	G2	Mildly decreased	60–89	1 if CKD	1	2
	G3a	Mildly to moderately decreased	45–59	1	2	3
	G3b	Moderately to severely decreased	30–44	2	3	3
	G4	Severely decreased	15–29	3	3	4+
	G5	Kidney failure	<15	4+	4+	4+

GFR and albuminuria grid to reflect the risk of progression by intensity of coloring (green, yellow, orange, red, deep red). The numbers in the boxes are a guide to the frequency of monitoring (number of times per year).

Kidney International Supplements (2013) 3, 5–14

Engage and Educate the patient

- Hydrate with 1.5-2 liters of fluid daily
- Exercise routinely
- Maintain a good body weight
- Take your medications as prescribed
- Get labs at least annually
- Good blood pressure and Diabetes control
- Follow a low salt diet
- Avoid tobacco
- Limit medications that can harm the kidneys (i.e. NSAIDS)

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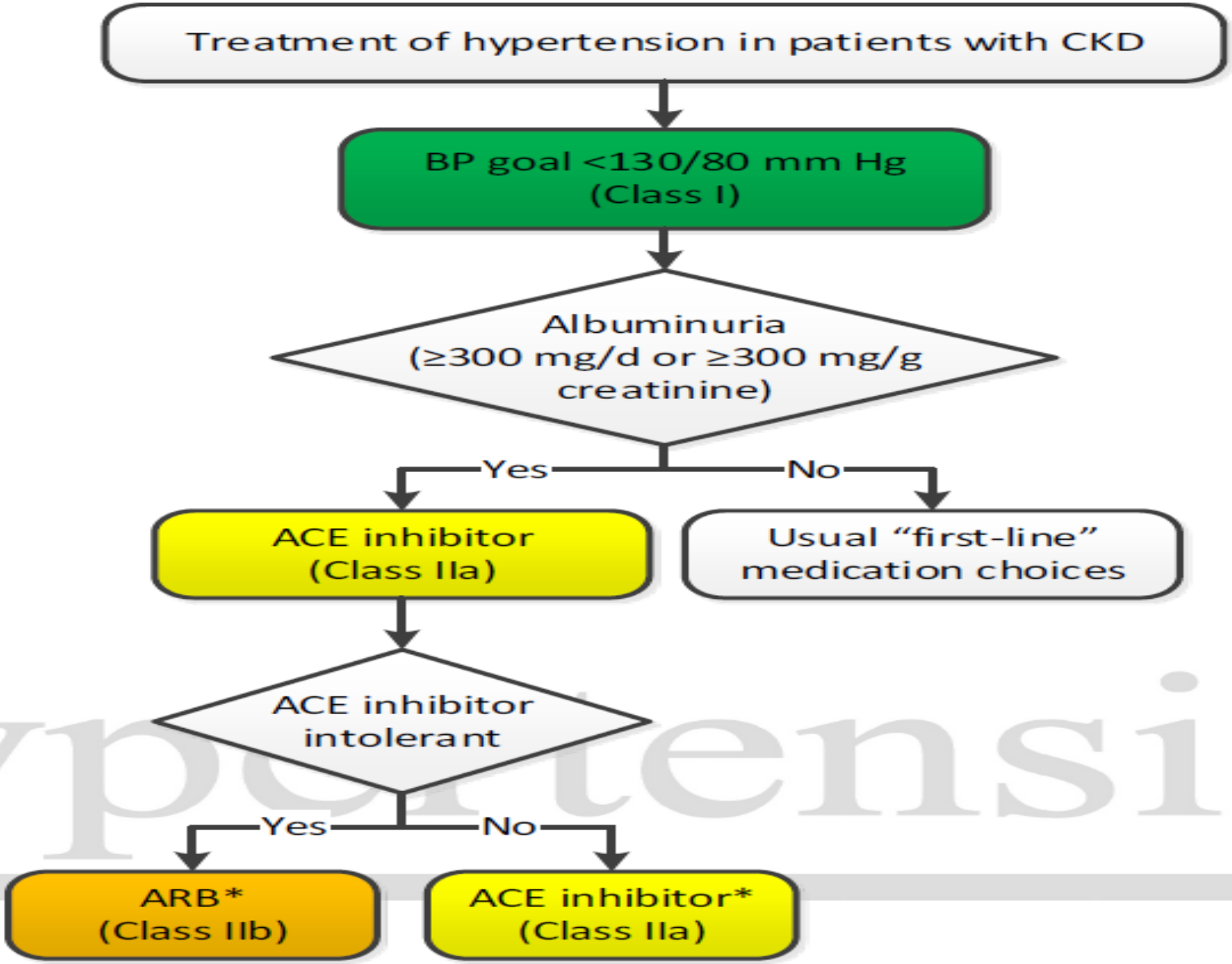
Treatment Goals

- Blood pressure goals – >110/60 & <130/80
  - Ace/arb medications indicated - > 300 ma/cr (30 in DM)
- CV reduction – moderate intensity statin for Gfr < 45-60
- DM – A1c 7-8%


Treatment of hypertension in patients with CKD
BP goal <130/80 mm Hg (Class I)
Albuminuria (≥300 mg/d or ≥300 mg/g creatinine)
Yes
No
ACE inhibitor (Class IIa)
Usual "first-line" medication choices
ACE inhibitor intolerant
Yes
No
ARB* (Class IIb)
ACE inhibitor* (Class IIa)

9.3. Chronic Kidney Disease

Recommendations for Treatment of Hypertension in Patients With CKD References that support recommendations are summarized in Online Data Supplements 37 and 38 and Systematic Review Report.		
COR	**LOE**	**Recommendations**
I	SBP: B-R[SR] DBP: C-EO	1. Adults with hypertension and CKD should be treated to a BP goal of less than 130/80 mm Hg (1-6).
IIa	B-R	2. In adults with hypertension and CKD (stage 3 or higher or stage 1 or 2 with albuminuria [≥300 mg/d, or ≥300 mg/g albumin-to-creatinine ratio or the equivalent in the first morning void]), treatment with an ACE inhibitor is reasonable to slow kidney disease progression (3, 7-12).
IIb	C-EO	3. In adults with hypertension and CKD (stage 3 or higher or stage 1 or 2 with albuminuria [≥300 mg/d, or ≥300 mg/g albumin-to-creatinine ratio in the first morning void]) (7, 8), treatment with an ARB may be reasonable if an ACE inhibitor is not tolerated.

SR indicates systematic review.

9.6. Diabetes Mellitus

Recommendations for Treatment of Hypertension in Patients With DM References that support recommendations are summarized in Online Data Supplements 46 and 47 and Systematic Review Report.		
COR	**LOE**	**Recommendations**
I	SBP: B-R[SR] DBP: C-EO	1. In adults with DM and hypertension, antihypertensive drug treatment should be initiated at a BP of 130/80 mm Hg or higher with a treatment goal of less than 130/80 mm Hg (1-8).
I	A[SR]	2. In adults with DM and hypertension, all first-line classes of antihypertensive agents (i.e., diuretics, ACE inhibitors, ARBs, and CCBs) are useful and effective (1, 9, 10).
IIb	B-NR	3. In adults with DM and hypertension, ACE inhibitors or ARBs may be considered in the presence of albuminuria (11, 12).

SR indicates systematic review.

10.3.1. Older Persons

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 (1).
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.

Hypertension Summary

- Take advantage of nighttime dosing
- DASH Diet
- Salt restriction < 2-2.3 gm per day
- Healthy body weight
- Adequate physical activity
- Avoid unhealthy alcohol intake

CV risk reduction– Statin therapy

- ASCVD risk assessment is recommended in all adults with hypertension, including adults with CKD & DM
- Majority of adults with DM and/or CKD have a 10-year ASCVD risk ≥ 10%, placing them in the high risk category.

CV reduction: Statin therapy

- ACC / AHA guideline for statin therapy
  - LDL-C levels ≥190 mg/dL
  - Age 40 to 75 years with diabetes and LDL-C levels 70 to 189 mg/dL
  - Age 40 to 75 years without diabetes and with a 10-year ASCVD risk ≥7.5% when statins are used for primary prevention
- USPSTF recommends a 10% threshold and the presence of a CV risk factor (B)

CV reduction: Statin therapy in CKD

- SHARP trial
- Lower incidence (9.5 vs 11.9 percent) of the primary composite outcome of coronary death, MI, CVA or revascularization in the CKD subgroup (6247) that received treatment (simvastatin plus ezetimibe) vs placebo.
- These findings are supported by multiple meta-analyses (RR 0.75-0.8)

Diabetes:

- A1c goal of 7-8.
  - Lower in the newly diagnosed and higher in the elderly and frail
- Tight control?
  - UKPDS/Kumamoto showed that tight glucose control **early in the course of diabetes** decreases microvascular complications
  - In **long standing diabetes** results are less supportive (ADVANCE, VADT & ACCORD)

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Manage/Avoid Complications

- Chronic Mild Hyperkalemia
  - Gfr > 25-30
  - Potassium < 5.5-5.9
  - Not acutely ill/no symptoms (Dehydration, AKI, DKA, HNK, Paralysis, Arrhythmia)
  - Tolerated well – noted while processing labs, patient without complaint
- Severe hyperkalemia
  - Usually with K+ > 7 with chronic progression, lower if acute
  - Weakness, paralysis, arrhythmia

Manage/Avoid Complications:
hyperkalemia causes

- Diminished renal function
- Type 4 RTA (hyporeninemic hypoaldosteronism)
- Ace/arb, spironolactone
- Dietary indiscretion
- Acidosis
- Beta blockers
- Exercise
- Fasting
- NSAIDS

Manage/Avoid Complications
Avoid hyperkalemia

- Start low and go slow – sub-therapeutic doses can be helpful
- One step at a time – start/advance only one med at a time
- Add diuretics prior to others
- Frequent labs
- Patient education – enlist your dietitian, invest in the patient
- Treat acidosis if present – bicarbonate therapy

Manage/Avoid Complications
Treatment of hyperkalemia

- Diuretics
- Low potassium diet – patient re-education
- Dose adjustments: (5-5.5) Discontinue: (> 5.5)
- Medications:
  - Sodium polystyrene sulfonate if needed for rare intermittent use
  - Patiromer, chronic (new)
- Treat underlying conditions

Manage/Avoid Complications
hyperkalemia: diet sources

Very high in potassium	High in potassium
Baked potatoes Baked acorn squash Baked butternut squash Beans Olives Pumpkin seeds Pomegranate Sauerkraut Vegetable juice cocktail Vegetable soups/stews	Apricots Bananas Dried fruits Strawberries/Kiwi Nectarine/Oranges/ Grapefruit Prunes/Prune juice Artichokes Avocado Broccoli Greens/Spinach Potato/Yams Tomato Milk/Yogurt Ensure & Boost supplements Salt substitute No Salt Pinto beans/ Dried beans Soy products Nuts

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Manage/Avoid Complications
Acidosis

- Associated with progression of CKD (AASK, CRIC).
- Diminished functional renal mass (gfr approx. 30) increases ammonium production in remaining nephrons, this activates complement & renin-angiotensin systems which cause tubulo-interstitial damage
- Supplementation decreases ammonium production and delays progression

Manage/Avoid Complications
Acidosis

- Initiate Rx for persistent $CO_2 < 22$
- Goal CO_2 22-28
- Dosing: start 325mg bid watch for CO_2 level change, edema or worsening hypertension
- Generally well tolerated and typical dose is 650 bid-tid
- Each oral tablet (650 mg) contains 8 mEq each of sodium and bicarbonate

Manage/Avoid Complications

Acidosis

- Benefits of acidosis treatment
  - Bone health
  - Lean body mass preservation
  - Improved nutritional status
- Acidosis etiology
- Dietary interventions

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Manage/Avoid complications
Volume Overload

- Diuretic dosing
  - Consider your objectives
    - Potassium, volume, proteinuria, blood pressure
  - Doses may need to be increased – hypoalbuminemia, gut edema
  - Lasix once daily vs. twice daily
    - IV may be required at times

Manage/Avoid complications
Volume Overload

- Avoid over-diuresis
- Avoid hypotension
- Frequent labs and clinical evaluation
- Patient education – enlist your dietitian, salt and k+ restriction
- Determine goal weight – adjust as needed

Manage/Avoid Complications
Diuretics

- Edema Causes
  - Severe hypertension
  - Nephrotic – albumin < 3, 3.5 grams proteinuria
  - Right heart failure
  - Liver disease
  - Salt indiscretion
  - Peripheral calcium channel blockers

Manage/Avoid Complications
Diuretics

- Edema Treatment
  - Diuretics
  - Salt restriction
  - Limit peripheral calcium channel blockers
  - Other – elevation, water exercise and ted hose

Manage/Avoid Complications

Diuretic Options

- Thiazides
  - Metolazone
  - Hydrochlorothiazide
  - Chlorthalidone
- Loop diuretics
  - Furosemide
  - Bumetanide
- Aldosterone receptor blockers
  - Spironolactone

- Item 101

A 58 year old woman is evaluated during a follow-up visit for a 5 year hx of stage G3b/A1 CKD caused by an analgesic nephropathy. History is also notable for hypertension. She takes amlodipine and no longer uses analgesics. On physical examination, temp is 98.6' F, BP is 132/78 mm Hg, pulse 82 and RR 14. BMI 26. Cardiac exam reveals no murmur, rub or gallop. Lungs are clear. Labs:

Creatinine	1.8 mg/dl
Sodium	140 mEq/L
Potassium	5.4 mEq/L
Chloride	110 mEq/L
Bicarbonate	18 mEq/L
pH	7.36
PCO2	35 mm Hg
eGFR	33 mL/min/1.73 m2

Item 101

Which of the following is the most appropriate treatment?

a) Intravenous sodium bicarbonate
b) Oral potassium citrate
c) Oral sodium bicarbonate
d) Continue current therapy

Item 101

Which of the following is the most appropriate treatment?

a) Intravenous sodium bicarbonate
b) Oral potassium citrate
c) **Oral sodium bicarbonate**
d) Continue current therapy

- Item 69

A 65 year old man is evaluated during a follow-up visit for a 5 year hx of stage G3b/A3 CKD due to diabetic nephropathy. He describes doing well with good exercise tolerance and no dyspnea. Medical history is also notable for Type 2 DM and hypertension. Medications are basal bolus insulin and Lisinopril. He takes amlodipine and no longer uses analgesics. On physical examination, temp is normal, BP is 145/75 mm Hg, pulse 82 and RR 16. BMI 28. There is no jugular venous distention and lungs are clear.

Bicarbonate	normal
creatinine	1.9 mg/dL
Potassium	4.0 mEq/L
Chloride	110 mEq/L
eGFR	42mL/min/1.73m2
Urine protein/creatinine ratio	3900 mg/g

Item 69

Which of the following is the most appropriate treatment?

a) Add an angiotensin receptor blocker
b) Increase Lisinopril dose
c) Replace Lisinopril with Amlodipine
d) No Change in current medicines

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a) Add an angiotensin receptor blocker
b) **Increase Lisinopril dose**
c) Replace Lisinopril with Amlodipine
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Questions?

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