Chronic Kidney Disease

Mr. Bean is a 55 year-old Caucasian male who has a history of hypertension and type 2 diabetes who presents to your office as a new patient. He was diagnosed with both diseases about 10 years ago. He reports “pretty good” blood pressure control in the 145/90 range when he checks with his home meter. His blood sugars are generally in the 160-180 range. He currently smokes 1/2 pack of cigarettes per day. His current medications are metformin 1000mg bid, and amlodipine 10 mg daily. He takes ibuprofen 400 mg twice a day for knee arthritis. He does not provide old records today, and reports no recent lab work done. VS: BP 150/90, 72 and regular, R12, Weight 250 lbs, Ht 71 inches. His physical exam, other than central adiposity, is normal.

1. What lab work would you like to order as part of his initial evaluation?
   BMP (or CMP), UA, HgA1c, UA and/or microalbumin screen

2. What key factors in his health would you counsel on him today?
   Smoking cessation, exercise, goals for blood pressure and blood sugar control, immunizations(pneumovax and influenza, Tdap if appropriate)

He returns for follow up in a week for the results on his blood work.

Na 140 — UA 1.010/pH6.5/Neg LE/1+protein/Neg blood
K 3.8
Cl 105 — FLP: T chol 210/HDL35/LDL135/Trig 200
CO2 25
BUN 15 — HgbA1c 8.0%
Cr 1.4

3. Using the MDRD equation, what is his estimated creatinine clearance?
   56 ml/min

4. Does he have chronic kidney disease? If so what stage?
   All individuals with GFR <60 mL/min/1.73 m2 for >3 months are classified as having chronic kidney disease, irrespective of the presence or absence of kidney damage. We ARE assuming this is his baseline, it would be prudent to ask about reversible causes of renal dysfunction (obstruction, hypovolemia, NSAIDs etc). He has Stage 3 CKD.

Stage	Description	GFR (ml/min/1.73 m^2)
1	Kidney damage (persistent albuminuria) with normal or increased GFR	≥90

Stage	Description	GFR (ml/min/1.73 m^2)
2	Kidney damage (persistent albuminuria) with mild ↓ GFR	60-89
3	Moderate ↓ GFR	30-59
4	Severe ↓ GFR	15-29
5	Kidney failure	<15 (or dialysis)

5. What class(es) of antihypertensives would be most likely to reduce risk of progression of his kidney disease and reduce his proteinuria?

   ACE inhibitors and ARBs

6. Which of the following factors have been shown to reduce progression of renal disease. (circle all that apply)

a. Blood pressure control
b. Smoking cessation
c. Treatment of hyperlipidemia
d. Low protein diet
e. Consumption of kidney beans

A reduction in blood pressure to less than 130/80 mmHg is the goal. However, evidence from the Modification of Diet in Renal Disease study, the AASK trial, and a meta-analysis from the ACE inhibition and Progressive Renal Disease (AIPRD) study group suggest that an even lower systolic pressure may be more effective in slowing progressive renal disease in patients with a spot urine total protein-to-creatinine ratio ≥1000 mg/g (which represents protein excretion of greater than 1000 mg/day). Caution is advised about lowering the systolic blood pressure below 110 mmHg

The optimal level of protein intake has also not been determined but it may be reasonable to restrict intake to 0.8 to 1.0 g/kg per day of high biologic value protein, with the lower value used in patients with progressive chronic kidney disease. Some recommend even lower levels, such as 0.6 to 0.75 g/kg per day of high value protein, with close supervision and dietary counseling. This effect, it should be noted, is modest at best.

Both hyperlipidemia and metabolic acidosis should be treated, in part because there is some evidence that they may enhance the rate of progression of the renal disease (see below.

Smoking cessation should be encouraged, with smoking stoppage being associated with a reduced rate of progression of chronic kidney disease. In an increasing number of studies, smoking also appears to correlate with an enhanced risk of developing kidney disease (primarily nephrosclerosis) as well as increasing the rate of progression among those with existing CKD.

You start him on ramipril 5 mg per day and discontinue the amlodipine.

7. What target blood pressure do you tell Mr. Bean that you're shooting for?
   >130/80

8. What is the most common cause of death in patients with CKD?
   Cardiovascular disease! Modify those risk factors!

9. Which of the following antihypertensives reduce proteinuria? (circle all that apply)

a. ACE inhibitors
b. Angiotension II receptor blockers
c. Non-dihydropyridine calcium channel blockers
d. Dihydropyridine calcium channel blockers
e. Alpha-blockers
f. Beta-blockers

One year later, despite your heroic efforts at controlling his blood pressure, diabetes and lipids, his Scr is now 2.5 mg/dl.

10. What stage of CKD is he now?
    Stage 4

11. What modifications would you make to his medication regimen?
    Discontinue metformin if not done already. Reassess for reversible causes of renal dysfunction. A question is often asked whether the benefit of ACE inhibitors and ARBs extends to patients with advanced kidney disease, particularly given the increased risk of hyperkalemia. Stated differently, is there a serum creatinine concentration above which one would not use such therapy? The answer appears to be no, except for truly end-stage disease.

    Once the GFR falls below 25 to 30 mL/min, the addition of oral phosphate binders are usually required to prevent hyperphosphatemia

12. When do you seek referral to a nephrologist?
    Ok, don't laugh. Here's the guideline: "Patients with CKD should be referred to a nephrologist early in the course of their disease, preferably before the plasma creatinine concentration exceeds 1.2 (106 micromol/L) and 1.5 mg/dL (133 micromol/L) in women and men, respectively, or the eGFR is less than 60 mL/min per 1.73 m2. These subspecialists are trained to help counsel the patient in choosing the optimal renal replacement therapy and to manage the many issues associated with chronic kidney disease. Lower costs and/or decreased morbidity and mortality may be associated with early referral and care by subspecialists. Reasons for later referral may include disease specific factors, patient and physician dependent causes, and health care system related factors." Drs. Canada and Green, we're gonna need a bigger boat.