

Chronic Kidney Disease Case Answers

**What stage CKD does this patient have?
Please calculate her GFR.**

33 by MDRD 47 by CG
Stage 3 CKD either way

What other information or diagnostic tests would you hope to find in her past records to help confirm this diagnosis?

Urine with micro, Microalbumin, Renal ultrasound

What is the most likely cause of her CKD?

Diabetes

Which co-morbidities put her at greater risk for progression of her kidney disease?

Smoking
Uncontrolled hypertension and diabetes

Medications in CKD

You check a UA on your patient in the office and find that she has 1+ protein on the dip. Also her BP is elevated as you have noted. Is it safe to increase her ACE-I? If you do increase it, what monitoring should you perform and when?

Repeat BMP – for potassium and creatinine - within 4 weeks of *initiating* ACE-I therapy in CKD and within 12 weeks if adjusting dose.
Also follow blood pressure at these intervals – both high and low readings would be of concern.
Would also repeat the urine with a microalbumin to monitor the effectiveness of your therapy.

2 months after increasing the Enalapril you find that her creatinine has increased to 2.1 and potassium is 4.6. Should you stop or decrease the ACE-I?

It is expected for GFR to decline somewhat with addition of an ACE-I.
In this case, the GFR has declined from 33 to 26 using the MDRD formula. This is a drop of 21%.
KDOQI guidelines suggest it is safe to continue ACE-I unless potassium is > 5.5 or the GFR decreases more than 30% over a 4 month period.

This creatinine of 2.1 is stable when checked in another 2 months and appears to be her new baseline. What other medications on her list would you change and why?

GFR is 26 = CKD stage 4 . HCTZ now less useful – consider calcium channel blocker for blood pressure or change to loop diuretic if treating volume overload.

I would personally check every medication she takes for guidelines about renal dosing.
You will find that Neurontin should be renally dosed; Lipitor and Zoloft are fine.

Metformin is contraindicated in renal dysfunction – manufacturer recommends stopping for Creat 1.4/1.5, others for GFR < 60
Glyburide has active metabolites that are cleared by the kidney and should not be used for GFR < 50
Glipizide is the sulfonylurea of choice in patients with kidney disease

Anemia in CKD

You notice that she has a chronic anemia with H/H as listed above. What do you expect her MCV to be? What additional studies might you order?

Expect her MCV to be normal or borderline low. Check Iron, TIBC, ferritin, transferrin saturation, retic count. Consider stool guaiac as well.

Results of your tests include a low iron level and a low ferritin. Are there any other diagnostic tests you might order?

She should be evaluated for other causes of anemia of chronic disease and low iron – most importantly screened for colon cancer. Cannot assume blindly that anemia is due to CKD. In this case, she had a recent colonoscopy which was normal.

What treatment if any would you recommend and why? What benefits are there to treatment?

Assuming her anemia is primarily due to CKD, guidelines recommend that she be treated with:

Iron to a goal transferrin saturation of > 20% and ferritin of >100

Guidelines also recommend a conversation with the patient about the use of erythropoietin treating to a goal hemoglobin of 11-12

There is clear evidence that if epo is used the target hemoglobin should not be greater than 13 – groups treated to above 13 had greater CV mortality. Guidelines suggest treating to goal hgb 11-12 will benefit quality of life, prevent transfusion, and possibly decrease CV risk although there is yet not high quality evidence to support this assertion.

Vit D and Phosphorus Balance in CKD

You notice that someone has checked Vitamin D and phosphorus levels on this patient. Why do you think this was done?

At a GFR of 30 or less, renal dysfunction leads to decreased phosphate excretion and decreased Vitamin D production.

Many people in Maine are relatively Vitamin D deficient even apart from renal disease.

Hyperphosphatemia leads to hypocalcemia (in the blood stream) but calcium deposition in soft tissue and vascular spaces and thus secondary hyperparathyroidism (elevated iPTH).

This calcium deposition in vessels is thought to increase the patient's risk of CAD. These changes also lead to a decrease of calcium in the bones and a spectrum of bone disorders specific to CKD called renal osteodystrophy.

Are this patient's levels normal?

In CKD 3 and 4, guidelines recommend maintaining the phosphorus level between 2.7 and 4.6

The Vitamin D level is also low.

Are there any other tests related to phosphorus balance that are indicated in this patient with CKD 3?

Intact PTH and calcium as well as phosphorus and Vitamin D are recommended at least annually and more often if being treated or for more severe stages of CKD.

Table 14. Frequency of Measurement of PTH and Calcium/Phosphorus by Stage of CKD

CKD Stage	GFR Range (mL/min/1.73 m ²)	Measurement of PTH	Measurement of Calcium/Phosphorus
3	30-59	Every 12 months	Every 12 months
4	15-29	Every 3 months	Every 3 months
5	<15 or dialysis	Every 3 months	Every month

You look more in her records and find a recent calcium level that is borderline low and an intact PTH of 75. Are there any treatments you would recommend to her at this time? If not now, when?

Could consider dietary modification with a low phosphorus diet – limit daily phosphorus to 1000mg / day.

Treat Vitamin D deficiency

Phosphate binders should be considered when dietary modifications alone are unsuccessful in maintaining the iPTH and phosphorus in the target ranges.

Table 26. Recommended Supplementation for Vitamin D Deficiency/Insufficiency in Patients with CKD Stages 3 and 4

Serum 25(OH)D (ng/mL) [nmol/L]	Definition	Ergocalciferol Dose (Vitamin D ₂)	Duration (months)	Comment
<5 [12]	Severe vitamin D deficiency	50,000 IU/wk orally x 12 wks; then monthly	6 months	Measure 25(OH)D levels after 6 months
5-15 [12-37]	Mild vitamin D deficiency	500,000 IU as single I.M. dose	6 months	Assure patient adherence; measure 25(OH)D at 6 months
16-30 [40-75]	Vitamin D insufficiency	50,000 IU/wk x 4 weeks, then 50,000 IU/month orally	6 months	Measure 25(OH)D levels after 6 months

Dietary Modification in CKD

At the time of the patient's first visit to you, what dietary modifications would you recommend to her?

Work to approach her ideal body weight would benefit both her BP and DM control.

There are multiple strategies to change one's diet in order to lose weight – most involve portion control, avoiding processed foods, limiting carbohydrates especially simple sugars as well as avoiding high fat foods.

The DASH diet has also been shown to be beneficial for patients with HTN – it is however not recommended in patients with CKD (GFR < 60) because that specific regimen has higher levels of protein, phosphorus and potassium than would be appropriate.

She could instead focus specifically on salt – limit to less than 2.4 gm per day.

Drinking more fluids in general is always a good recommendation.

You further review her records and realize that she has an elevated phosphorus and intact PTH.

You read a bit online and think perhaps she should be on a low phosphorus diet. What foods should she avoid?

Large amounts of phosphorus are found in:

- dairy products such as milk, cheese, yogurt, ice cream and pudding
- nuts and peanut butter

- dried beans and peas such as kidney beans, split peas and lentils
- beverages such as cocoa, beer and dark cola drinks

You also wonder about a low potassium diet. What foods should she avoid that are high in potassium?

Large amounts of potassium are found in:

- certain fruits and vegetables (like bananas, melons, oranges, potatoes, tomatoes, dried fruits, nuts, avocados, deep colored and leafy green vegetables and some juices)
- milk and yogurt
- dried beans and peas
- most salt substitutes
- protein-rich foods such as meat, poultry, pork and fish

She thinks she has heard that people with renal failure should be on a low protein diet. Is this true? Should she stop eating meat?

Limiting protein in CKD is controversial and strong evidence does not yet exist.

Low protein in the diet would help the kidneys but these patients are also at high risk of malnutrition.

All people with CKD should have a nutrition consult to evaluate their specific protein intake.

Guidelines suggest that patients with CKD 4 or 5 consider a low protein diet with close monitoring by a nutritionist.