

The Case of Juan Cruz: Approaching Kidney Failure

Objectives

Students will be able to:

1. Identify chronic kidney disease using estimated glomerular filtration rate (eGFR) and urine albumin- to-creatinine ratio (UACR)
2. Apply the basic steps for eating right for chronic kidney disease to the case study

Initial Visit Background

Juan Cruz is a 60-year-old Puerto Rican man with a recent diagnosis of chronic kidney disease due to type 2 diabetes. He was told he is approaching kidney failure. He has not taken any medications for the past 3 years. He reports he lost about 20 pounds in the past few months and now weighs 167 pounds. His height is 67 inches.

MNT Referral Data

His A1C is 12%, blood pressure was 154/98, and his low-density lipoprotein cholesterol is 129.

Selected lab data listed on Medical Nutrition Therapy (MNT) referral:

- Estimated glomerular filtration rate (eGFR) 17
 - Creatinine 3.7
- Urine albumin-to-creatinine ratio (UACR) 3,765
- Albumin 2.5 (low)
- Phosphorus 4.9 (high)
- Potassium 5.0 (high end of reference range)

He is referred for MNT to manage diabetic kidney disease. To start, his doctor recommended he decrease sodium intake and told him he should not use salt substitute. The physician knows Puerto Rican condiments such adobo and sazón are sources of sodium and commonly used to season foods.

NOTE

Adobo is an all-purpose seasoning used to flavor and/or marinate meat, chicken, or fish made by mixing crushed peppercorns, oregano, onion powder, turmeric, garlic powder, and salt. Can contain monosodium glutamate (MSG).

Sazón is a type of seasoned salt found in Spanish and Mexican markets. The seasoning is used on meats, fish, poultry and in soups and stews. Typical ingredients include cilantro, achiote, garlic and salt. Can contain MSG.

At the first MNT visit in early June, Mr. Cruz is very angry. He does not want to talk about kidney failure or dialysis. He is willing to talk about his diet. Mr. Cruz lives with his wife, who is a housewife. The meals are prepared at home because they live on a tight budget. He works long hours and reports feeling very hungry when he arrives home. On the weekends, he always spends time with other family members and usually drinks 2 to 3 beers. Mr. Cruz states he does not drink alcohol on weekdays. He is trying to cut back on sodium and finds this difficult to do. Recently his wife noticed he is eating less meat and is worried because he has always been a big meat eater. He reports meat smells bad and does not taste good even when he adds salt. His wife uses corn oil to fry and cook their meals. Mr. Cruz has never seen a dietitian before, but he has other family members with diabetes mellitus and they recommended that he drink diet soda instead of regular sodas.

He is not physically active because he says he does not have time. He is not interested in monitoring his blood sugar levels.

Recall

Breakfast	Lunch	Dinner
10 ounces acerola juice * 4 medium slices Italian bread 2 Tbsp. butter 2 ounces brewed coffee with 6 ounces whole milk	1 cup stewed rice with green pigeon peas 4 ounces baked pork tenderloin 1/3 cup green leaf lettuce and 2 Tbsp. orange tomatoes 4 Tbsp. guava paste 2 ounces white cheese 12 ounces diet cola	4 ounces sautéed beef cube steak with onions 1 cup white rice 1 cup stewed red beans 3 medium fried plantains (Tostones**) 10 ounces orange juice
	Afternoon Snack: 2 ounces brewed coffee with 6 ounces whole milk	Before Bedtime: 4 ounces chamomile tea

*Acerola is a West Indian Cherry

** Tostones is a thick slice of green plantain that is soaked in water seasoned with adobo then fried, flattened, and then fried again. Salt is usually added after cooking it.

Nutrient Analysis

Food	Kcal	PRO (g)	Carb (g)	Fat (g)	Na (mg)	P (mg)	K (mg)
10 ounces acerola juice	69	1.2	14.5	0.9	9	27	293
4 medium slices Italian bread	217	7	40	2.8	490	82	88
2 Tbsp. butter	204	0.2	0	23	203	7	7
2 ounces brewed coffee	1	0	0	0	1	2	29
6 ounces whole milk	112	6	9	6	79	154	242
Totals for breakfast	603	14.4	63.5	32.7	782	272	659
4 ounces baked pork tenderloin	167	29.5	0	4.5	65	300	475
1 cup stewed rice with green pigeon peas	412	11	66	11.4	366	170	362
1/3 cup green leaf lettuce	2	0.2	0.3	0	3	3	23
2 Tbsp. orange tomatoes	3	0.2	0.6	0	9	6	44
4 Tbsp. guava paste	214	0	55	0	2	2	52
2 ounces white cheese	97	6	2	7	47	88	59
12 ounces diet cola	7	0.4	1	0.1	28	32	28
Totals for lunch	902	47.3	124.9	23	520	601	1,043
2 ounces brewed coffee with 6 ounces whole milk	112	6	9	6	79	154	242
Totals for snack	113	6	9	6	80	156	271
4 ounces sautéed beef cube steak with onions	313	41.3	7.4	12	229	276	489
1 cup white rice	244	4	44	5	579	68	55
1 cup stewed red beans	213	11	26	8	640	163	513
3 medium fried plantains (Tostones)	277	2	42	14	3,414	44	589
10 ounces orange juice	140	2.2	32.2	0.6	3	53	620
Totals for dinner	1187	60.5	151.6	39.6	4,865	604	2,266
4 ounces chamomile tea	1	0	0.2	0	1	0	11
DAILY TOTALS	2806	128.2 18.0%	349.2 50.0%	101.3 32.0%	6,248	1,633	4,196

The dietitian explains why sodium restriction is a priority for managing CKD. She reviews his diet and educates Mr. Cruz about his high sodium intake and how this can contribute to the progression of the kidney disease. She suggests he continue to reduce his sodium intake by seasoning meats and stews with herbs and spices and by not adding salt or adobo to foods. In addition, she explains why his taste for meat may have changed. She briefly mentions sources of carbohydrate and the importance of portion control to help achieve glucose control and

suggests he eat smaller portions of high carbohydrate foods and drinks. She also explains that phosphorus restriction is important for many people with CKD, and even though diet colas are lower in carbohydrates, colas contain added phosphorus. She recommends he switch to a diet drink that does not contain “phos” in the ingredients list, such as a light colored soda pop. She writes down all the recommendations for his wife. He is not as angry when he leaves. He agrees to return for another visit in 1 to 2 months. He agrees to ask his wife to come with him.

Other information

He saw the nephrologist the previous week. He has no interest in renal replacement therapy. Current medications include 20 units glargine (long acting insulin taken at bedtime), 20 milligrams (mg) simvastatin, 50 mg losartan, baby aspirin, 80 mg furosemide twice a day, 500 mg calcium carbonate twice a day, 650 mg sodium bicarbonate twice a day, 325 mg ferrous sulfate twice a day, and 50,000 international units (I.U.) ergocalciferol weekly. He feels he is taking too many medications. He has not told his family about his diagnosis of kidney disease.

Questions

1. Chronic kidney disease is identified when the eGFR is between 15-60.
Mr. Cruz's eGFR is 17. He is approaching kidney failure.
2. Kidney damage may be identified by an abnormal UACR. What is the normal UACR?

Answer: less than 30

Mr. Cruz's UACR is 3,765.

3. Write the note for documenting the visit.

A	<i>60-year-old Puerto Rican male, with uncontrolled diabetes, diabetic kidney disease, uncontrolled hypertension and albuminuria. Ht 67", Wt 167 #, BP 154/98. Pertinent labs: UACR 3,765, eGFR 17, A1C 12.0, Alb 2.5. Pt has not taken any medication in the past 3 years</i>
D	<i>Excessive mineral intake (sodium) related to consumption of foods high in sodium as evidenced by diet recall's sodium intake estimated at 6,200 mg and compared to estimated needs of 1,500 -2,300 mg. Excessive carbohydrate intake related to food- and nutrition-related knowledge deficit as evidenced by diet recall indicating large portion sizes of foods high in carbohydrate.</i>
I	<i>Nutrition education, priority modification and relationship to health and disease. Low sodium diet and relationship to controlling blood pressure and slowing CKD progression. Reduction of portion sizes of meals and drinks and the relationship to blood glucose control.</i>
M & E	<i>Short term: Reduce intake of high sodium foods and the use of adobo and table salt in meal preparation. Reduce portion size of meals and drinks. Switch to a light colored soda pop to reduce phosphorus. Long term: Review diet recall in future visit. Monitor BP, UACR, eGFR, A1c and Alb for improvement.</i>

4. Using his current weight of 167 pounds, estimate protein intake per kilogram body weight and compare to recommended intake. Use 0.8 grams protein/kilogram as recommended amount.

<p>Answer:</p> <p><i>167 pounds/2.2 pounds per kilogram ≈76 kg.</i></p> <p><i>128.2 grams protein/ 76 kilograms ≈ 1.7 grams protein/kilogram</i></p> <p><i>Recommended intake is about 60 grams per day. He is eating more than twice the recommended amount of protein.</i></p>

5. List at least 3 recommendations to lower protein intake and estimate the differences in protein amount based on your recommendations. For example, he could decrease his portion of milk (with coffee) from 6 ounces to 4 ounces of milk (6 g protein vs. 4 g protein) for his afternoon snack.

Answer:

- *Decrease portion of milk (with coffee) from 6 ounces to 4 ounces (6 g vs. 4 g protein).*
- *At lunch, decrease portion of pork tenderloin from 4 ounces to 3 ounces (29.5 g vs. 22 g protein) or even lower to 2 ounces (29.5 g vs. 15 g protein).*
- *At lunch, decrease portion of stewed rice with pigeon peas from 1 cup to $\frac{3}{4}$ cup (11 g vs. 8 g protein) or even lower to $\frac{1}{2}$ cup (11 g vs. 5.5 g protein).*
- *At lunch, decrease portion of white cheese from 2 ounces to 1 ounce (6 g vs. 3 g).*
- *At dinner, decrease portion of cubed steak from 4 ounces to 3 ounces (41 g vs. 31 g protein) or even lower to 2 ounces (41 g vs. 20 g).*
- *At dinner, decrease portion of stewed red beans from 1 cup to $\frac{1}{2}$ cup (11 g vs. 5.5 g protein).*

6. His serum phosphorus level is elevated. Use your recommendations for reducing protein intake listed in question 3 to estimate the differences in intake for phosphorus.

Example Answer:

Food (NOTE: totals are not listed at the bottom of this table)	Phosphorus (mg) in original recall	Phosphorus (mg) in suggested serving
Milk (6 ounces to 4 ounces)	154	103
Pork (4 ounces to 3 ounces)	300	225
Pork (4 ounces to 2 ounces)	300	150
Stewed rice with pigeon peas (1 cup to $\frac{3}{4}$ cup)	170	128
Stewed rice with pigeon peas (1 cup to $\frac{1}{2}$ cup)	170	85
White Cheese (2 ounces to 1 ounce)	88	44
Cubed steak (4 ounces to 3 ounces)	276	207
Cubed steak (4 ounces to 2 ounces)	276	138
Red beans (1 cup to $\frac{1}{2}$ cup)	163	81
TOTAL change in phosphorus intake based on your recommendations		

What other recommendations could the dietitian make to lower phosphorus intake?

Answer:

- *Decrease intake of diet colas, which are higher in phosphorus, and switch to a diet beverage that does not contain phosphorus. Review the ingredients list of the beverage to make sure it does not contain “phos” in the ingredients list.*

7. His serum potassium is at the high end of the reference range. He takes losartan to lower blood pressure and reduce albuminuria; this medication also decreases urinary potassium excretion. Using your recommendations for reducing protein intake listed in question 3, estimate the differences in intake for potassium.

Example Answer:

Food (NOTE: totals are not listed at the bottom of this table.)	Potassium (mg) in original recall	Potassium (mg) in suggested serving
Milk (6 ounces to 4 ounces)	242	162
Pork (4 ounces to 3 ounces)	475	356
Pork (4 ounces to 2 ounces)	475	238
Stewed rice with pigeon peas (1 cup to $\frac{3}{4}$ cup)	362	272
Stewed rice with pigeon peas (1 cup to $\frac{1}{2}$ cup)	362	181
White Cheese (2 ounces to 1 ounce)	59	30
Cubed steak (4 ounces to 3 ounces)	489	367
Cubed steak (4 ounces to 2 ounces)	489	245
Red beans (1 cup to $\frac{1}{2}$ cup)	513	256
TOTAL change in potassium intake based on your recommendations		

8. List other sources of potassium in his diet (other items with over 200 milligrams potassium).

Answer:

*Acerola juice
Fried plantains
Orange juice*

9. **Extra credit:** After looking at your answers for questions 6 and 7, comment on the nutrient composition of foods rich in protein in relation to phosphorus and potassium content.

Answer:

Foods rich in protein tend to be rich in phosphorus and potassium. Reducing protein intake will reduce phosphorus and potassium intake.

Follow Up with Mr. Cruz

Mr. Cruz returns with his wife for his second Medical Nutrition Therapy (MNT) appointment in August as scheduled. She now uses less adobo and sazón when she prepares meals. His feet are not as swollen since he decreased his sodium intake. He cut his portions of protein-rich food since the last visit. They switched to reduced-fat (2%) milk even though this had not been specifically discussed before. However, he is still drinking colas at lunch and may be having a hard time switching to an alternative. They started walking for about 30 minutes twice a week. His wife has many questions about his diet, diagnosis, and dialysis.

Breakfast	Lunch	Dinner
4 ounces passion fruit juice 1 cup oatmeal prepared with 2% milk 2 ounces brewed coffee with 6 ounces 2% milk	½ cup yellow rice with chicken ½ cup stewed red beans ¼ cup fried sweet plantains ½ cup sliced mango 12 ounces diet cola	1 baked chicken drumstick ¾ cup cassava with garlic sauce ½ cup lettuce 2 Tbsp. red tomato 2 slices avocado ½ cup vanilla custard (flan) 4 ounces tamarind drink
	Snack: 2 ounces brewed coffee with 6 ounces 2% milk	Evening snack: 4 ounces chamomile tea

Nutrient Analysis

Food	Kcal	PR (g)	Carb (g)	Fat (g)	Na (mg)	P (mg)	K (mg)
4 ounces passion fruit juice	74	0.8	17.9	0.2	7	31	344
½ cup dry oatmeal prepared with 8 ounces of 2% milk	154 122	5.3 8.0	27.4 11.7	2.6 4.8	2 115	166 224	147 342
2 ounces brewed coffee in 6 ounces 2% milk	1 92	0 6	0 8.8	0 3.6	1 86	2 168	29 256
Totals for breakfast	443	20.1	65.8	11.2	211	591	1,118
½ cup yellow rice with chicken	235	10.7	34.7	6.1	105	131	303
½ cup stewed red beans	106	5.5	13	4	320	81	256
¼ cup fried sweet plantains (ripe)	213	1	30	11	4	32	429
½ cup sliced mango	50	0.7	12.4	0.3	1	12	139
12 ounces diet cola	7	0.4	1	0.1	28	32	28
Totals for lunch	611	18.3	91.1	21.5	458	288	1,155
2 ounces brewed coffee in 6 ounces 2% milk	1 92	0 6	0 8.8	0 3.6	1 86	2 168	29 256
Totals for snack	93	6	8.8	3.6	87	170	285
1 baked chicken drumstick, no skin	176	22.7	0.4	8.8	550	196	264
¾ cup cassava with garlic sauce	488	2.2	59.3	27.4	61	44	425
1/2 cup shredded iceberg lettuce	3	0.2	0.7	0	2	5	32
2 Tbsp. red tomatoes	4	0.2	0.9	0	1	6	55
2 slices avocado (0.2 cups)	47	0.6	2.5	4.3	2	15	142
½ cup vanilla custard (flan)	222	6.9	35	6.2	81	147	181
4 ounces tamarind drink	134	1	35	0	11	33	180
Totals for dinner	1,074	33.8	133.8	46.7	697	446	1,279
4 ounces chamomile tea	1	0	0.2	0	1	0	11
DAILY TOTALS	2,315	84.2 14%	308.5 53%	86.6 33%	1,541	1,495	4,133

In July, the physician reduced the dose of insulin by half due to frequent hypoglycemia and his A1C dropped from 12% to 6.2% in 2 months. His last blood pressure was 138/80, down from 154/98. Physical exam now shows trace edema in his feet.

Recent lab data

Test	Reference Ranges (Units)	Aug 2012	July 2012	June 2012	May 2012
Est GFR	> 60 (mL/min/1.73 m ²)	16 L	17 L	16 L	17 L
UACR	< 30 (mg/g)	2,888 H			3,765 H
Glu	70-99 (mg/dL)	298 H	70	115 H	134 H
BUN	7-18 (mg/dL)	54 H	62 H	47 H	62 H
Creat	0.8-1.2 (mg/dL)	3.9 H	3.7 H	3.8 H	3.7 H
Na	135-145 (mEq/L)	135	141	141	140
K	3.5-5.0 (mEq/L)	5.2 H	5.0	4.8	5.0
Cl	101-111 (mEq/L)	102	110	111	109
CO2	21-32 (mEq/L)	23.0	22.0	21.8 L	20.1 L
Phos	2.5-4.6 (mg/dL)	4.8 H	4.6	4.7 H	4.9 H
Ca	8.5-10.2 (mg/dL)	8.3 L	8.1 L	8.2 L	8.0 L
Alb	3.4-5.0 (gm/dL)	2.9 L	2.6 L	2.5 L	2.4 L
TG	< 150 (mg/dL)				155
HDL	> 40 (mg/dL)				32
LDL	< 100 (mg/dL)				129
A1C	Normal ≤ 5.6% Pre-diabetes 5.7-6.4% Diabetes ≥ 6.5%		6.2%		12%
Hgb	12-17 (g/dL)	10.2 L			10.3 L
TIBC	250-450	210 L			276
Serum iron	40-160	75			45
% saturation	15-50	35.7			16
25-OH D (total)	≥ 20 (ng/mL)	20			15 L
25-OH D3	(ng/mL)	< 4			< 4
25-OH D2	(ng/mL)	20			15
iPTH	10-65 (pg/mL)	132 H			197 H

Current medications include 10 units glargine (long acting insulin taken at bedtime), 20 milligrams (mg) simvastatin, 50 mg losartan, baby aspirin, 80 mg furosemide twice a day, 500 mg calcium carbonate three a day with meals, 650 mg sodium bicarbonate twice a day, 325 mg ferrous sulfate twice a day and 50,000 international units (I.U.) ergocalciferol weekly.

Questions

- Write in the totals for his current recall and use the United States Department of Agriculture's online tool *Interactive DRI for Healthcare Professionals* (http://fnic.nal.usda.gov/fnic/interactiveDRI/dri_results.php) to fill in the table below. How does his current intake compare to the recommended daily amounts? He is 60 years old, his height is 67 inches and he currently weighs 164 pounds. Use low active for activity level.

Nutrients	Initial recall	Current recall	Recommended intake	Adequate? Inadequate? High? Low?
Calories	2,806	2,315	2,425	Adequate
Protein(g)	128	84	60	High
Carbohydrate (g)	349	308	273-394	Adequate
Fat (g)	101	87	54-94	Adequate
Sodium (mg)	6,248	1,541	1,300–2,300	Adequate
Phosphorus (mg)	1,633	1,495	700	High
Potassium(mg)*	4,196	4,133	4,700	High

**Adequate intake for potassium does not apply to individuals with medical conditions or who take medications that may impair potassium excretion.*

- Review his current lab data and prioritize the next diet step(s) to recommend.
(Hint: review NKDEP's *Eating Right for Kidney Health: Tips for People with Chronic Kidney Disease*, available at <http://nkdep.nih.gov/resources/eating-right.shtml>)

Answer:

Serum potassium is elevated.

Serum phosphorus is elevated.

He needs to be instructed about potassium and phosphorus in his diet.

Note: see slides 49-50 in *Chronic Kidney Disease 101: Nutrition Intervention slide deck*

- Which food(s) in the recall are rich in those nutrients that were prioritized in question 2?

Answer:

Milk in coffee, items prepared with milk (oatmeal and flan), diet cola, and chicken.

4. Mr. Cruz was experiencing frequent hypoglycemia and his doctor reduced his insulin doses. How should he treat low blood glucose?

Answer:

He should use glucose tablets.

If choosing juice, he should limit those rich in potassium.

He should avoid using colas due to their phosphoric acid content.

He should avoid using milk, which is rich in phosphorus and potassium.

Note: see slides 32-35 in *Chronic Kidney Disease 101: Nutrition Intervention slide deck*

5. His LDL is elevated. List possible dietary interventions.

Answer:

He now uses 2% milk instead of whole milk. He decreased his intake of animal protein.

6. Write the note for documenting the visit.

A	60-year-old Puerto Rican male, with diabetic kidney disease, uncontrolled glucose levels, hyperkalemia and hyperphosphatemia. Ht 67", Wt 167 #. Pertinent labs: Gluc 298, Alb 2.9, P 4.8, K 5.2. Physician reduced the dose of insulin due to frequent hypoglycemia.
D	Excessive intake of potassium and phosphorus related to high potassium and phosphorus food choices as evidenced by diet recall's nutrient analysis estimated at 1500mg of P and 4000mg of K. Altered nutrition-related laboratory values of glucose related to endocrine dysfunction as evidenced by consumption of foods high in sugar.
I	Nutrition education, priority modification and relationship to health and disease. Reduce intake of foods high in potassium and phosphorus and relationship to improve lab values and slowing CKD progression. Reduce intake of sugary foods and recommend pt to take medications as prescribed and relationship to improving glucose control.
M & E	Short term: Reduce intake of sugary foods, and foods high in potassium and phosphorus. Long term: Review diet recall in future visit. Monitor eGFR, Glucose, K, and P levels.

Clinical Questions

1. Describe the status of his kidney function (eGFR).

Answer:

Mr. Cruz's eGFR appears to be stable, ranging from 16-17 for the past few months.

2. His urine-albumin-to-creatinine ratio (UACR) decreased from 3,765 to 2,806. This is still significantly higher than normal (less than 30 mg/g). List possible interventions for lowering the UACR and discuss the intervention(s) that worked for Mr. Cruz.

Answer:

- *Control blood pressure*
- *Reduce sodium intake*
- *Achieve good control of diabetes early*
- *Reduce weight if obese*
- *Reduce protein intake if excessive*
- *Achieve tobacco cessation*

*He takes losartan to control blood pressure and lower urine albumin.
He is eating less salt and protein.*

Note: *see slide 36 in Chronic Kidney Disease 101: Nutrition Intervention slide deck*

3. The kidneys help maintain the acid-base balance by excreting hydrogen ion (acid) and synthesizing bicarbonate (base). As CKD progresses, and there are fewer functioning nephrons, less acid is excreted into the urine and less base is synthesized. This may lead to chronic metabolic acidosis or acidemia. Acidemia may be associated with reduced albumin synthesis and muscle degradation.

Serum bicarbonate less than 22 milliequivalents per liter may indicate acidemia in CKD. (NOTE: The bicarbonate is identified as CO₂ above and HCO₃ in the slide deck.)

Mr. Cruz's serum bicarbonate has increased from 20.1 to 23 and his serum albumin increased from 2.4 to 2.9 within the same time frame. He is eating fewer calories and less protein. Review slides 53–57 in the Chronic Kidney Disease 101: Nutrition Intervention slide deck and identify the interventions that improved Mr. Cruz's acidemia and hypoalbuminemia.

Answer:

He is eating less animal protein and he is taking sodium bicarbonate.

4. Anemia is a common complication of CKD. The kidneys produce erythropoietin, the hormone needed for red blood cell synthesis. Hemoglobin is used to monitor anemia in CKD. Review slides 69–73 in the slide deck and discuss the status of this complication for Mr. Cruz. Identify the medication prescribed to treat this complication.

Answer:

His hemoglobin is low. He takes ferrous sulfate twice a day to treat the anemia.

5. Abnormal mineral and bone metabolism is another common complication of kidney disease. The kidneys activate vitamin D. People with CKD may have low vitamin D and as a result low serum calcium. Parathyroid hormone controls serum calcium level and the level of intact parathyroid hormone (iPTH) may be increased in CKD, depending on the type of bone disease. Serum phosphorus increases as there are fewer nephrons to excrete phosphorus into the urine.

The 25-OH vitamin D level is used to assess vitamin D status. Review slides 59–63 and discuss the status of this complication for Mr. Cruz.

Look specifically at the trends in 25-OH, calcium, phosphorus and intact parathyroid hormone (iPTH) levels. Identify the medications prescribed to treat this complication. Identify the dietary interventions that may be implemented for this complication.

Answer:

- *His 25-OH vitamin D level was low, but improved. The level increased from 15 to 20.*
- *His serum calcium level improved as the vitamin D level increased. The level increased from 8.0 to 8.3.*
- *His serum phosphorus initially decreased and is trending up.*
- *The iPTH level decreased from 197 to 132.*

He takes supplemental vitamin D (ergocalciferol).

He takes calcium carbonate with meals as a phosphorus binder.

He decreased his protein intake which means he decreased his phosphorus intake.

Decreasing cola intake may help further reduce phosphorus intake.

6. **Extra credit** (the answer is not found within the Chronic Kidney Disease 101: Nutrition Intervention slides): Mr. Cruz's wife wants to know about options for kidney failure. What are his options?

Consider reviewing the following NKDEP module about the transition to kidney failure for more information or use your textbook or other lecture notes as needed.

<http://nkdep.nih.gov/resources/diet-training-module-5-transition-ckd-kidney-failure-508.ppt>

Answer:

The options for kidney failure include:

- *Hemodialysis*
- *Peritoneal dialysis*
- *Kidney transplant*
- *Medical management with dialysis (no renal replacement therapy)*

For more information, visit www.nkdep.nih.gov/nutrition or call 1-866-4 KIDNEY (1-866-454-3639). *The National Kidney Disease Education Program (NKDEP) works to improve the understanding, detection, and management of kidney disease. NKDEP is a program of the National Institutes of Health (NIH). NKDEP is a program of the National Institutes of Health.*

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