



## The Case of Juan Cruz: Approaching Kidney Failure

### 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 as 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
	<b>Afternoon Snack:</b> 2 ounces brewed coffee with 6 ounces whole milk	<b>Before Bedtime:</b> 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
<b>Totals for breakfast</b>	<b>603</b>	<b>14.4</b>	<b>63.5</b>	<b>32.7</b>	<b>782</b>	<b>272</b>	<b>659</b>
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
<b>Totals for lunch</b>	<b>902</b>	<b>47.3</b>	<b>124.9</b>	<b>23</b>	<b>520</b>	<b>601</b>	<b>1,043</b>
2 ounces brewed coffee with 6 ounces whole milk	112	6	9	6	79	154	242
<b>Totals for snack</b>	<b>113</b>	<b>6</b>	<b>9</b>	<b>6</b>	<b>80</b>	<b>156</b>	<b>271</b>
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
<b>Totals for dinner</b>	<b>1187</b>	<b>60.5</b>	<b>151.6</b>	<b>39.6</b>	<b>4,865</b>	<b>604</b>	<b>2,266</b>
4 ounces chamomile tea	1	0	0.2	0	1	0	11
<b>DAILY TOTALS</b>	<b>2806</b>	<b>128.2</b> 18.0%	<b>349.2</b> 50.0%	<b>101.3</b> 32.0%	<b>6,248</b>	<b>1,633</b>	<b>4,196</b>

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 some people with CKD, and even though diet colas are lower in carbohydrates, dark colas contain a lot of phosphorus. She recommends he switch to a diet drink that does not contain “phos” in the ingredients list, such as a light colored soda. 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 \_\_\_\_\_. Mr. Cruz’s eGFR is \_\_\_\_\_. He is approaching \_\_\_\_\_.
2. Kidney damage may be identified by an abnormal UACR. What is the normal UACR? Mr. Cruz’s UACR is \_\_\_\_\_.
3. Write the note for documenting the visit.

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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.
  
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.
  
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. What other recommendations could be made to lower phosphorus intake?
  
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.
  
8. List other sources of potassium in his diet (other items with over 200 milligrams potassium).

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.

### 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
<b>Totals for breakfast</b>	<b>443</b>	<b>20.1</b>	<b>65.8</b>	<b>11.2</b>	<b>211</b>	<b>591</b>	<b>1,118</b>
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
<b>Totals for lunch</b>	<b>611</b>	<b>18.3</b>	<b>91.1</b>	<b>21.5</b>	<b>458</b>	<b>288</b>	<b>1,155</b>
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
<b>Totals for snack</b>	<b>93</b>	<b>6</b>	<b>8.8</b>	<b>3.6</b>	<b>87</b>	<b>170</b>	<b>285</b>
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
<b>Totals for dinner</b>	<b>1,074</b>	<b>33.8</b>	<b>133.8</b>	<b>46.7</b>	<b>697</b>	<b>446</b>	<b>1,279</b>
4 ounces chamomile tea	1	0	0.2	0	1	0	11
<b>DAILY TOTALS</b>	<b>2,315</b>	<b>84.2</b> 14%	<b>308.5</b> 53%	<b>86.6</b> 33%	<b>1,541</b>	<b>1,495</b>	<b>4,133</b>

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 <sup>2</sup> )	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

1. 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](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			
Protein(g)	128			
Carbohydrate (g)	349			
Fat (g)	101			
Sodium (mg)	6,248			
Phosphorus (mg)	1,633			
Potassium(mg)*	4,196			

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

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

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

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

6. Write the note for documenting the visit.

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### **Clinical Questions**

1. Describe the status of his kidney function (eGFR).
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.
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 CO<sub>2</sub> above and HCO<sub>3</sub> 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.

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.

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.

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>

For more information, visit [www.nkdep.nih.gov/nutrition](http://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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