Case 26

Chronic Kidney Disease (CKD) Treated with Dialysis

Objectives

After completing this case, the student will be able to:

1. Describe the pathophysiology of chronic kidney disease (CKD).
2. Describe the stages of CKD.
3. Differentiate the physiology of peritoneal dialysis and hemodialysis.
4. Identify and explain common nutritional problems associated with CKD.
5. Interpret laboratory parameters for nutritional implications and significance.
6. Analyze nutrition assessment data to evaluate nutritional status and identify specific nutrition problems.
7. Determine nutrition diagnoses and write appropriate PES statements.
8. Develop a nutrition care plan with appropriate measurable goals, interventions, and strategies for monitoring and evaluation that addresses the nutrition diagnoses of this case.
9. Integrate sociocultural and ethnic food consumption issues within a nutrition care plan.
10. Make appropriate documentation in the medical record.

Enez Joaquin is a 24-year-old Pima Indian who has had type 2 diabetes mellitus since age 13. Mrs. Joaquin has experienced a declining glomerular filtration rate for the past 2 years. She is being admitted in preparation for kidney replacement therapy.

UH UNIVERSITY HOSPITAL

ADMISSION DATABASE

Name: Enez Joaquin
DOB: 4/13 (age 24)
Physician: L. Nila, MD

BED #	DATE:	TIME:	TRIAGE STATUS (ER ONLY): ☐ Red ☐ Yellow ☐ Green ☐ White
2	3/5	1830	

Initial Vital Signs

TEMP:	RESP:	SAO_2:	
98.6	25		
HT:	WT (lb):	B/P:	PULSE:
5'0"	170	220/80	84
LAST TETANUS		LAST ATE	LAST DRANK
4 years ago		2 days ago	4 hours ago-water

PRIMARY PERSON TO CONTACT:
Name: Eddie Joaquin (husband)
Home #: 555-3947
Work #: 554-2100

ORIENTATION TO UNIT: ☒ Call light ☒ Television/telephone ☒ Bathroom ☒ Visiting ☒ Smoking ☒ Meals ☒ Patient rights/responsibilities

CHIEF COMPLAINT/HX OF PRESENT ILLNESS

N/A

PERSONAL ARTICLES: (Check if retained/describe)
☐ Contacts ☐ R ☐ L ☐ Dentures ☐ Upper ☐ Lower
☐ Jewelry:
☐ Other:

ALLERGIES: Meds, Food, IVP Dye, Seafood: Type of Reaction

none

VALUABLES ENVELOPE:
☐ Valuables instructions

PREVIOUS HOSPITALIZATIONS/SURGERIES

childbirth 7 years ago

INFORMATION OBTAINED FROM:
☒ Patient ☐ Previous record
☐ Family ☐ Responsible party

Signature Enez Joaquin

Home Medications (including OTC) **Codes: A=Sent home** **B=Sent to pharmacy** **C=Not brought in**

Medication	Dose	Frequency	Time of Last Dose	Code	Patient Understanding of Drug
Glucophage	850 mg	twice daily	?	C	no
Vasotec	20 mg	three X daily	?	C	no

Do you take all medications as prescribed? ☐ Yes ☒ No If no, why?

PATIENT/FAMILY HISTORY

☐ Cold in past two weeks
☐ Hay fever
☐ Emphysema/lung problems
☐ TB disease/positive TB skin test
☐ Cancer
☐ Stroke/past paralysis
☐ Heart attack
☐ Angina/chest pain
☐ Heart problems

☒ High blood pressure Patient
☐ Arthritis
☐ Claustrophobia
☐ Circulation problems
☐ Easy bleeding/bruising/anemia
☐ Sickle cell disease
☐ Liver disease/jaundice
☐ Thyroid disease
☒ Diabetes Patient

☒ Kidney/urinary problems Patient
☒ Gastric/abdominal pain/heartburn Patient
☐ Hearing problems
☐ Glaucoma/eye problems
☐ Back pain
☐ Seizures
☐ Other

RISK SCREENING

Have you had a blood transfusion? ☐ Yes ☒ No
Do you smoke? ☐ Yes ☒ No
If yes, how many pack(s)?
Does anyone in your household smoke? ☒ Yes ☐ No
Do you drink alcohol? ☒ Yes ☐ No
If yes, how often? daily How much? 12 oz beer
When was your last drink? 3/4
Do you take any recreational drugs? ☐ Yes ☒ No
If yes, type:_____ Route:
Frequency:_____ Date last used:_____/_____/_____

FOR WOMEN Ages 12-52

Is there any chance you could be pregnant? ☐ Yes ☒ No
If yes, expected date (EDC):
Gravida/Para: 1/1

ALL WOMEN

Date of last Pap smear: 1/25
Do you perform regular breast self-exams? ☐ Yes ☒ No

ALL MEN

Do you perform regular testicular exams? ☐ Yes ☐ No

Additional comments:

x Liz Romero, RN
Signature/Title

Client name: Enez Joaquin
DOB: 4/13
Age: 24
Sex: Female
Education: High school
Occupation: Secretary
Hours of work: 9 AM–5 PM
Household members: Husband age 26, type 2 diabetes under control; daughter age 7, in good health
Ethnic background: Pima Indian
Religious affiliation: Catholic
Referring physician: Lourdes Nila, MD (nephrology)

Chief complaint:
Patient complains of anorexia; N/V; 4 kg weight gain in the past 2 weeks, edema in extremities, face, and eyes; malaise; progressive SOB with 3-pillow orthopnea; pruritus; muscle cramps; and inability to urinate.

Patient history:
Mrs. Joaquin is a 24-year-old Native American woman who was diagnosed with type 2 DM when she was 13 years old and has been poorly compliant with prescribed treatment. She is from the Pima Indian tribe of southern Arizona. She lives with her husband and 7-year-old daughter. Her husband also has type 2 DM. He was diagnosed at the age of 18. Her renal function has been monitored for the past 7 years. Progressive decompensation of kidney function has been documented by declining GFR, increasing creatinine and urea concentrations, elevated serum phosphate, and normochromic, normocytic anemia. She is being admitted for preparation for kidney replacement therapy.
Onset of disease: Diagnosed with Stage 3 chronic kidney disease 2 years ago. Her acute symptoms have developed over the last 2 weeks.
Type of Tx: Control BP; prepare for kidney replacement therapy; nutrition consult.
PMH: Gravida 1/para 1. Infant weighed 10 lbs at birth 7 years ago. Patient admits she recently stopped taking a prescribed hypoglycemic agent, and she has never filled her prescription for antihypertensive medication.
Meds: Glucophage (metformin) 850 mg bid
Smoker: No
Family Hx: Both mother and father diagnosed with DM

Physical exam:
General appearance: Overweight Native American female who appears her age. Lethargic, complaining of N/V.
Vitals: Temp 98.6°F, BP 220/80 mm Hg, HR 86 bpm, RR 25 bpm
Heart: S4, S1, and S2, regular rate and rhythm. I/VI systolic ejection murmur, upper left sternal border.
HEENT: Normocephalic, equal carotid pulses, neck supple, no bruits
Eyes: PERRLA
Ears: Noncontributory

Nose: Noncontributory
Throat: Noncontributory
Genitalia: Normal female
Neurologic: Oriented to person, place, and time; intact, mild asterixis
Extremities: Muscle weakness; 3+ pitting edema to the knees, no cyanosis
Skin: Dry and yellowish brown
Chest/lungs: Generalized rhonchi with rales that are mild at the bases (patient breathes with poor effort)
Peripheral vascular: Normal pulse (3+) bilaterally
Abdomen: Bowel sounds positive, soft; generalized mild tenderness; no rebound

Nutrition Hx:
General: Intake has been poor due to anorexia, N & V. Patient states that she tried to follow the diet that she was taught 2 years ago. "It went pretty well for awhile, but it was hard to keep up with."

Usual dietary intake:
Breakfast: Cold cereal, bread or fried potatoes, fried egg (occasionally)
Lunch: Bologna sandwich, potato chips, Coke
Dinner: Chopped meat, fried potatoes
Snacks: Crackers and peanut butter

Food allergies/intolerances/aversions: None
Previous nutrition therapy? Yes *If yes, when:* 2 years ago when patient dx with Stage 3 chronic kidney disease *Where?* Reservation Health Service
Food purchase/preparation: Self
Vit/min intake: None
Current diet order: 30 kcal/kg, 0.8 g protein/kg, 8–12 mg phosphorus/kg, 2–3 g Na
24-hour recall: N/A

Dx:
Chronic kidney disease; type 2 DM

Tx plan:
Evaluate for kidney replacement therapy
Capoten/captopril
Erythropoietin (r-HuEPO) 30 units/kg
Vitamin/mineral supplement
Hectorol 2.5 μg four times daily 3 × week
35 kcal/kg, 1.2 g protein/kg, 2 g K, 1 g phosphorus, 2 g Na, 1,000 mL fluid + urine output per day
Glucophage (metformin) 850 mg twice daily
CBC, chemistry
Phos Lo
Stool softener
Sodium bicarbonate, 2 g every day
Occult fecal blood

UH UNIVERSITY HOSPITAL

NAME: Enez Joaquin
AGE: 24
PHYSICIAN: L. Nila, MD

DOB: 4/13
SEX: F

**********CHEMISTRY**********

DAY:				
DATE:		Admit	d/c	
TIME:				
LOCATION:				
	NORMAL			UNITS
Albumin	3.5–5	3.7	3.4 L	g/dL
Total protein	6–8	6.2	6.0	g/dL
Prealbumin	16–35			mg/dL
Transferrin	250–380 (women)			mg/dL
	215–365 (men)			
Sodium	136–145	130 L	134 L	mEq/L
Potassium	3.5–5.5	5.8 H	5.6 H	mEq/L
Chloride	95–105	91 L	100	mEq/L
PO_4	2.3–4.7	9.5 H	7.3 H	mg/dL
Magnesium	1.8–3	2.9	2.7	mg/dL
Osmolality	285–295			mmol/kg/H_2O
Total CO_2	23–30	20 L	23	mEq/L
Glucose	70–110	282 H	200 H	mg/dL
BUN	8–18	69 H	55 H	mg/dL
Creatinine	0.6–1.2	12.0 H	8.5 H	mg/dL
Uric acid	2.8–8.8 (women)			mg/dL
	4.0–9.0 (men)			
Calcium	9–11	8.2 L	8.6 L	mg/dL
Bilirubin	≤0.3			mg/dL
Ammonia (NH_3)	9–33			μmol/L
ALT	4–36	26		U/L
AST	0–35	28		U/L
Alk phos	30–120	131		U/L
CPK	30–135 (women)			U/L
	55–170 (men)			
LDH	208–378	315		U/L
CHOL	120–199	220 H		mg/dL
HDL-C	>55 (women)			mg/dL
	>45 (men)			
VLDL	7–32			mg/dL
LDL	<130			mg/dL
LDL/HDL ratio	<3.22 (women)			
	<3.55 (men)			
Apo A	101–199 (women)			mg/dL
	94–178 (men)			
Apo B	60–126 (women)			mg/dL
	63–133 (men)			
TG	35–135 (women)	200 H		mg/dL
	40–160 (men)			
T_4	4–12			mcg/dL
T_3	75–98			mcg/dL
HbA_{1C}	3.9–5.2	8.9 H		%

UH UNIVERSITY HOSPITAL

NAME: Enez Joaquin
AGE: 24
PHYSICIAN: L. Nila, MD

DOB: 4/13
SEX: F

**********URINALYSIS**********

DAY:		Admit	Postop	d/c	
DATE:					
TIME:					
LOCATION:					
	NORMAL				UNITS
Coll meth		Random specimen	First morning	First morning	
Color		Straw	Straw	Pale yellow	
Appear		Hazy	Slightly hazy	Slightly hazy	
Sp grv	1.003-1.030	1.010			
pH	5-7	7.9			
Prot	NEG	2+			mg/dL
Glu	NEG				mg/dL
Ket	NEG				
Occ bld	NEG				
Ubil	NEG				
Nit	NEG				
Urobil	<1.1				EU/dL
Leu bst	NEG				
Prot chk	NEG				
WBCs	0-5	20			/HPF
RBCs	0-5				/HPF
EPIs	0				/LPF
Bact	0				
Mucus	0				
Crys	0				
Casts	0				/LPF
Yeast	0				

UH UNIVERSITY HOSPITAL

Name: Enez Joaquin
Physician: L. Nila, MD

PATIENT CARE SUMMARY SHEET

Date: 3/5 Room: 324 Wt Yesterday: Today: 170

Temp °F	NIGHTS								DAYS								EVENINGS							
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
105																								
104																								
103																								
102																								
101																								
100																								
99																								
98																								
97																								
96																								
Pulse																								
Respiration																			84					82
BP																			25					24
Blood Glucose																			220/80					210/78
Appetite/Assist																			210					
INTAKE																			0					
Oral																								
IV																			0	50				
TF Formula/Flush																			0					
Shift Total																			0					
OUTPUT																								
Void																								
Cath.																			N/A					100
Emesis																								
BM																					50			
Drains																								
Shift Total																								
Gain																	50 cc							
Loss																	150 cc							
Signatures																								
																	Sandy Dunn, RN							

UH UNIVERSITY HOSPITAL

Name: Enez Joaquin
Physician: L. Nila, MD

PATIENT CARE SUMMARY SHEET

Date: 3/6 Room: 324 Wt Yesterday: 170 Today: 165 Postdialysis: 165

Temp °F	NIGHTS								DAYS								EVENINGS							
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
105																								
104																								
103																								
102																								
101																								
100																								
99								99																
98																								
97																								
96																								
Pulse								80			84													
Respiration								23			25													
BP								200/75			220/80													
Blood Glucose								170			200													
Appetite/Assist								NPO			NPO													
INTAKE																								
Oral								0			0													
IV																								
TF Formula/Flush																								
Shift Total																								
OUTPUT																					300			
Void								200																
Cath.																								
Emesis				100												50								
BM								×1																
Drains																								
Shift Total																								
Gain	NPO																							
Loss	300 cc																							
Signatures	Alice Langa, RT								Sandy Dunn, RN								Michele Barker, RN							

Case Questions

I. Understanding the Disease and Pathophysiology

1. Describe the physiological functions of the kidneys.

2. What diseases/conditions can lead to chronic kidney disease (CKD)?

3. Explain how type 2 diabetes mellitus can lead to CKD.

4. Outline the stages of CKD, including the distinguishing signs and symptoms.

5. From your reading of Mrs. Joaquin's history and physical, what signs and symptoms did she have?

6. What are the treatment options for Stage 5 CKD?

7. Describe the differences between hemodialysis and peritoneal dialysis.

II. Understanding the Nutrition Therapy

8. Explain the reasons for the following components of Mrs. Joaquin's medical nutrition therapy:

Nutrition Therapy	Rationale
35 kcal/kg	
1.2 g protein/kg	
2 g K	
1 g phosphorus	
2 g Na	
1,000 mL fluid + urine output	

III. Nutrition Assessment

A. Evaluation of Weight/Body Composition

9. Calculate and interpret Mrs. Joaquin's BMI. How does edema affect your interpretation?

10. What is edema-free weight? The following equation can be used to calculate the edema-free adjusted body weight (aBW_{ef}):

$$aBW_{ef} = BW_{ef} + [(SBW - BW_{ef}) \times 0.25]$$

where BW_{ef} is the actual edema-free body weight and SBW is the standard body weight as determined from the NHANES II data.

Calculate Mrs. Joaquin's edema-free weight. Is this the same as dry weight?

B. Calculation of Nutrient Requirements

11. What are the energy requirements for CKD?

12. Calculate what Mrs. Joaquin's energy needs will be once she begins hemodialysis.

13. What are Mrs. Joaquin's protein requirements when she begins hemodialysis?

14. What is the rationale? How would these change if she were on peritoneal dialysis?

C. Intake Domain

15. Are there any potential benefits of using different types of protein, such as plant protein rather than animal protein, in the diet for a patient with CKD? Explain.

16. Mrs. Joaquin has a PO_4 restriction. Why?

17. What foods have the highest levels of phosphorus?

18. Mrs. Joaquin tells you that one of her friends can drink only certain amounts of liquids and wants to know if that is the case for her. What foods are considered to be fluids? What recommendations can you make for Mrs. Joaquin?

19. If a patient must follow a fluid restriction, what can be done to help reduce his or her thirst?

20. Identify nutrition problems within the intake domain using the appropriate diagnostic term.

D. Clinical Domain

21. Several biochemical indices are used to diagnose chronic kidney disease. One is glomerular filtration rate (GFR). What does GFR measure?

22. What test is usually done to estimate glomerular filtration rate?

23. Mrs. Joaquin's GFR is 28 mL/min. What does this tell you about her kidney function?

24. Evaluate Mrs. Joaquin's chemistry report. What labs support the diagnosis of Stage 4 CKD?

25. Examine the patient care summary sheet for hospital day 2. What was Mrs. Joaquin's weight postdialysis? Why did it change?

26. Which of Mrs. Joaquin's other symptoms would you expect to begin to improve?

27. Explain why the following medications were prescribed by completing the table.

Medication	Indications/Mechanism	Nutritional Concerns
Vasotec		
Erythropoietin		
Vitamin/mineral supplement		
Calcitriol		
Glucophage		
Sodium bicarbonate		
Phos Lo		

28. Identify nutrition problems within the clinical domain using the appropriate diagnostic term.

E. Behavioral–Environmental Domain

29. What health problems have been identified in the Pima Indians through epidemiological data?

30. Explain what is meant by the "thrifty gene" theory.

31. How does nephropathy affect Pima Indians?

IV. Nutrition Diagnosis

32. Choose two high-priority nutrition problems and complete a PES statement for each.

V. Nutrition Intervention

33. For each PES statement, establish an ideal goal (based on the signs and symptoms) and appropriate intervention (based on the etiology).

34. When Mrs. Joaquin begins dialysis, energy and protein recommendations will increase. Explain why.

35. Why is it recommended for patients to have at least 50% of their protein from sources that have high biological value?

36. The MD ordered daily use of a multivitamin/mineral supplement containing B-complex, but not fat-soluble vitamins. Why are these restrictions specified?

37. What resources would you use to teach Mrs. Joaquin about her diet?

38. Using Mrs. Joaquin's typical intake and the prescribed diet, write a sample menu. Make sure you can justify your changes and that it is consistent with her nutrition prescription.

Diet PTA		**Sample Menu**
Breakfast:	Cold cereal (¾ c unsweetened)	
	Bread (2 slices) or fried potatoes (1 med potato)	
	1 fried egg (occasionally)	
Lunch:	Bologna sandwich (2 slices white bread, 2 slices bologna, mustard)	
	Potato chips (1 oz)	
	1 can Coke	
Dinner:	Chopped meat (3 oz beef)	
	Fried potatoes (1½ medium)	
HS Snack:	Crackers (6 saltines) and peanut butter (2 tbsp)	

39. Using the renal exchange list, plan a 1-day diet that complies with your diet order. Provide a nutrient analysis to assure consistency with all components of the prescription.

40. Write an initial medical record note for your consultation with Mrs. Joaquin.

Bibliography

American Dietetic Association. *Nutrition Diagnosis and Intervention: Standardized Language for the Nutrition Care Process.* Chicago, IL: American Dietetic Association; 2007.

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Pronsky ZM. *Powers and Moore's Food and Medication Interaction,* 14th ed. Birchrunville, PA: Food–Medication Interactions; 2006.

Internet Resources

American Association of Kidney Patients. http://www.aakp.org/

Atlas of Diseases of the Kidney. http://www.kidneyatlas.org/

Cook's Thesaurus. http://www.foodsubs.com/

Culinary Kidney Cooks. http://www.culinarykidneycooks.com/

eMedicineHealth: Chronic Kidney Disease. http://www.emedicinehealth.com/chronic_kidney_disease/article_em.htm

Kidney School. http://www.kidneyschool.org/

National Institute of Diabetes, Digestive and Kidney Diseases (NIDDK). http://www2.niddk.nih.gov/

National Kidney Foundation. http://www.kidney.org/atoz/atozTopic.cfm?topic=4

National Kidney Foundation K/DOQI Guidelines: Evaluation, Classification, and Stratification. http://www.kidney.org/professionals/kdoqi/guidelines_ckd/toc.htm

The Nephron Information Center. http://www.nephron.com/

The Nephron Information Center: Food Values. http://foodvalues.us/

Renal Web. http://www.renalweb.com/

San Jose State University: Renal Dialysis—A Team Effort. http://www.nufs.sjsu.edu/renaldial/index.html

United States Renal Data System (USRDS). http://www.usrds.org/

Meghan Ames

Mrs. Matuszak

KNH 406

April 3, 2010

Chronic Kidney Disease Case Study #5

I. Understanding the Disease and Pathophysiology

1) Describe the physiological functions of the kidneys.

   The kidney has three functions. It is responsible for excreting water, minerals, and organic compounds, as well as removing nonessential solutes from the blood. A part of this maintenance includes regulation of acid-base and electrolyte balance. Finally, the kidney produces hormones such as erythropoietin and 1,25-dihydroxycholecalciferol.

2) What disease/conditions can lead to chronic kidney disease (CKD)?

   Common causes of CKD include:

   - diabetes
   - hypertension
   - glomerulonephritis
   - hereditary cystic and congenital renal disease
   - interstitial nephritis and pyelonephritis
   - neoplasm/tumor

3) Explain how type 2 diabetes mellitus can lead to CKD.

   Uncontrolled DM can result in extreme hypertension which can cause kidney damage. The thick blood and high concentrations of glucose can damage the glomeruli, resulting in albuminuria. Eventually glomeruli are destroyed and remaining nephrons are under further stress, which can eventually lead to chronic kidney disease.

4) Outline the stages of CKD, including the distinguishing signs and symptoms.

   Stage 1 CKD is characterized by kidney damage with a normal or increased GFR ($\geq$ 90 mL/min/1.73m^2). Stage 2, 3, and 4 are characterized by mild (60-89 mL/min/1.73m^2), moderate (30-59 mL/min/1.73m^2), and sever (15-29 mL/min/1.73m^2), respectively, decreased in GFR. Stage 5 is full kidney failure, characterized by a GFR < 15 mL/min/1.73m^2.

5) From your reading of Mrs. Joaquin's history and physical, what signs and symptoms did she have?

Mrs. Joaquin is at risk for renal problems because of her DM. Documented signs of decreasing renal function include declining GFR, increasing creatinine and urea concentrations, elevated serum phosphate, and normochromic, normocytc anemia. In addition her weight gain, edema, and decreased urine output are signs of fluid imbalance which may be related to renal trouble.

6) What are the treatment options for Stage 5 CKD?

Stage 5 CKD is treated with renal replacement therapy (hemodialysis or peritoneal dialysis) and nutrition therapy. Goals of nutrition therapy are to meet nutritional reequriements, prevent malnutrition, minize uremia and associated CKD complications, and maintain blood pressure and fluid status. Renal transplantation is the ideal treatment.

7) Describe the differences between hemodialysis and peritoneal dialysis.

In hemodialysis, the dialyzer is manmade and the filtration takes place outside of the patient's body. In hemodialysis, the circulatory system is accessed via an arteriovenous fistula, and blood travels to the external dialyzer membrane. Peritoneal dialysis utilized the patient's peritoneal cavity, and blood is accessed while it remains in the vessels.

II. Understanding the Nutrition Therapy

8) Explain the reasons of the following components of Mrs. Joaquin's medical nutrition therapy:

Nutrition Therapy	Rationale
35 kcal/kg	Provide adequate energy to prevent malnutrition
1.2 g protein/kg	Ensure neutral or positive nitrogen balance and provide adequate amino acids
2 g Na	Decrease Na intake due to decreased Na excretion
1,000 mL fluid + urine output	Maintain fluid balance

III. Nutrition Assessment

A. Evaluation of Weight/Body Composition

9) Calculate and interpret Mrs. Joaquin's BMI. How does edema affect your interpretation?

height = 5' = 1.5 m
weight = 170 # = 77.3 kg — UBW = 73.3 kg
BMI = 77.3 kg / 1.5^2 m = 34.4 — BMI considering UBW = 73.3 kg / 1.5^2 m = 32.6

Mrs. J.'s BMI classifies her as obese. Her current weight suggests that she is obese (BMI = 34.4), but considering her reported weight gain (likely resulting from edema) she is still considered obese (BMI = 32.6)

10) What is edema-free weight? The following equation can be used to calculate the edema-free adjusted body weight (aBW_{ef}):

$$aBW_{ef} = BW_{ef} + [(SBW- BW_{ef}) \times 0.25]$$

where BW_{ef} is the actual edema-free body weight and SBW is the standard body weight as determined from the NHANES II data.

Calculate Mrs. Joaquin's edema-free weight. Is this the same as dry weight?

Edema-free weight is an individual's standard body weight that is not impacted by any symptoms of edema.

NHANES SBW = 50 kg
BW_{ef} = actual edema-free body weight = 73.3 kg
aBW_{ef} = edema-free adjusted body weight = 73.3 kg + [(50-73.3) x 0.25] = 67.5 kg

Mrs. J.'s edema-free weight is slightly lower than her dry weight (73.3 kg) because dry weight is her weight after just one round of dialysis, which does not rid the body of all the excess water it is holding. Mrs. J.'s edema-free adjusted body weight (67.5 kg) suggests that she can still lose more water weight.

B. Calculation of Nutrient Requirements

11) What are the energy requirements for CKD?

30-35 cal/kg for over 60 years and 35 kcal/kg for under 60 years

12) Calculate what Mrs. Joaquin's energy needs will be once she beings hemodialysis.

kcal = 35 kcal/kg = 35 kcal x 67.5 kg = 2362.5 ≈ 2,350

13) What are Mrs. Joaquin's protein requirements when she begins hemodialysis?

g. protein = 1.2 g/kg = 1.2 g x 67.5 kg = 81 g protein

14) What is the rationale? How would these change if she were on peritoneal dialysis?

Energy needs of those in hemodialysis are similar to or slightly higher than those of healthy individuals. It is recommended that patients older than 60 years old receive 30-35 kcal/kg and those younger than 60 years old receive 30 kcal/kg. Individuals receive peritoneal dialysis have similar energy needs and must only be sure to consider kilocalories provided by dialysate.

Protein needs for individuals on dialysis are slightly higher than healthy individuals because the kidney replacement therapy removes additional proteins from the blood (≈ 10-12 g free amino acids and 5-15 g albumin daily). In addition, protein needs are higher due to inflammation, infection, altered albumin turnover, and metabolic acidosis. Patients on both hemodialysis and peritoneal dialysis treatment need 1.2 g/kg of protein daily with

at least 50% coming from sources with a high biological value. The only special consideration for peritoneal dialysis is that needs increase during episodes of peritonitis.

C. Intake Domain

15) Are there any potential benefits of using different types of protein, such as plant protein rather than animal protein, in the diet for a patient with CKD? Explain.

At least 50% of protein intake should be from sources with high bioavailability. Complete proteins are more bioavailable than incomplete proteins, and thus animal sources are sometimes a better choice. Benefits of one protein source must also be weighed with the other nutrients, such as fats, vitamins, and minerals, that are also included in that food choice.

16) Mrs. Joaquin has a PO_4 restriction. Why?

A decreasing GFR can result in hyperphosphatemia. In order to prevent this, CKD patients must decrease dietary intakes of phosphorus.

17) What foods have the highest level of phosphorus?

Foods high in phosphorus include beer, cocoa, colas, cheese, milk, liver, shellfish, peas, beans, and whole grain products.

18) Mrs. Joaquin tells you that one of her friends can drink only certain amounts of liquids and wants to know if that is the case for her. What foods are considered to be fluids? What recommendations can you make for Mrs. Joaquin?

Foods that are considered fluids include soups, popsicles, sherbet, ice cream, yogurt, custard, and gelatin. Mrs. J. is still holding excess fluids that need to be removed. Until her weight returns to normal, she should restrict fluid intake. After usual body weight is met, Mrs. J. should alter fluid intake to balance with fluid output.

19) If a patient must follow a fluid restriction, what can be done to help reduce his or her thirst?

Intakes high in sodium increase thirst, and thus high sodium foods should be avoided. Additional tips include maintaining healthy oral hygiene, use lip balm, consume frozen fruits, and drink form small glasses/cups.

20) Identify nutrition problems within the intake domain using the appropriate diagnostic term.

Excessive phosphorus intake (NI-55.2) RT CKD and reduced GFR AEB serum PO_4 level of 9.5 mg/dL.

Excessive fluid intake (NI-3.2) RT CKD and reduced GFR AEB edema and weight gain.

Limited adherence to nutrition-related recommendations RT pt.'s interpretation of recommendations to be too difficult AEB pt. self-report, diet hx, and noncompliance.

D. Clinical Domain

21) Several biochemical indices are used to diagnose chronic kidney disease. One is glomerular filtration rate (GFR). What does GFR measure?

Glomerular filtration rate is a measure of the filtration ability of the glomerulus, and can be used as an index of kidney function. Normal GFR values fall around 125 mL/min.

22) What test is usually done to estimate glomerular filtration rate?

The plasma creatinine is usually measured and applied to the appropriate equation, considering age, weight (edema-free), gender, and race.

23) Mrs. Joaquin's GFR is 28 mL/min. What does this tell you about her kidney function?

Mrs. Joaquin is in Stage 4 CKD (GFR between 15 and 29 mL/min/1.73m^2) suggesting that she has kidney damage resulting in a serious decrease in GFR. At this point, Mrs. J. is approaching kidney failure and kidney replacement therapy is necessary.

24) Evaluate Mrs. Joaquin's chemistry report. What labs support the diagnosis of Stage 4 CKD?

Mrs. J's BUN is 59 mg/dL, which is way above the normal range of 8-18 mg/dL suggesting that the kidneys are failing to remove nitrogenous waste from the blood. Potassium (5.8 mEq/L) and phosphate (9.5 mg/dL) levels are also higher than the normal ranges of 3.5-5.5 mEq/L and 2.3-4.7 mg/dL, respectively. Calcium (8.2 mg/dL) levels are slightly low and total cholesterol (220 mg/dL) and triglycerides (200 mg/dL) are high.

25) Examine the patient care summary sheet for hospital day 2. What was Mrs. Joaquin's weight postdialysis? Why did it change?

Mrs. J's postdialysis weight is 165 lb., showing a 5 lb. loss since before dialysis. This is due to a loss of fluid resulting from the dialysis.

26) Which of Mrs. Joaquin's other symptoms would you expect to begin to improve?

As Mrs. J. continues dialysis, her weight should return to normal with a reduction of edema and blood pressure. Her appetite should return and her nausea and vomiting should dissipate.

27) Explain why the following medications were prescribed by completing the table.

Medication	Indications/Mechanism	Nutritional Concerns
Vasotec	ACE inhibitor; treat HTN	None
Erythropoietin	Increase Hb concentrations	Possible iron deficiency

Vitamin/mineral supplement	Replenish vitamins/minerals lost in HD	Possible toxicity if overconsumed
Calcitriol	Prevent hypocalcemia	Consume with low phosphate diet
Glucophage*	Manage blood sugar	None
Sodium bicarbonate*	Neutralize stomach acid	Consume with low-Na diet
Phos Lo*	Reduce phos. levels	Should not be taken if hypercalemia

*should not be taken if pt. has kidney problems
Adapted from www.drugs.com and www.nlm.nih.gov

28) Identify nutrition problems within the clinical domain using the appropriate diagnostic term.

Excessive fat intake (NI-51.2) RT pt. food choices AEB dyslipidemia.

Excessive potassium and phosphorus intake RT CKD and reduced GFR AEB serum potassium level of 5.8 mEq/L and PO_4 level of 9.5 mg/dL.

E. Behavioral-Environmental Domain

29) What health problems have been identified in the Pima Indians through epidemiological data?

Studies suggest that Pima Indians have over 20 times the rate of new cases of kidney failure and that over 90 percent of these cases can be attributed to diabetes (Harris, n.d.).

30) Explain what is meant by the "thrifty gene" theory.

The "thrifty gene theory" attempts to explain a genetic predisposition to diabetes. The theory suggests that people living in environments with frequent and regular stretches of famine adapted genetically to store food and energy more efficiently. When descendents of these individuals are placed in environments where food security is not a concern, their bodies still react as if famine were a reality, and can more easily lead to obesity and DM (Pyhtila, 2007).

31) How does nephropathy affect Pima Indians?

Diabetic nephropathy is a leading cause of renal disease and is prominent in the Pima Indian communities. According to Soman (2009), diabetic nephropathy is responsible for 30-40% of all end-stage renal disease cases in the United States. Additionally, nephropathy is relatively high in Pima Indians, seen at about 50% of Pima Indians by the age of 20 (Soman, 2009).

IV. Nutrition Diagnosis

32) Choose two high-priority nutritional problems and complete a PES statement for each.
Excessive fluid intake (NI-3.2) RT CKD and reduced GFR AEB edema and weight gain.

Excessive potassium and phosphorus intake RT CKD and reduced GFR AEB serum potassium level of 5.8 mEq/L and PO_4 level of 9.5 mg/dL.

V. Nutritional Intervention

33) For each PES statement, establish an ideal goal (based on the signs and symptoms) and appropriate intervention (based on the etiology).

Reduce weight until actual weight reaches adjusted edema free body weight by consuming fluids not to exceed 1L/day plus daily urine output.

Reduce serum potassium and phosphorus levels WNL by selecting foods that are low in phosphorus and potassium.

34) When Mrs. Joaquin begins dialysis, energy and protein recommendations will increase. Explain why.

Dialysis results in increased loss of protein. In addition protein and energy needs are higher in individuals with CKD due to inflammation, infection, altered albumin turnover, and metabolic acidosis.

35) Why is it recommended for patients to have at least 50% of their protein from sources that have high biological value?

Digestion of proteins is an additional stress on the kidneys and selecting more bioavailable protein sources can allow for decreased production of nitrogen waste and alleviate some of the stress on the kidneys.

36) The MD ordered daily use of a multivitamin/mineral supplement containing B-complex, but not fat-soluble vitamins. Why are these restrictions specified?

Loss of water soluble vitamins is a concern for dialysis patients due to the excess fluid removal. The MD ordered supplementation of the water-soluble vitamins to replace the vitamins lost in dialysis. It is not necessary to supplement fat-soluble vitamins because they are no impacted by kidney replacement therapy.

37) What resources would you use to teach Mrs. Joaquin about her diet?

I would provide Mrs. J. with lists of foods to choose and avoid as well as recipes and menus she can follow. Additionally, I could put together a tracking chart so that Mrs. J. can be knowledgeable of how much fluid and electrolytes she takes in daily.

38) Using Mrs. Joaquin's typical intake and the prescribed diet, write a sample menu. Make sure you can justify your changes and that it is consistent with her nutrition prescription.

	Diet PTA	Sample Menu
Breakfast	Cold cereal (3/4 c unsweetened)	Select from refined grains
	Bread (2 slices) or fried potatoes (1 med potato)	Baked potatoes
	1 fried egg (occasionally)	1 fried egg
Lunch	Bologna sandwich (2 slices white bread, 2 slices bologna, mustard)	Turkey sandwich (2 slices white bread, 2 slices turkey, mustard)
	Potato chips (1 oz)	Pasta salad
	1 can coke	Apple juice
Dinner	Chopped meat (3 oz beef)	3 oz. beef
	Fried potatoes	Broccoli
HS Snack	Crackers (6 saltines) and peanut butter (2 T)	6 saltines and 2 T peanut butter

39) Using the renal exchange list, plan a 1-day diet that complies with your diet order. Provide a nutrient analysis to assure consistency with all components of the prescription.

Rx: 2,300 kcal; 80 g protein; 2-3 g K; 2-3 g Na

Food	Na (mg)	K (mg)	Phos (mg)	Protein (g)	Kcal
Breakfast					
4 oz. milk	60	185	110	4	75
2 egg	120	124	170	12	155
2 slices white toast	270	60	50	4	130
4 T jelly	10	24	2	0	100
Snack					
4 graham crackers	170	40	30	2	120
3 T peanut butter	300	430	240	16	380
Lunch					
3 oz. turkey breast	45	240	180	25	130
2 slices white bread	270	60	50	4	130
1 T. mayo	80	5	4	0.2	100
1 c. strawberries	1	240	27	1	40

8 oz. iced tea	7	88	2	0	2
Snack					
Carrots	25	230	30	0.7	30
Bell pepper	1	100	12	0.5	15
Dinner					
Portobello mushroom	6	518	140	4	36
Broccoli	24	280	60	2.6	25
White rice	2	55	70	4	200
Biscuit	530	115	220	3.2	180
White wine	5	80	15	0.1	70
Ice cream	51	0	0	3	120
Total	1.9 g	2.85 g	1.4 g	86 g	2,040

40) Write an initial medical record note for your consultation with Mrs. Joaquin.

A: 24 y/o female, dx with stage 4 CKD
current weight = 77 kg, UBW = 73 kg, current BMI = 34.4

D: Excessive fluid intake (NI-3.2) RT CKD and reduced GFR AEB edema and weight gain.
Excessive potassium and phosphorus intake RT CKD and reduced GFR AEB serum potassium level of 5.8 mEq/L and PO_4 level of 9.5 mg/dL.

I: Reduce weight until actual weight reaches adjusted edema free body weight by consuming fluids not to exceed 1L/day plus daily urine output.
Reduce serum potassium and phosphorus levels WNL by selecting foods that are low in phosphorus and potassium.

M/E: Continue to monitor pts. labs paying careful attention to BUN, K+, PO_4, Na.
Evaluate pts. dietary intake to ensure compliance with diet rx.

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