

1. Describe the physiological functions of the kidneys.

The main function of the kidneys is to maintain the balance of fluids, electrolytes, and organic solutes. The kidneys filter blood and produce ultra filtrate, and have the ability to regulate water homeostasis. Additionally, they control blood pressure with the renin-angiotensin mechanism.

2. What diseases/conditions can lead to chronic kidney disease (CKD)? Explain the relationship between diabetes and CKD.

Diabetes mellitus, hypertension, and glomerulonephritis can lead to CKD. When someone has CKD, the glomerulus can become enlarged due to large amounts of sugar in blood. This causes the glomerulus to function abnormally and proteins are able to pass through and are excreted in urine.

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

Stage 1: Kidney damage, but normal to increased kidney function; normal or slightly elevated GFR (normal is 90 mL/min/1.73m<sup>2</sup>)

Stage 2: Mild decrease in kidney function; mild decrease in GFR (60 mL/min/1.73m<sup>2</sup> to 89 mL/min/1.73m<sup>2</sup>)

Stage 3: Moderated decrease in kidney function; GRF is between 30 mL/min/1.73m<sup>2</sup> and 59 mL/min/1.73m<sup>2</sup>

Stage 4: Severe kidney function; blood pressure will be high, protein found in urine, nephropathy; GFR is between 15 mL/min/1.73m<sup>2</sup> and 29 mL/min/1.73m<sup>2</sup>

Stage 5: Kidney failure/treatment necessary; defined as end-stage renal disease; signs and symptoms include N/V, edema changes in skin color; GFR is less than 15 mL/min/1.73m<sup>2</sup>.

5. What are the treatment options for Stage 5 CKD? Explain the differences between hemodialysis and peritoneal dialysis.

The treatment options include dialysis or kidney transplant. There are two types of dialysis, hemodialysis and peritoneal dialysis. Hemodialysis uses an external machine to filter waste, while peritoneal dialysis uses blood vessels in abdominal lining to fill in for your kidneys with the help of a cleansing fluid that flows into and out of the peritoneal space.

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

<b>Nutrition Therapy</b>	<b>Rationale</b>
35 kcal/kg	To provide adequate energy intake
1.2 g protein/kg	To provide adequate protein
2 g K	To prevent hyperkalemia
1 g phosphorus	To prevent hyperphosphatemia
2 g Na	To prevent fluid retention
1000 mL fluid + urine output	To prevent edema

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

$$\text{BMI} = 77.3\text{kg}/(1.52\text{m})^2 = 33.5 = \text{obese}$$

Mrs. Joaquin is considered obese as evidenced by her BMI. Her BMI may be overestimated due to edema.

8. What is edema-free weight? Calculate Mrs. Joaquin's edema-free weight.

Edema-free weight is the patient's weight minus the fluid that was result of edema.

$$\text{aBW}_{\text{ef}} = \text{BW}_{\text{ef}} + [ (\text{SBW} - \text{BW}_{\text{ef}}) \times 0.25 ]$$

$$\begin{aligned} \text{aBW}_{\text{ef}} &= 165 + [ (65 - 165) \times 0.25 ] \\ &= 165 + [ (-100) \times 0.25 ] \\ &= 165 + (-25) \\ &= 140 \text{ lbs} = 63.6\text{kg} \end{aligned}$$

12. What are the considerations for differences in protein requirements among predialysis, hemodialysis, and peritoneal dialysis patients.

Predialysis = 0.75 g protein/kg

Hemodialysis = 1.2 g protein/kg

Peritoneal dialysis = at least 1.2 g protein/kg, if not more

13. Mrs Joaquin has a PO<sub>4</sub> restriction. Why? What foods have the highest levels of phosphorus?

Too much PO<sub>4</sub> can cause complications like hyperphosphatemia. Foods that have the highest levels of phosphorus include beer, cheese, beans, beef/chicken liver, organs meats, bran cereal, whole grains, cocoa and chocolate drinks, milk, dark colas, ice cream, custard, pudding, carp, oysters, sardines, nuts, seeds, caramels, and wheat germ.

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

Foods that are considered fluids are foods that are liquid at room temperature and include jello, ice cream, popsicles, and soup. Recommendations to decrease thirst include to avoid eating salty foods, drinking cold beverages to quench thirst, to drink from a small glass, to chew gum, to eat frozen grapes/blueberries, and to brush teeth often.

16. Evaluate Mrs. Joaquin's chemistry report. What labs support the diagnosis of Stage 5 CKD.

Her high PO<sub>4</sub> level, high glucose level, high BUN, high creatinine level.

19. What health problems have been identified in the Pima Indians through epidemiological data. Explain what is meant by the "thrifty gene". Are the Pima at high risk for complications of diabetes? Explain.

Pima Indians have high rates of obesity and obesity is a major risk factor for diabetes. The "thrifty gene" theory proposes that for thousands of years the Pima Indians would go through periods of an overabundance of food and then periods of famine so they developed a gene that would retain fat for a fuel source when there was a time of famine. However, as the Pima Indians developed a Western lifestyle, they had no bouts of famine and always have had access to food. Since they always have access to food their body still actively stores fat to save it for a famine, which will never come causing the majority of Pima's to be obese.

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

Protein from sources of high biological value contain all essential amino acids and are better absorbed by the body. CKD patients have a high recommended amount of protein so it is important that they get at least 50% from sources of high biological value.