Case Study #18: Chronic Kidney Disease Treated with Dialysis

1) The kidney is a filtering system for your body. Inside the kidney are thousands of nephrons that help filter the blood, helping to remove the waste in the blood and disposing of it through urine, then allowing the clean blood to filter back into the body. Not only does the kidney help with filtering the blood, but it also keeps electrolytes in the body stable as well as getting ride of extra fluids.
(http://kidney.niddk.nih.gov/kudiseases/pubs/yourkidneys/#how)

2) Most causes of chronic kidney disease (CKD) are either do to the person being diabetic or having high blood pressure (hypertension). Diabetics are characterized as having high amounts of glucose (sugar) in their blood; high blood sugar causes your organs, including your kidney, to undergo huge amounts of stress, which can result in damaging the organs. If a diabetic does not closely control their blood sugar, the high blood pressure can cause your kidney to undergo too much stress resulting in CKD.
(http://www.kidney.org/kidneydisease/aboutckd.cfm)

3) The five stages of CKD can be monitored by the kidney's glomerular filtration rate (GFR). In stage 1, GFR is between 90-130 mL/min, the kidney is for the most part normal with slight damage and abnormalities that can be found in the urine. The 2nd stage has a GFR of 60-89 mL/min with a mild decrease in kidney function as well as the abnormal urine content. Stage 3 has a GFR of 30-59 mL/min with a moderate decrease in kidney function. Stage 4 has a GFR of 15-29 mL/min with sever decreases in kidney functions. Stage 5 has a GRF of less than 15 mL/min with kidney failures and is also called end-stage renal disease. The final stage results in death unless a transplant or dialysis is used.
(Medical Nutrition Therapy for Renal Disorders. Krause's Food and the Nutrition Care Process. Pg 811)

5) Treatments for stage 5 CKD are either a kidney transplant or dialysis. Hemodialysis is when the patient's blood is run through a dialyzer, which cleans the blood for them, since the kidney cannot. It is conducted at a clinical setting and must be done three times a week, with each session being four hours long. This is a rigid form of dialysis and does not allow the patient to have a lot of flexibility. Peritoneal dialysis is a simpler form of dialysis. In this form, a tube is placed in the abdominal cavity and exchanges dialysis fluid at regular intervals. The machine used, "cycler", is small and can be used to fit the patient lifestyle, either by using it at night or during the day. This type of dialysis is needed four times a day for only 15-30 minutes, and therefore is a much more convenient for patient with active lifestyles or busy schedules, that cannot make it to a clinic three times a week.

(http://nephrology.medicine.ufl.edu/patient-care/renal-replacement-therpay/home-dialysis/)

6) Energy intake for CKD patients should be limited to 35 kcal/kg/day to spare protein for tissue repair and maintenance. Protein should be restricted to 1.2g protein/kg/day in order to decrease glomerular pressure; increased glomerular pressure can accelerate renal damage. Potassium was reduced because the high CKD stage Mrs. Joaquin is in, at this level, the kidney cannot filter all the potassium digested. Phosphorus was limited to help delay hyperparathyroidism. Sodium was set to 2g a day to help prevent hypotension and further deterioration of renal functions. The restriction on fluids was ordered, because of the failing renal functions. The kidneys filter less and less fluids, causing edema which can lead to other problems.
(Medical Nutrition Therapy for Renal Disorders. Krause's Food and the Nutrition Care Process. Pg 811-813)

7) BMI: 33.2 – obese. Based off the BMI (33.2), Mrs. Joaquin is considered obese. However, since she has edema, the retention of water within the body, her weight may be inflated which would make her BMI greater than it really is.
(http://www.cancer.net/navigating-cancer-care/side-effects/edema-or-fluid-retention)

8) Edema-free weight is the weight of your actual body, minus the water retention, due to edema. Edema-free weight is used to accurately figure out the nutrient needs of a patient. The formula for Edema-free weight is:
aBWef = BWef + [(SBW – BWef) x 0.25}

aBWef = 165 + [(65-165) x 0.25}

aBWef = 63.6kg

(https://www.kidney.org/professionals/kdoqi/guidelines_updates/nut_a12.html)

12) One of the kidney's function is to remove excess amino acids from the blood, if a patient has CKD and is pre-dialysis, their kidney is not getting help and any extra protein being consumed equals more work for the failing kidney. To prevent further straining the kidney, pre-dialysis patients have a lower protein requirement.
(http://nephron.org/nephsites/adp/index.htm/protein_ckd.htm)

With both hemodialysis (HD) and peritoneal dialysis (PD) the energy requirements are very similar, with HD being 1.2 kcal/kg and PD ranging from 1.2-1.5 kcal/kg. The reason for the higher protein requirements is because dialysis patients lose amino acids during their treatment, with PD losing slightly more, thus the reason for the

range. Other reasons for the high protein requirement are: infection, sores, wounds, or anemia. The reason why patients are able to consume more protein on dialysis than off it is because through dialysis, the blood is being filtered.
(Medical Nutrition Therapy for Renal Disorders. Krause's Food and the Nutrition Care Process. Pg 818) (http://ispd.org/NAC/wp-content/uploads/2010/11/Nutrition-and-PD-Tucker-Nov-2011.pdf)

13) Mrs. Joaquin has a phosphorus restriction because of her chronic kidney disease, as the kidneys start to fail, minerals can build up in the kidney. She has been ordered to restrict her phosphorus to prevent hyperphosphatemia. Foods with high levels of phosphorus are: Cheese, egg yolk, milk, meat, fish, poultry, and whole-grain cereals. (Medical Nutrition Therapy for Renal Disorders. Krause's Food and the Nutrition Care Process. Pg 95, 812)

14) Foods that are considered to be fluids are those that are usually fluid or become a fluid at room temperature. Examples of fluid foods would be soups, tea, Jell-O, ice cream, juice, Popsicle, and pudding.
(http://www.nlm.nih.gov/medlineplus/ency/patientinstructions/000206.htm)
Recommendations that can be made are for her to limit her sodium intake or eat frozen juice.
(http://www.nlm.nih.gov/medlineplus/ency/article/002442.htm)
To reduce thirst on a fluid restriction diet, the patient can use a smaller cup to drink out of and to space out your fluid intake throughout the day.
(http://www.kidneypatientguide.org.uk/F_S_Thirst.php)

15) GFR measures how much blood is being passed through and filtered by the glomeruli each minute. A normal GFR is between 90-130 mL/min. A GFR rate of 28 mL/min would be considered severe decrease in renal function and is considered to be an indicator that the patient is in stage 4 of CKD.
(http://www.nlm.nih.gov/medlineplus/ency/article/007305.htm) (Medical Nutrition Therapy for Renal Disorders. Krause's Food and the Nutrition Care Process. Pg 811)

16) Lab Results:

Sodium: low sodium levels points to losses of sodium in the urine, or because of her edema, it may be more likely that she is retaining more water in her body. This results in a dilution of the blood.

Potassium: high potassium levels are an indicator that the kidneys are no longer filtering properly.

Chloride: low chloride levels are an indicator that renal functions are failing.

BUN: high levels indicate poor renal filtration.

Creatinine serum: high levels indicate poor renal filtration.

Glucose: high levels are an indicator that the patient may be diabetic. Since the kidney is responsible for metabolizing insulin, insulin has a higher half-life and the patient should not have high blood sugar.

Phosphate: high levels indicate poor renal filtration

Calcium: low levels indicate that the kidney is not able to convert vitamin D into its active form. Which is needed for calcium to be absorbed.

Cholesterol: high levels indicate that renal functions are failing causing the lipids to pass through to become altered.

HDL: low levels can be due to her genetics, because of her weight, or because of her diet

LDL: high levels can be due to her genetics, her weight, her diet, and/or because she is a renal patient

Triglycerides: high levels indicate that renal functions are failing causing the lipids to pass through to become altered.

HbA: high HbA levels could point to her having type 2 diabetes

pH: high levels are an indicator of CKD

Protein: high levels indicate that protein is being excreted in the urine, a sign of renal problems.

WBC: high levels are an indicator that the body is trying to fight off an infection

(http://www.kidney.org/atoz/content/cholesterol.cfm) (http://www.nlm.nih.gov/medlineplus/ency/article/003583.htm) (Medical Nutrition Therapy for Renal Disorders. Krause's Food and the Nutrition Care Process. Pg 819-821)

18) PDR – physician desk reference

Capoten/captopril: An angiotensin-converting enzyme inhibitor (ACEI) used to lower blood pressure and may slow renal damage. Can diminish taste perception, increase risk of hyperkalemia, and can cause anemia. (http://effectivehealthcare.ahrq.gov/index.cfm/search-for-guides-reviews-and-reports/?productid=1139&pageaction=displayproduct)

Erythropoietin: Prescribed to help produce more red blood cells. This will help with some of the symptoms associated with anemia, such as fatigue and weakness. May decrease iron, Vit B12, and/or folate. (http://www.mayoclinic.org/diseases-conditions/kidney-disease/basics/treatment/con-20026778)

Sodium bicarbonate: used as an alkalinizing agent. May increase thirst and weight from the body retaining more fluid.

Renal Caps: Prescribed for malnutrition due to renal failure. Contains Vitamin C, Thiamin, Riboflavin, Niacin, Vitamin B6, Folate, Vitamin B12, Biotin, and Pantothenic Acid.

Renvela: Prescribed to control serum phosphorus levels. May decrease Vitamin D, E, K, and folic acid levels.

Hectorol: Prescribed to treat hyperparathyroidism. Can cause patient to develop hypocalcemia.

Glucophage: Prescribed to increase the effects of her insulin and to lower the glucose absorbed by the GI. May decrease folate and vitamin B12 absorption.

(http://www.pdr.net/ )

19) Health problems associated with Pima Indians are obesity and diabetes. With half of the adult population having diabetes and 95% of those with diabetes being overweight.

The "thrify gene" theory says that populations that relied on farming, gathering, and fishing for sustenace, like the Pima indians, experience periods of famine then an abundance of food. In order to survive the periods of famine, these populations developed a "thrifty gene", which allowed their bodies to store fat during the plentiful years.

The Pima are at a higher risk for complications of diabetes, since approximately half of the adult Pima population get diabetes and, with the majority getting it around the age of 36, they have the disease for a long time. The longer you have diabetes, the more likely you will develop a complication, such as kidney disesae.
(http://diabetes.niddk.nih.gov/dm/pubs/pima/obesity/obesity.htm)

22) Proteins that are considered high biological value are foods that have all the essential amino acids in them and can be absorbed by the body's tissues. Food examples would be meat, cheese, fish, poultry, and eggs. A by-produce of breaking down protein is urea, which is toxic, if you are consuming low biological value proteins, such as legumes, you will have more of this by-product. If you have CKD, you want to limit the amount of urea in your system, since your kidney will be unable to excrete all of it.
(Medical Nutrition Therapy for Renal Disorders. Krause's Food and the Nutrition Care Process. Pg 52)