Dialysis for Kidney Disease.

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The Kidneys

- The kidneys are two bean-shaped organs that rest against the back muscles in the upper abdominal cavity. They are located on both sides of the spine.
- The kidneys are there to extract waste from blood, balance body fluids and acid in other important functions of the body, and form urine.
- The kidneys have four functions:
  - Waste excretion
  - Water level balancing
  - Blood pressure regulation
  - Red blood cell regulation
  - Acid regulation
Chronic Kidney Disease

• Chronic Kidney Disease evolves from Acute Kidney Failure which is the condition when the kidneys can no longer function the way they should.

• Chronic kidney disease is caused by:
  – Infection
  – Blood-clotting disorders
  – Decreased blood flow caused by low blood pressure
  – Acute tubular necrosis, or death of the tubular cells that deliver urine to the ureters
  – Autoimmune kidney disorders
  – Urinary tract infections
  – Complications from pregnancy
Symptoms Of CKD

- Symptoms of chronic kidney includes:
  - Changes in urination
  - Swelling of the feet, ankles, hands or face
  - Fatigue or weakness; shortness of breath.
  - Ammonia breath or an ammonia or metal taste in the mouth
  - Back or flank pain
  - Itching; loss of appetite
  - Nausea and vomiting
  - Hypoglycemic episodes if diabetic.
To keep CKD under control the National Kidney Foundation (NKF) created a 5 stage guideline to help doctors identify each level of kidney disease.

The Glomerular filtration rate (GFR) is used to determine the stages of CKD. GFR is used to measure the amount of creatinine in the blood.

A mathematic equation is used to estimate GFR. In addition to serum creatinine, other factors in the equation include age, face and gender.

- Stage one: has kidney damage with a GFR at a normal or high level greater than 90 ml/min. They don’t have any symptoms to indicate the kidneys are damaged.
- Stage two: has kidney damage with a mild decrease in their GFR of 60-89 ml/min.
- Stage three: has kidney damage with a moderate decrease in the GFR of 30-59 ml/min. The kidney function starts to decline, and waste products start to build up in the blood causing a condition known as “uremia.”
- Stage four: has advanced kidney damage with a severe decrease in the GFR to 15-30 ml/min. Patient is put on dialysis.
- Stage five: has end stage renal disease (ESRD) with a GFR of 15 ml/min or less. At this stage of kidney disease the kidneys have lost almost all their ability to function effectively. Dialysis or a kidney transplant is needed to live.
Dialysis

- At stage four and five patients are put on dialysis because the kidney can no longer function regularly.
- Dialysis is a treatment to replace filtering function of the kidneys when they reach end stage renal disease.
- Dialysis helps remove waste from the blood and it works as an artificial replacement of lost kidney function through the process of diffusion of solutes and ultrafiltration of fluid across a semi-permeable membrane.
History of Dialysis

- The first dialyzer was created by Dr. Willem Kolff, a Dutch physician who used sausage casing, beverage cans, washing machine and other available items.
- For the first two years Dr. Kolff used the machine on 16 patients with Acute Kidney Disease, but it was a failure.
- In 1945 he did a retrial on a 67-year-old woman who went through 11 hours of dialysis everyday and she lived for 7 more years.
- In 1968, Henry Tenckhoff invented another form of dialysis treatment that could remain in patient's abdomen permanently, instead of being inserted for every treatment.
- There are two types of dialysis:
  - Hemodialysis
  - Peritoneal dialysis
Hemodialysis

• The dialyzer is made up of thousands of tiny synthetic hollow fibers which acts as the semipermeable membrane.
• Patient's blood is pumped through the blood compartment of a dialyzer, exposing it to a partially permeable membrane.
• The blood flow through the fiber and the dialysate solution flows on the outside of the fiber.
• The blood travels to and from the dialysis machine in large volume and high speed so that toxins, waste, and extra fluid can be removed from the body.
• The clean blood then flows back into the body.
• The procedure of hemodialysis is done 2–3 times a week in the hospital. Since 2007 over 25,000 patients have been going through the treatment in the comfort of their home.
Pre -Hemodialysis

- Before getting hemodialysis treatment doctor must access the blood stream. The process is know as Vascular Access.
- There are three types of vascular access
  - The Arterio Venous (AV) fistula
  - The Arterio Venous (AV) graft
  - The central venous catheter or internal port devices.
Peritoneal dialysis

- During the process of peritoneal dialysis, a sterile solution containing glucose is run through a tube into the peritoneal cavity, located around the intestine where the peritoneal membrane acts as a semi-permeable membrane.
- Helps to remove harmful fluids from the body.
- Dialysate is also used.
- The peritoneal cavity is then connected to a machine called cycler.
- This is process is done in the body.
- Patients have to perform peritoneal dialysis in the comfort of their homes four to five days out of the week. For about 8 hour each day.
Pre-Peritoneal dialysis
Pros and Cons

• **Pros:**
  – It is pay for by patients private health care.
  – Keep the body clean until the kidney transplant is performed.

• **Cons:**
  - You don’t know when a kidney is going to come in.
  - It’s a long process to go through each day.
  - Patients have to be put on a special diet and they can not drink.
Bibliography


