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# Dialysis and Its Complications and Dietary Management

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## ABSTRACT

Dialysis is a process of removing waste products and excess fluids from the body. It is divided majorly into four types. Hemodialysis and peritoneal dialysis are majorly used in majority of cases. The principle involved in the hemodialysis and peritoneal dialysis and advantages and disadvantages are discussed below. Complications induced by the both hemodialysis and peritoneal dialysis also mentioned such as nausea, headache, leg cramps etc. Dietary guidelines for patients who are starting on hemodialysis and peritoneal dialysis.

**Keywords:** Dialysis, Dietary guidelines, Hemodialysis

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# INTRODUCTION

Dialysis is the artificial system for cleansing the blood, it is the most common treatment option for patient with end-stage renal disease.it is divided majorly into two types

1. Hemodialysis
2. Peritoneal dialysis

**Hemodialysis**

**Conventional hemodialysis**

This type of dialysis is usually done three times a week, for about 3-4 hrs, for each treatment. During this procedure patient blood is drawn out through a tube at a rate of 200-400 ml/min. the tube is connected to gauze inserted into one port of a dialysis catheter. During the procedure monitor the patient blood pressure

**Daily hemodialysis**

This type of dialysis used by those patients who do their own dialysis at home. It is have less stress but require more frequent access. It is simple by using the catheters, but more problematic with fistula. Daily hemodialysis is usually done for 2hrs six days a week

**Nocturnal hemodialysis**

The procedure is similar to conventional hemodialysis except it is performed 3-6 nights a week and between 6 & 10 hrs per session while the patient sleeps

**Advantages and disadvantages**

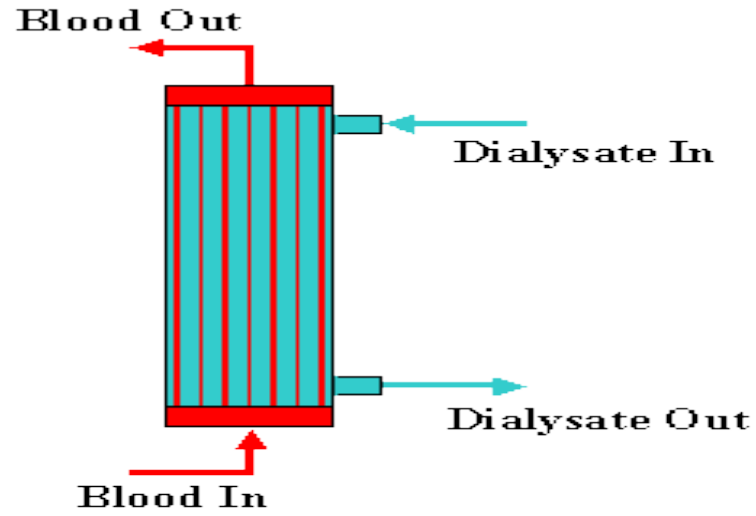
**Advantages**

- Low mortality rate
- Better control of blood pressure and abdominal cramps
- Less diet restriction
- Better solute clearance effect for the daily hemodialysis: better tolerance and fewer complications with more frequent dialysis

**Disadvantages**

- Restricts independence, as people undergoing this procedure cannot travel around because of supplies' availability
- Requires more supplies such as high water quality and electricity
- Requires reliable technology like dialysis machines
- The procedure is complicated and requires that care givers have more knowledge

- Requires time to set up and clean dialysis machines, and expense with machines **Principle involved in hemodialysis**




Schematic diagram of hemodialysis hemodialyzer flow.

**Figure 1: Schematic diagram if hemodialysis hemo dialyzer flow**

The dialyzer consists of bundle of semi permeable hollow tubes surrounded by a hard plastic casing. The fibers are potted into the casing with an impermeable glue at the end. Blood can flow into distribution cap along with the interior of the fiber to the exit distribution cap and hence out of the dialyzer. Dialysate basically distilled water with an electrolyte and pH composition similar to that of the blood plasma , flows counter – current to the blood on the outside of the fibers

**Procedure:**

The three basic components of hemodialysis are the blood delivery system, the dialyzer itself and the composition of method of delivery of the dialysate. For acute hemodialysis catheters are usually placed in the femoral vein and passed into inferior venecava. Blood from one is equipment to measure flow and pressure within the system. Blood return through second catheter dialysis begins at a blood flow rate of 50-100ml/min and is gradually increased.

**Hemodialysis dosing and adequacy**

By the process dialysis is necessary to remove waste products such as urea from the blood.as the urea is highly toxic to the body, whether process of dialysis removing the urea is assessed periodically once a month – test the patient blood to measure dialysis adequacy .blood is sampled during beginning of dialysis and at the end of dialysis process. Generally two methods are used to assess the adequacy they are URR and kt/V.

- A patient average URR should exceed the value 65%
- A patient average kt/V should be at least 1.2
- The value URR or kt/V is increased either by increasing the time on dialysis or increasing blood flow through the dialyzer

**Dietary guidelines for adults starting hemodialysis:**

- Eat more high protein foods.
- Eat less high salt, high potassium, and high phosphorus foods.
- Learn how much fluid you can safely drink (including coffee, tea, and water).

**Salt & Sodium**

- Use less salt and eat fewer salty foods: this may help to control blood pressure and reduce weight gains between dialysis sessions.
- Use herbs, spices, and low-salt flavor enhancers in place of salt.
- Avoid salt substitutes made with potassium.

**Meat/Protein**

People on dialysis need to eat more protein. Protein can help maintain blood protein levels and improve health. Eat a high protein food (meat, fish, poultry, fresh pork, or eggs) at every meal, or about 8-10 ounces of high protein foods every day

**Milk/Yogurt/Cheese**

Limit your intake of milk, yogurt, and cheese to ½-cup milk *or* ½-cup yogurt *or* 1-ounce cheese per day. Most dairy foods are *very* high in phosphorus.

The phosphorus content is the same for all types of milk – skim, low fat, and whole**.** If you do eat any high-phosphorus foods, take a phosphate binder with that meal.

**Dairy foods "low" in phosphorus:**

- Butter and tub margarine
- Cream cheese
- Heavy cream
- Ricotta cheese
- Brie cheese
- Non-dairy whipped topping
- Sherbet

If you have or are at risk for heart disease, some of the high fat foods listed above may not be good choices for you. Certain brands of non-dairy creams and "milk" (such as rice milk) are low in phosphorus and potassium.

**Eat 2-3 servings of low-potassium vegetables each day. One serving = ½-cup.**

**Choose:**

| | |
|---|---|
| • Broccoli (raw or cooked from frozen)<br>• Cabbage<br>• Carrots<br>• Cauliflower<br>• Celery<br>• Cucumber<br>• Eggplant<br>• Garlic | • Green and Wax beans ("string beans")<br>• Lettuce-all types (1 cup)<br>• Onion<br>• Peppers-all types and colors<br>• Radishes<br>• Watercress<br>• Zucchini and Yellow squash |

**Limit or avoid:**

| | |
|---|---|
| • Potatoes (including French Fries, potato chips and sweet potatoes)<br>• Tomatoes and tomato sauce<br>• Winter squash<br>• Pumpkin<br>• Asparagus (cooked) | • Avocado<br>• Beets<br>• Beet greens<br>• Cooked spinach<br>• Parsnips and rutabaga |

**Side effects:**

Low blood pressure fatigue, chest pain, leg cramps, nausea, headache while removing the too much fluid

**Complications:**

Sepsis

Infection

Bleeding

**Peritoneal dialysis:**

**Advantages**:

- Fewer negative side effects such as nausea, vomiting, cramping and weight gain
- Fewer dietary restrictions
- Needle-free treatments
- Direct shipment of PD supplies to your home or travel destination
- Infrequent trips to the dialysis center

- Greater flexibility and freedom in your treatment schedule

**Two type's peritoneal dialysis**

In **continuous ambulatory peritoneal dialysis (CAPD)**,this process uses a gravity fill and empty abdomen .CAPD requires 3 or 4 exchanges during the day and one long –usually 8 to 10 hours overnight dwell time as when the patient sleeps. The solution used for CAPD in overnight dwell contain higher concentration of dextrose

In Continuous cycler-assisted peritoneal dialysis (CCPD) process uses a machine to fill and empty the abdomen 3-5 times during the night while person sleeps. Sometimes additional exchange is done in the mid afternoon to increase the amount of waste removed and to prevent excess absorption of fluid

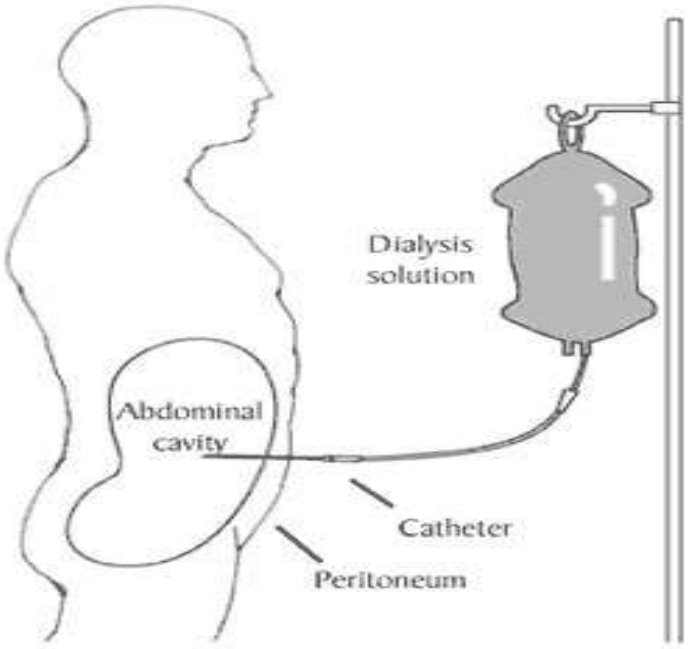



**Figure 2: Continuous cycler-assisted peritoneal dialysis (CCPD)**

**Procedure:**

It works on same principle as hemodialysis allowing the diffusion fluids from mesenteric capillaries across peritoneal membrane into dialysate dwelling in the peritoneal cavity

It involves the placing of a sty let catheter at the bed side under local anesthesia .Dialysate fluid is instilled and 1to2 lit is exchanged each hour.

**Dosing and adequacy**

The optimum dosing of peritoneal dialysis is not known. The following parameters are generally used to assesses the adequacy

- Total solute clearance

●Residual renal function

**Complications:**

- Pain
- Hemorrhage
- Peritonitis
- Arrhythmias
- Pneumonia
- Hyperglycemia
- Electrolyte imbalance

**Dietary guidelines for adults starting peritoneal dialysis**

**Protein**

Body needs protein for growth, building muscles and repairing tissue.

Need to eat more protein to replace what is lost. The type of protein eat is also very important. High quality protein should be eaten at each meal. It comes from animal sources such as eggs, fish, chicken and meat. Low quality protein needs to be limited in our diet. It comes from plant sources such as vegetables and grains.

**Calories**

Calories give body energy. One source of calories is the food you eat. Another source is the sugar in dialysate solution that can affect you because:

- It takes extra fluid out of the body.
- It is taken in by your body.
- It can cause unwanted weight gain.

**Potassium**

Potassium is a mineral found naturally in foods that is dangerous when you have too much or too little. It is plentiful in dried fruits, dried beans and peas, nuts, meat, milk, fruits and vegetables and also in salt substitutes. Since both high and low levels of potassium in our body are dangerous to our heart, our potassium level will be watched closely.

**Fluid and Sodium**

Sodium is a mineral that is found naturally in foods and can affect your blood pressure. It is found in large amounts in table salt and in canned foods and processed meats (cold cuts).

Sodium can help to control your thirst and our weight gain. It may also lower your use of high-sugar solutions

Phosphorus is a mineral present in all foods. It is found in large amounts in milk, cheese, nuts, dried beans and peas.

Eating foods high in phosphorus will raise the phosphorus in our blood and this can cause calcium to be pulled from our bones. This will make bones weak and cause them to break easily. To help control the phosphorus in our blood, you may need to take medicine called a phosphate binder. It should be taken with our meals and snacks.

**Vitamins and Minerals**

The dialysis treatment washes some water-soluble vitamins out of your body. If you are not getting all the vitamins and minerals you need from the foods you eat, vitamin and mineral supplements may be recommended. It is important to take only what is ordered for you. Certain vitamins and minerals can be harmful to persons on dialysis

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