



Hemodialysis

Patient Education Manual

SANFORD
HEALTH

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Welcome

Welcome to Sanford Dialysis! We want you to feel at ease with this change in your life.

Sanford Health's mission is "dedicated to the work of health and healing." Our goal is to provide you with **quality** care.

Your dialysis contact phone number is: _____

This book will help you and your family learn about treatment for end-stage renal disease (ESRD). No two people respond the same way to dialysis. You are the most important member of the team. You are not in this alone. We will partner with you on this journey.

Over the next few weeks, you will learn a lot of new things. It can feel like too much at times. The dialysis team will help you and your family learn what you need to know. This will make it easier for you to be involved in your care. We suggest you keep this handbook.

- Use it as a guide.
- Share it with your family or support persons.
- Bring it with you for learning sessions with your dialysis team.
- Write down your questions.
 - Do not be afraid to ask.
 - All questions are important.

We welcome any comments, ideas, concerns, or complaints about your care. You may talk with the dialysis manager or director by calling Sanford Dialysis.

This handbook does not replace talking with your dialysis doctor or nurse about your care. They are the experts in dialysis care. We understand that you are not feeling very well right now. We will help you learn what you need to know as you start to feel better.

- Medicare requires that we talk about certain things the first day you are here.

Hemodialysis

Dialysis cleans your blood. **Hemodialysis** uses a machine and an artificial kidney (called a dialyzer) to take the extra fluids and wastes out of your blood. Your blood goes through the tubing to the dialysis machine and back to you. It is usually done 2 to 4 times a week for 3 to 4 hours each time.

During your treatment, you can watch TV, read, sleep, or whatever quiet activity will help you pass the time.

Most patients feel cold during their treatment. This is because some of the blood is outside the body. You may bring a blanket to keep you warm.

Sometimes people do not feel good during hemodialysis. The staff can do some things to help you feel better. It is important that you tell the staff right away if you feel or have:

- Access site bleeding
- Access site redness, tenderness, or drainage
- Chest pain
- Cramps
- Dizzy
- Edema (Swelling)
- High or low blood pressure
- Muscle weakness
- Short of breath
- Sick to your stomach (Nausea)

There is more information on hemodialysis in this book.

Dialysis Access

Dialysis access is needed to move your blood to and from the dialysis machine.

There are 3 different types of access:

- Catheter
- Fistula
- Graft

The dialysis nurse will teach you how to take care of your access.

Medicare requires that the dialysis staff see your face and access at all times when you are connected to the dialysis machine. That means a blanket or clothing **cannot** cover your access site.



At all times Dialysis staff must be able to see your:

- Face
- Access
- Blood lines

Dialysis staff will uncover your access if they cannot see it.

This is for your safety.

Infection Prevention

Stopping the spread of infection is very important. Cleaning your hands is the easiest and most important thing you can do. Use hand sanitizer or soap and water to clean your hands. You will see our staff prevent infection by:

- Washing your access arm before dialysis
- Washing the dialysis station between patients
- Wearing gloves, gowns, face shields, and masks
- Keeping your catheter dressing dry

See the Infection Prevention section to learn more.

Concerns

If you have a complaint or concern about your care at dialysis, you can talk to a:

- Social worker
- Clinical manager or department director
- Sanford Health Patient Representative

Outside agencies you can contact for concerns about your care are:

- Renal Network
- State Department of Health
- State Office of Ombudsman

Learn more and find out how to contact someone for help in the following pages.

Admission

A patient at Sanford Dialysis must:

- Have a diagnosis of acute or chronic kidney disease
- Need dialysis treatments
- Be treated by a nephrologist
- Be age 16 or older
 - Patients under age 16 are considered on a case by case basis

The dialysis department must be able to meet your needs. You will sign consents for treatment and other forms as needed before dialysis begins.

Discharge

You may be discharged from dialysis if you:

- Ask to move to some other facility
- Receive a kidney transplant
- Do not follow the policies and procedures of Sanford Dialysis

A doctor may stop dialysis if:

- You regain kidney function
- Dialysis can no longer be done for medical reasons
- You and your family choose to stop dialysis

You and/or family must meet with the doctor to talk about your choice.

Involuntary Discharge

When a patient is discharged against their will, it is called an **involuntary discharge**.

This may happen if the patient:

- Affects the ability of the department to function
- Is disruptive or abusive toward other patients or staff

A good faith effort will be made to work with each patient.

The facility will record in the medical record:

- Assessments
- Ongoing problems
- Efforts to resolve the problems

In most cases, the dialysis department will give the patient a written, 30-day advance notice of discharge. If there is an urgent threat to the health or safety of others, little or no notice may be given. The patient will be given choices for treatment by other doctors and dialysis departments.

Transfer

You may change to a different facility for any reason.

- Sanford will give the medical records to the accepting facility.
- You will be discharged from Sanford.

Temporary Transfer

A Temporary transfer is when a patient goes to another facility for a short period of time. The patient plans to come back to the “home” facility.

A patient may go to another facility for treatment when on vacation or traveling out of town. The patient will be discharged from the dialysis department if gone for more than 30 days. The treatment time slot will not be held. The patient will be re-admitted in an open time slot when they come back.

Midwest Kidney Network (Renal Network 11)

The Midwest Kidney Network is a non-profit organization supporting people with kidney disease. This group serves the following states:

- Michigan
- Minnesota
- North Dakota
- South Dakota
- Wisconsin

Renal Network 11 Bill of Rights

Patients have a right to:

- Respect, dignity, and recognition of their individuality and personal needs, and sensitivity to his or her psychological needs and ability to cope with ESRD.
- Receive all information in a way that they can understand.
- Privacy and confidentiality in all aspects of treatment and in personal medical records, including the right to view and receive a copy of their medical record (a nominal charge may be assessed).
- Be informed about and participate, if desired, in all aspects of their care, and be informed of the right to refuse treatment, to discontinue treatment, and to refuse to participate in experimental research.
- Be informed about their right to execute advance directives, and the facility's policy regarding advance directives.
- Be informed about all treatment modalities and settings, including, but not limited to transplantation, home dialysis modalities (both peritoneal and hemodialysis), and in-facility hemodialysis.
- The patient has the right to receive resource information for dialysis modalities not offered by the facility, including information about alternative scheduling options for working patients.
- Be informed of facility policies regarding patient care, including, but not limited to, isolation of patients.
- Be informed of facility policies regarding the reuse of dialysis supplies, including hemodialyzers.

- Be informed by the physician, nurse practitioner, or physician's assistant treating the patient for ESRD of their own medical status as documented in the medical record, unless the medical record contains a documented contraindication.
- Be informed of services available in the facility and charges for services not covered by Medicare.
- Receive the necessary services outlined in the Patient Plan of Care.
- Be informed of the rules and expectations of the facility regarding patient conduct and responsibilities.
- Be informed of the facility's internal grievance process.
- Be informed of external grievance mechanisms and processes, including how to contact the ESRD Network and the State Survey Agency.
- Be informed of their right to file internal grievances or external grievances or both without reprisal or denial of services; and be informed that they may file internal or external grievances, personally, anonymously, or through a representative of the patient's own choosing.
- Be informed of the facility's policies for transfer, routine or involuntary discharge, and discontinuation of services to patients.
- The right to equal consideration of treatment without regard to age, sex, race, religion, or ethnic origin.
- Receive written 30-day notice in advance of an involuntary discharge after the facility follows the specific involuntary discharge procedure in the Conditions for Coverage, except in the case of immediate threats to the health and safety of others, when an abbreviated discharge procedure may be followed.

Patient Responsibilities

In order to make your treatment effective and improve the quality of your life, you and your family should take some specific responsibilities in the day-to-day management of your care. To improve your care:

- Learn all you can about your disease, its treatment, treatment options, and your rights and responsibilities as a renal patient.
- Recognize what an emergency is and what actions must be taken in emergency situations.
- Provide a complete and accurate medical history to the professional team supervising your care.
- Let a member of your professional team know if you do not understand information about your care and treatment.
- Tell a member of your professional care team if there is a sudden change in your condition.
- Obtain and take the medications prescribed for you or discuss with the professional care team why you are unable to do so.
- Follow your diet or request further instructions if you do not understand or are unable to follow your diet.
- Make every effort to arrive for your scheduled dialysis treatments on time and inform the dialysis unit if you are unable to come.
- Stay on dialysis for the prescribed length of your treatment run.
- Consider the needs of other patients whom you encounter and understand that the professional team has a responsibility for all of the patients under their care.
- Tell a member of your professional care team if you are diagnosed with a communicable disease.
- Inform a member of your professional care team if you need to miss regularly scheduled dialysis treatment(s) for vacation or any other reason.

Adapted from the Conditions for Coverage for End Stage Renal Disease Facilities,
Centers for Medicare and Medicaid Services

Final Rule published April 15, 2008, Effective date October 14, 2008 Approved,
Network 11 Consumer Committee 01/15/2009 Approved, Network 11 Executive Committee

If you have a concern or complaint

You have the right to voice concerns or complaints. We take these very seriously.

What you should do:

- Write out your concern.
 - Be very specific about dates, events, and persons involved.
 - Include all facts about the concern.
 - Include what has been done to resolve the issue.
 - Make copies of all written information.
- Ask to talk with the Social Worker, Dialysis Clinical Manager, or the Dialysis Director.
 - The staff member will meet with you to talk about the issue.
 - You may have a family member or another person come with you.
 - Bring copies of the written report.
 - The goal is to make a plan of action and reach a solution.
- You can talk to the Patient Representative.
- If you want to bypass this process or you cannot solve the issue, you may call other agencies to help you:

Renal Network of the Upper Midwest 1360
Energy Park Drive, Suite 200
St. Paul, MN 55108
(651) 644-9877 or (800) 973-3773

If you live in Minnesota:

1. Minnesota Department of Health
(651) 215-8702
2. Office of Ombudsman for Older Minnesotans
(800) 657-3591
3. If you are on Medicare:
Stratus Health
2901 Metro Drive Suite 400
Bloomington, MN 52425
(952) 854-3306

If you live in North Dakota:

1. North Dakota Department of Health
600 East Boulevard Avenue
Bismarck, ND 58505-0200
(701) 328-2352
2. Office of Ombudsman for Older North Dakotans
(800) 451-8693
3. If you are on Medicare:
ND Health Care Review
800 31st Avenue SW
Minot, ND 58701
(701) 852-4231

If you live in South Dakota:

1. South Dakota Department of Health
600 East Capital Avenue
Pierre, SD 57501-2536
(605) 773-3361 or (800) 738-3361
2. Office of Ombudsman for Older South Dakotans
(605) 773-3656
3. If you are on Medicare:
South Dakota Foundation for Medicare
2600 West 49th Street, Suite 300
Sioux Falls, SD 57105
(605) 336-3505 or (800) 658-2285

Heartland Kidney Network (Renal Network 12)

Heartland Kidney Network is a non-profit corporation under contract with the Centers for Medicare and Medicaid Services (CMS) to oversee the End Stage Renal Disease Program in Kansas, Missouri, Nebraska, and Iowa. **A poster will be present in these locations.** There are 17 other Networks with the same purpose across the United States.

Who do I call if I have questions?

There are many resources to call if you have questions about your care. The place to start is your home dialysis department.

What if I have questions about my bill?

Call (800) 437-4010 and ask for the Patient Accounts Office.

They will be able to answer questions about billing. If this is about a dialysis bill, ask to talk with the person who does dialysis billing.

Who and What You Will See at Dialysis

Our goal is to give the best care possible to meet your needs. Many staff members will be involved with your care.

Social Worker

Social Workers have a broad area of knowledge. They may:

- Help you with your living situation or financial needs
- Refer you to community agencies that help with home care, meals and other areas as needed
- Make referrals to financial resources
- Help you fill out Medicare forms
- Answer Medicare questions
- Help with transportation problems
- Provide you with adjustment or quality-of-life counseling
- Help with travel plans, such as, if you need to have dialysis elsewhere for a period of time

Dietitian

Renal dietitians are trained in kidney disease and nutrition. They will:

- Review your nutritional needs
- Work closely with your doctor and dialysis team
- Follow your monthly lab results
- Teach you how to get the best nutrition to keep you healthy

Nephrologist

This is a doctor who is trained in kidney disease and dialysis. This doctor:

- Is responsible for your overall care
- Monitors your physical health and general well-being
- Writes orders based on your needs

Nurse Practitioners (NP) and Physician Assistants (PA)

These professionals have advanced education and clinical training. They:

- Follow your labs
- Monitor your care
- Work closely with the doctor

Nursing Staff

The nursing staff gives your dialysis treatment.

- Nurses look at many parts of your care and treatment plan.
- The nursing staff is made up of:
 - Registered Nurses (RN)
 - Licensed Practical Nurses (LPN)
 - Dialysis Technicians (CCHT)

Each dialysis service has a leadership team. Please let the nursing staff know if you want to speak to someone in charge.

Dialysis Pharmacist

The pharmacist works with the medical providers. They:

- Monitor your medications
- Monitor your labs
- May adjust the dose of medications used to treat and prevent complications of kidney disease

Your Plan of Care and Care Conferences

Your health care team meets each month to review your care.

- They talk about any concerns that you or they may have.
- The dialysis team looks at your:
 - Labs
 - Diet
 - Social needs
 - Physical changes

You and your family are always welcome at care conferences. This is a good time for you to take an active role in your care.

- Dates and times of these meetings are posted on each unit.
- Be sure to let us know if you would like to come.

Visitor Guidelines

Visitors are welcome during your hemodialysis treatment. We ask that visitors follow these rules:

- Wait in the lobby until patients are settled and on dialysis.
- Limit visitors to 1 or 2 at a time.
- Keep voices low to not disturb others.
- Shirts and shoes must be worn in the dialysis unit.
- Small children are discouraged from visiting during dialysis treatments.
 - If a child does visit, an adult, other than the patient, must be with the child at all times.
 - Children should not play, crawl or lay on the floor.
- Visitors cannot eat or drink in the patient care area.

Eating and Drinking in the Hemodialysis Unit

You may need to eat during dialysis to meet your nutritional needs. Infection prevention concerns and adverse effects such as nausea, vomiting, and low blood pressure can be affected by what you eat and drink.

Guidelines for eating and drinking during hemodialysis treatments

- **Limit** how much you drink to one cup during hemodialysis treatments.
- Patients cannot eat or drink during hemodialysis “on” and “off” times.
- Only small portions or finger foods are allowed.
- Food cannot be refrigerated or heated on the unit.
- Microwave popcorn is not allowed.
- Food cannot be delivered by a restaurant.
- The staff cannot get food from outside of the dialysis department for you.
- If you often have low blood pressure, you will need to limit your intake of liquids and calories during your treatment.
- If you are diabetic and take insulin, bring a small snack.
- Eat a snack within 1 hour before you come for dialysis if you are not able to eat during your treatment.
- Low blood sugars will be treated with 15 grams of carbohydrate, such as:
 - Glucose gel
 - Glucose tab
 - Nutritional supplement
- Nutritional supplements may be given during treatment. This is determined by dietitian.
- Any foods brought in for patients are to be given after the treatment in the waiting room area.
- Dietitians are available to talk to you about your nutrition questions and your needs.

Using the bathroom during dialysis

Urinals and bedpans are available for use during dialysis. If needed, you may be able to use a bedside commode or bathroom for a bowel movement. Remember:

- Do not use laxatives before coming to dialysis.
- Eating a large meal before dialysis or eating during dialysis may cause your bowels to move.
- Low blood pressure may start the urge for your bowels to move.

If you need to have a bowel movement during your dialysis treatment:

- It is important to maintain your personal dignity and safety.
- Staff must make sure your vital signs are stable before you get up.
- Blood will be returned to you before you can use the bedside commode or be assisted to the bathroom. This takes time.
- If treatment time is interrupted:
 - Clotting in the dialyzer may be increased.
 - It will delay your off time.

Comfort Measures

We want you to be comfortable during your dialysis treatment.

- Each patient will sit in a recliner during treatment.
- The staff can help you get comfortable.
- It is common to feel chilled or cold during dialysis.
 - Your body temperature often cools down when blood is outside the body and exposed to the dialysis solution.
 - Bring a blanket and pillow with you to use during your treatment.
- Each dialysis station has a television with headphones.
- The dialysis unit does not supply magazines or books.
- You are welcome to bring reading material from home.

Use of cell phones and other electronic equipment

Cell phones and other electronic equipment may be used during your dialysis treatment.

It is not allowed during your “on” or “off” times.

- You should be at least 3 feet away from the dialysis machine.
- Laptop computers, iPods, personal DVD players may be used while you are in the dialysis unit.
- Electronic devices may be used with limits:
 - Devices must be battery-operated or have a “wall wart” with low voltage. A “wall wart” lowers the voltage of these devices. Newer models often have this feature.
 - Direct 120 AC plug-ins are **not** allowed.
 - Older devices must run on battery power.

If you have questions, ask the dialysis center staff.

Hemodialysis Schedules

We do our best to schedule dialysis treatment times. This is a challenge.

- Dialysis patients may have treatment times that vary from 2 to 5 hours.
- Treatment time can be affected by a change in the doctor's orders or lab values.
- Treatments may be delayed if a patient had a problem earlier in the day.

The first concern is your safety. We must have enough space and staff to care for you and all of our patients. We will work with you to find a time that meets your needs. Patients may be on a waiting list for a different dialysis time. Most patients are able to change times in the future.

Factors to consider when planning a hemodialysis schedule:

- Available time slots
- Patient's job
- Medical problems
- Rides to and from dialysis

Your treatment may be delayed due to:

- Weather
- Patient emergencies
- Equipment breakdown
- Water or power failure

Vacation Policy

We know there are times when you will take a vacation or be out of town on scheduled treatment days. You still need to have your dialysis.

- We will help you set up hemodialysis treatments in another facility while you are gone.
- Be sure to tell the nursing staff as soon as you know you may be gone. This is important even if your plans are not final.

If you are gone for more than one month, the same time slot may not be available when you return. You must call the dialysis unit before you come back. This helps us plan for available treatment times.

Travel Information

As soon as you start planning a trip, discuss your travel plans with the dialysis staff. This may be the social worker or charge nurse.

There is no guarantee that you can have your dialysis treatment when or where you want while you are gone. The accepting dialysis unit will decide if and when you can be treated there.

Some units require a 6 to 8 week notice before a visiting patient comes. There is much work to do to plan a dialysis treatment someplace else. You may need:

- Lab work within the last 30 days.
- Copies of your medical records.
- Approval in advance from your insurance company.
- Payment at the time of treatment.

When traveling, be sure to have:

- Refills of all your medications
- Copy of your insurance information
- Contact information for your home dialysis center

What you need to know:

You will be discharged from your local Sanford Dialysis if you are gone for more than 30 days.

- Your treatment time slot will not be saved for you.
- You will be admitted again in an open time slot when you come back to the home dialysis center.

Your Role in Patient Safety

Safety starts with each one of us. You can:

- Learn about kidney disease.
- Tell the staff about any changes such as:
 - New medications
 - Recent injuries
 - Falls
 - Hospitalizations
 - New phone number or address
- Keep copies of your medical information available and up to date.
- Come to your dialysis treatments on time and stay for the whole time.
- Wear a medical alert bracelet or necklace.
- Know your diet and fluid limits.
- Know your medications.
- Wash your hands often.
- Wash your access site before dialysis.
- Keep your access visible at all times during dialysis.
- Be aware of possible bad weather and take precautions.
- Know what to do if you miss a dialysis treatment.
- Read the emergency information in this book.
- Have a stock of emergency food and supplies.
- Know your emergency diet.
- Use common sense.
- Attend care plan meetings with the dialysis team.
- Ask questions.

Patient Registration

Federal regulations require Sanford to re-register patients for dialysis services.

- Medicare requires we ask many questions to determine the primary payer for your services. We ask about:
 - Your work status
 - What date you started outpatient dialysis
- A Sanford staff member will call you about a week before the re-registration dates.
- Your personal information will be updated:
 - Address
 - Phone numbers
 - Insurance

Public Notice

This notice is required by The Joint Commission

The Joint Commission may conduct an unannounced accreditation survey of this organization, Sanford Health, at any time. The purpose of the survey will be to evaluate Sanford's continuous compliance with nationally established Joint Commission standards. The survey results will be used to determine whether, and the conditions under which, accreditation should be awarded to Sanford Health and its organizational entities.

The Joint Commission standards deal with organizational quality of care issues and the safety of the environment in which care is provided. If an individual has any concerns about patient care and safety at Sanford Health that have not been addressed, he or she is encouraged to contact the **Sanford patient representative:**

- Bemidji area: (218) 333-6459
- Bismarck area: (701) 323-1050
- Fargo area: (701) 234-5876
- Sioux Falls area: (605) 333-6546

If concerns cannot be resolved through the patient representative, the individual is encouraged to contact the Joint Commission. Contact information for the Joint Commission is:

Office of Quality Monitoring
The Joint Commission
One Renaissance Boulevard
Oakbrook Terrace, IL 60181
E-mail: patientsafetyreport@jointcommission.org
Phone: (800) 994-6610
Fax: (630) 792-5005

Emergency Planning

An emergency can happen at any time. Sometimes, there is no warning.

This can be a natural disaster such as a:

- Blizzard
- Tornado
- Flood
- Earthquake
- Fire
- Electrical power blackout

Some emergencies affect a community and some affect the dialysis center.

Emergencies can occur at any day, time, or place. Emergency plans must be in place.

The goal is to be ready.

Preparing for an Emergency

The most important thing is to plan ahead for an emergency.

- Make an emergency supply kit.
 - Keep your kit with you at all times.
 - Make sure the information and supplies are up to date.
 - Put these things in plastic zipper bags inside a plastic container with a lid:
 - A list of your allergies
 - A list of all the medicines that you take
 - 5 to 7 day supply of your medicines (Replace this supply at least once each year.)
 - Name and phone number for your doctor and dialysis center
 - A copy of your insurance card
- If you are diabetic, keep a 5 to 7 day supply of your medicines and supplies.
 - Insulin (Keep it cool but do not freeze it. It is best to keep it refrigerated but it will keep at room temperature for up to 1 month.)
 - Syringes
 - Your glucometer, lancets, alcohol wipes, test strips and spare batteries
 - Treatment for low blood sugar readings
- Make an evacuation plan.
 - Plan to leave your home as told by local authorities
 - If you go to a shelter, tell the person in charge that you are on dialysis
 - Be safe
- Wear a medical alert necklace or bracelet.
 - Include your medical problems
 - Ask your social worker if you need help getting one

- Know what diet to follow if you miss your dialysis treatment. Keep a:
 - Supply of canned foods
 - Can opener
- Other things to think about:
 - Battery-operated radio with new batteries
 - Flashlights with new batteries
 - Extra batteries
 - First aid kit
 - Fire extinguisher
- Give the dialysis center an alternate phone number for you and an emergency contact.

Winter weather

- If bad weather is forecast, make sure you have a supply of food and medication.
- Do not leave home if no travel is advised.
- If you live out of town and bad weather is forecast, come to the town where your dialysis center is located before the weather gets bad. Call the dialysis social worker if you need help with housing.
- Bring your medications and supplies with you. Remember your cell phone, if you have one.
- Keep extra warm clothes and blankets in your car in case you get stranded.
- Know the emergency services in your town. In some areas, emergency vehicles may bring patients to dialysis.

Flood

- Stay out of low-lying areas where it is likely to flood.
- Move to higher ground.
- Do not drive through flooded areas or cross water that may be more than knee deep.
- Remember the water supply may be contaminated.

After an emergency

- Make sure your surroundings are safe.
- Stay home unless you are hurt or authorities tell you to leave.
(Remember to take your supplies and medications when you leave home.)
- Listen to your TV or radio for community information.
- Call your dialysis center and let them know what has happened.
- Follow your emergency diet.
- If you are in a shelter, let them know you are a dialysis patient.

An Emergency at the Dialysis Center

The dialysis center has policies and procedures to make sure we are prepared for an emergency.

Fire

- The dialysis center has regular fire drills.
- The fire alarms are tested every month to make sure they are all working.
- The local fire department is notified when the fire alarm goes off. They will arrive within a few minutes.

Tornado

All of the dialysis centers receive emergency weather notices from local authorities.

- If severe weather is close, you will be told what to do.
- We cannot force you to stay at the dialysis center if you choose to leave.
- It is much safer in the building than in your vehicle.

Loss of power or water

- Dialysis centers have a back-up plan in case of power failure or water contamination.
- In some cases, your dialysis treatment may be delayed or moved to another location.

Medical Emergency

- Dialysis staff have current CPR training.
- All staff have training every year on the use of emergency medical equipment.

Emergency Disconnect

You must know how to remove yourself from the hemodialysis machine. This is called emergency disconnect. You would do this **only** if you are in **immediate** danger or if you need to leave the building. A fire or tornado is an example of this type of emergency. Hopefully, you will never have to do this. But, it is important to be prepared just in case. The staff will review this with you often. Again, our goal is to be prepared but never use our emergency plans.

Emergency Disconnect Procedure:

- Disconnect only when the nurse tells you.
- There are a total of 4 clamps on the tubing:
 - Close the 2 clamps closest to your access.
 - Close the 2 clamps on the tubing that goes to the dialysis machine.
 - The machine will alarm when the clamps are closed. Ignore the alarm.
- Twist the connections apart between your access and the bloodlines.
- If all lines have been clamped, there should be no bleeding.
- Do **not** take the needles out of your arm.
- Do **not** cut the tubing.
- Dialysis staff will help if you cannot disconnect yourself.
- If you have a catheter, the dialysis staff will disconnect it for you.
- The dialysis staff will tell you when to leave after you have disconnected.
- Remain calm.
- Follow the directions from dialysis staff or other authorities.

Missing a Hemodialysis Treatment

An emergency situation may cause you to miss your dialysis treatment. If this happens:

- Call the hemodialysis center to reschedule your treatment as soon as possible.
Do not wait until your next appointment for dialysis.
- Patients who miss treatments or do not get their full treatment time have:
 - More hospital admissions
 - More infections
 - More bleeding
 - A poor appetite
 - Feel more tired and weak
 - A higher chance of death

Your diet is very important if you miss a dialysis treatment. You must:

- Cut back on what you drink to half of your normal fluid limit or less than 2 cups.
 - Too much fluid can cause:
 - Breathing problems
 - Swelling
 - Increased blood pressure
- Avoid salt and salty foods as these can make you thirsty.
- Potassium can build up in your blood very fast. Avoid high potassium foods such as:
 - Potatoes
 - Tomatoes
 - Oranges
 - Bananas
 - Dried fruit

Talk with your dietitian if you have questions about certain foods.

Kidney Functions

The kidneys have many important jobs that keep you healthy. They affect your entire body.

- Most people are born with 2 kidneys.
- The kidneys are:
 - Located in your mid-back tucked up under your ribs on each side of your spine
 - Shaped like a kidney bean
 - Slightly larger than your fist

What do the Kidneys do?

Your kidneys are very important to your health. The kidneys have 5 main jobs:

- Make urine
- Filter blood to take out the wastes
- Balance chemicals such as sodium and potassium (electrolytes) in your blood
- Help control blood pressure
- Help to make red blood cells

What causes kidney disease?

There are several things that can lead to kidney disease.

- Most kidney disease is from damage to the tiny blood vessels in the kidney.
When this happens:
 - The kidney does not get enough blood flow
 - The blood is not cleaned
 - Fluids and wastes can build up in the body
- Sometimes controlling the underlying health problem can slow progression from kidney disease to kidney failure.
- Some patients have more than one health problem that leads to kidney disease.
- When the kidneys stop working, it is called kidney failure.

Some causes of kidney disease

- **Diabetes** is the leading cause of kidney disease.
 - The body may not make enough insulin or may not use insulin the way it should. This causes the blood glucose or blood sugar to be too high.
 - High blood sugar affects the tiny blood vessels in the kidneys. This slows the blood flow to your kidneys. Then the kidneys are not able to remove the fluids or wastes from the blood.
- **High Blood Pressure (Hypertension)** is the second leading cause of kidney disease.
 - It causes the arteries to harden and decreases blood flow. This can destroy the small arteries in the kidneys. The kidneys will not be able to filter or remove fluids and wastes.
 - High blood pressure can lead to a heart attack or stroke.
 - Often, high blood pressure has few symptoms until it is in the advanced stages.
- **Infection** anywhere in the body may cause the body to make poisons.
 - These poisons can build up.
 - They may damage the small blood vessels in the kidneys.
 - Some medications used to treat infections cannot be used with kidney disease.
- **Obstruction** is a blockage.
 - In the urinary tract, a blockage:
 - May be caused by a kidney stone, cyst, blood clot, tumor, enlarged prostate or inherited disease
 - Can prevent normal urination
 - Increases pressure in the urinary system and can damage the kidneys
 - In the blood vessels, a blockage:
 - May be caused by a blood clot
 - Can decrease blood flow to the kidneys
 - Does not allow the kidneys to remove fluids or wastes from the blood

Drugs and Toxins can be poisonous to the kidneys.

- Poisons build up in the body.
- The kidneys stop working when levels are too high.
- Those poisons can include:
 - Medications
 - Chemicals
 - Pesticides
 - Street drugs

Acute and Chronic Kidney Disease

There are 2 types of kidney disease. They are very different but may have similar treatments.

Acute Renal Failure (ARF) or Acute Kidney Injury (AKI)

Both ARF and AKI mean the kidneys suddenly stop working. This condition is watched very closely in the hospital.

Some causes of acute kidney injury can be:

- A severe injury or accident
- Infection
- Surgery
- Blood clot
- Burn
- Medications such as antibiotics, contrast dyes, and cancer drugs

Dialysis may be used to help the kidneys get better. Sometimes it is possible to reverse an acute kidney injury and the kidneys may start working again.

Sometimes acute kidney injury does not improve and it becomes chronic renal failure.

Chronic Kidney Disease (CKD)

CKD is usually a slow, gradual kidney shutdown over months or years.

- This is the more common type of kidney failure.
- Diabetes and high blood pressure are the leading causes of chronic kidney disease.
- Kidney disease may be slowed down with medications and lifestyle changes.
- The kidneys will stop working if kidney disease is not treated and controlled.
- Often, people with chronic kidney disease may not have any symptoms early in the disease. As kidney function slows down, the symptoms become more noticeable. They may include:
 - Swelling in the hands or feet
 - Feeling tired
 - High blood pressure
 - Trouble breathing

Chronic kidney disease will never go away

- Treatment will help the patient feel better.
- Treatment will not cure the disease.
- Dialysis or kidney transplant is needed when the kidneys are no longer working.

Stages of Chronic Kidney Disease

Your kidney doctor (nephrologist) will use blood and urine tests to measure your Glomerular Filtration Rate (GFR). The GFR is the best test to measure how well your kidneys are cleaning your blood. The lower the GFR, the less your kidneys are working.

Chronic Kidney Disease is measured in stages. These stages are determined by your GFR.

Normal kidney function: GFR is between 90 and 120

- No kidney damage
- No protein in your urine

Stage 1: GFR is more than 90

- May have kidney damage
- May have protein in urine
- Most patients do not have any symptoms of kidney damage.

Stage 2: GFR is 60 to 90

- Some kidney damage
- Most patients do not have any symptoms of kidney damage.

Stage 3: GFR is 30 to 59

- When most new CKD is diagnosed
- Patients should see a nephrologist.
- Patients have symptoms of CKD:
 - Begin to feel tired
 - Have some swelling in hands or feet
 - Have higher blood pressure readings
 - Have some shortness of breath

Stage 4: GFR is 15 to 29

- Kidneys are working less
- Most patients feel more tired because:
 - Toxins start to build up
 - Not making enough red blood cells
- This is the time to start planning for treatment.
- Patients and family members are encouraged to attend CKD classes and treatment option classes.
- An access may be placed if peritoneal dialysis or hemodialysis is chosen.

Stage 5: GFR is less than 15.

- Kidneys are barely working
- This is the time to start treatment
- The patient:
 - Feels very tired
 - Has a decreased appetite
 - Feels nauseated
 - Has swelling in hands or feet

Treatment of Chronic Kidney Disease

Your nephrologist will work with you to develop a treatment plan. The plan depends on the stage of your kidney disease. The goal is to slow down or limit kidney damage that may prevent kidney failure.

- The treatment may include medications to control high blood pressure or high blood sugar.
- You may talk to a dietitian:
 - Before dialysis starts, limit how much protein you eat. This will reduce the amount of work your kidneys must do.
 - After dialysis starts, you will need to eat more protein.
- Your body may still make urine with chronic kidney disease.
 - As kidney disease gets worse, you will make less urine.
 - Over time, you will stop making urine.

Your body will need dialysis or a transplant when your kidneys are not removing the fluids and wastes.

Note: Not treating kidney disease will cause toxins to build up to dangerous levels. This can lead to death. Everyone has the option to choose not to treat kidney disease. For more information, see the Treatment Options section of this book.

Treatment Options

Treatment options for Chronic Kidney Disease (CKD)

CKD is a permanent condition. Treatment will:

- Help the patient feel better
- **Not** cure the disease
- **Not** make the kidneys start working again

You and your nephrologist will decide on the treatment option that is best for you.

It is based upon your:

- Needs
- Interests
- Abilities
- Medical problems

It is quite common for patients to change treatments as their life changes.

Patients have 4 choices for their dialysis treatment:

- Hemodialysis
- Peritoneal Dialysis
- Kidney Transplant
- No Dialysis

Hemodialysis

The word “hemo” means blood and the word “dialysis” means to filter.

- Hemodialysis cleans your blood through a filter.
- Blood flows from your body to the dialysis machine then through a special filter.
 - The special filter is called a dialyzer.
 - The dialyzer is sometimes called an artificial kidney.
- As blood goes through the dialyzer, fluid and wastes are removed.
- The blood goes back to your body after going through the dialyzer.

Hemodialysis needs a way to remove blood from the body and return it. This is called an **access**.

- A doctor places the access in a blood vessel in the patient’s chest or arm.
- An access allows blood to flow to the machine where the wastes are removed.
- Blood is returned to the patient through the access.

Hemodialysis treatments are most often done in an out-patient department 3 times a week. Each session is 3 to 5 hours long. The length of time depends on the person’s condition.

Some patients can do hemodialysis treatments at home.

- Home treatments are most often done 5 to 6 times a week.
- The patient needs someone to help them.
- The patient must meet strict requirements.
- Talk to your nephrologist or dialysis nurse if you want to know more about home hemodialysis.

See the Hemodialysis and Vascular Access sections of this book for more information.

Peritoneal Dialysis (PD)

- Peritoneal dialysis uses the lining of the abdominal cavity to clean your blood. The membrane acts like a filter to remove the fluids and wastes from your body.
- This lining is called the peritoneal membrane. It holds organs like your intestines, liver and stomach in place.

One advantage of peritoneal dialysis is that you can do it at home. It allows your schedule to be more flexible.

- A special tube, called a peritoneal catheter, is placed into the abdomen near the belly button.
- A special cleaning fluid, called dialysate, goes into the abdomen through the catheter.
 - The fluid stays in the abdomen for a few hours.
 - Then it is drained out of the abdomen.
 - New fluid is put in.
- This is done 4 times a day.
 - In some cases, peritoneal dialysis may be done at night with a machine.

Kidney Transplant

A healthy kidney (from someone else) is surgically placed in your body. The new kidney works in place of the diseased kidney. Remember, a transplant does not cure kidney disease. It is another treatment option.

- Donated kidneys can come from a living person or from someone who has just died.
- The transplanted kidney must match your blood and tissue type.
- A relative is often the best donor. But, someone who is not related to you may also be a good match.

Your nephrologist and transplant center staff meet with you and decide if you are a candidate for a transplant.

- A series of tests are done to make sure you are healthy enough for the surgery.
 - This process can take many months.
- Patients who do not have a blood relative to donate a kidney are placed on a waiting list.
 - Some patients wait many months for a kidney match.

After the transplant, 2 things are very important.

- The patient **must** take medications to suppress the immune system.
 - These drugs keep your body from destroying the transplanted kidney.
 - Without medications to suppress the immune system, the body will fight or reject the kidney and the kidney will stop working.
- The patient is expected to be active in their own cares.
 - This means working with the transplant team to monitor their progress and treatments.
 - The patient must keep all follow-up doctor and lab appointments.

Be sure to ask your doctor or dialysis nurse if you want to know more about kidney transplant.

No Dialysis Treatment

All patients have the right to decide not to start dialysis. If you start dialysis, you have the right to stop. You also have the right to start dialysis again if you change your mind.

We respect your right to make your own decisions. Before you stop dialysis, we encourage you to talk seriously with your family and doctor. Choosing no treatment or stopping dialysis will likely result in death within a few days to a few weeks.

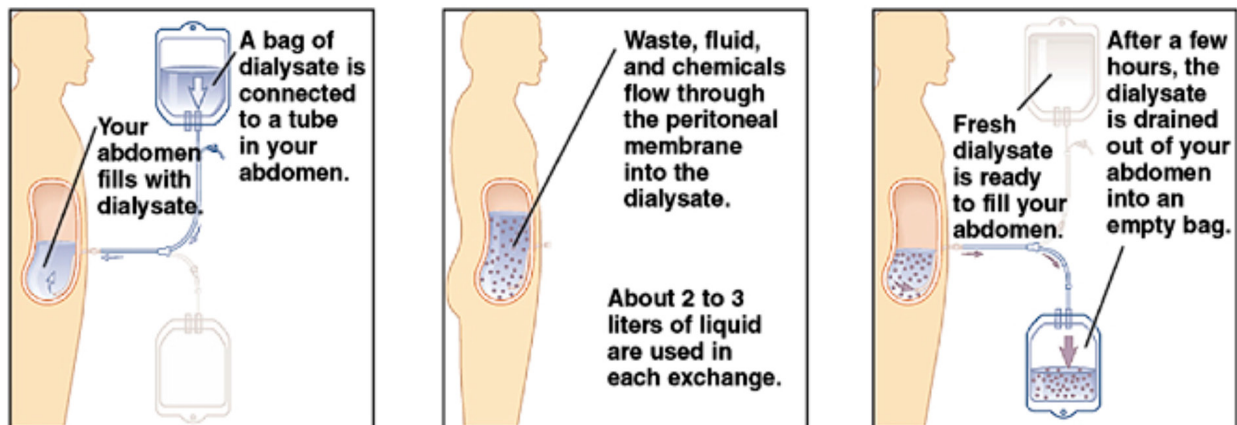
If you choose no dialysis treatment, ask your doctor or social worker to refer you to hospice or palliative care. Hospice will help you and your family with home care, comfort, emotional and spiritual support.



Peritoneal Dialysis (PD)

This is a treatment for kidney failure that uses the body's own peritoneal membrane.

- This membrane:
 - Lines the inside of the abdomen and holds your abdominal organs in place
 - Creates a space that holds the dialysis fluid, called dialysate
 - Acts like a filter between the dialysate and your blood
- The dialysate removes the fluid and wastes from your blood through the membrane.
- Patients must have a special tube (catheter) in their abdomen to fill and drain the dialysate.



Peritoneal Dialysis Treatments

PD is done about 4 times every day at natural breaks in the day: morning, noon, evening, and bedtime. PD involves 3 steps:

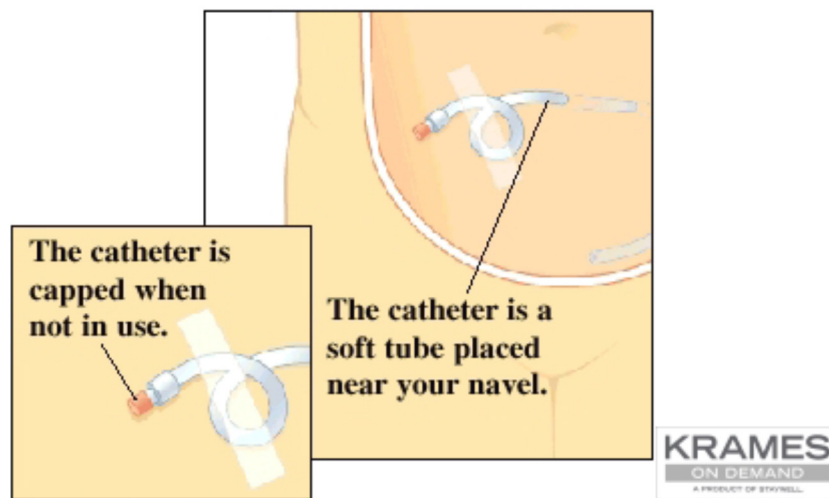
1. **Drain** the old fluid from the abdomen.
 - The patient connects their catheter to tubing and a collection bag.
 - The dialysate drains from the abdomen by gravity.
 - This takes about 20 minutes.
2. **Fill** the abdomen with new dialysate.
 - New dialysate goes into the abdominal cavity through the catheter.
 - This takes about 10 minutes.
 - Then the patient disconnects the tubing from the catheter.

3. Dwell.

- The dialysate sits in the abdominal cavity and absorbs the fluid and wastes from the blood.
- The old dialysate is drained and the process is repeated.
- Patients can sleep 8 to 10 hours at night.

Many patients do their PD exchanges during the day.

- It takes about 5 minutes to set up.
- Patients can read or watch TV while they drain and fill the dialysate.
- Patients can do normal activities during the dwell phase.



Peritoneal Dialysis Access

The PD catheter is a soft plastic tube used to move dialysate in and out of the abdomen.

- The doctor places the catheter in an outpatient or day surgery department.
- One end of the catheter is inside the abdomen.
- The other end is outside the body.
- It is important to plan ahead and have the catheter put in before PD is needed.
 - The catheter must heal before starting PD treatments.
 - It usually takes 2 to 3 weeks for the PD catheter to heal.

Advantages of Peritoneal Dialysis

- It is most like normal kidney function.
- It is gentle and continuous.
- It is a treatment that patients can do every day at home.
- Patients come to the dialysis center once a month for a visit.
- It is easy to learn.

- Patients are taught how to do PD through a training program at the dialysis center.
- It usually takes 1 week of training.
- Family members are welcome to come to the training.
- It is flexible and portable.
 - The schedule allows for work or other activities during the day.
 - Patients can travel and take the supplies with them. The supplies can be sent ahead.
- Some patients use a machine at night to do their PD exchanges.
 - This can allow you to continue most normal daytime activities.
 - Ask for more information if you want to use a machine at night.

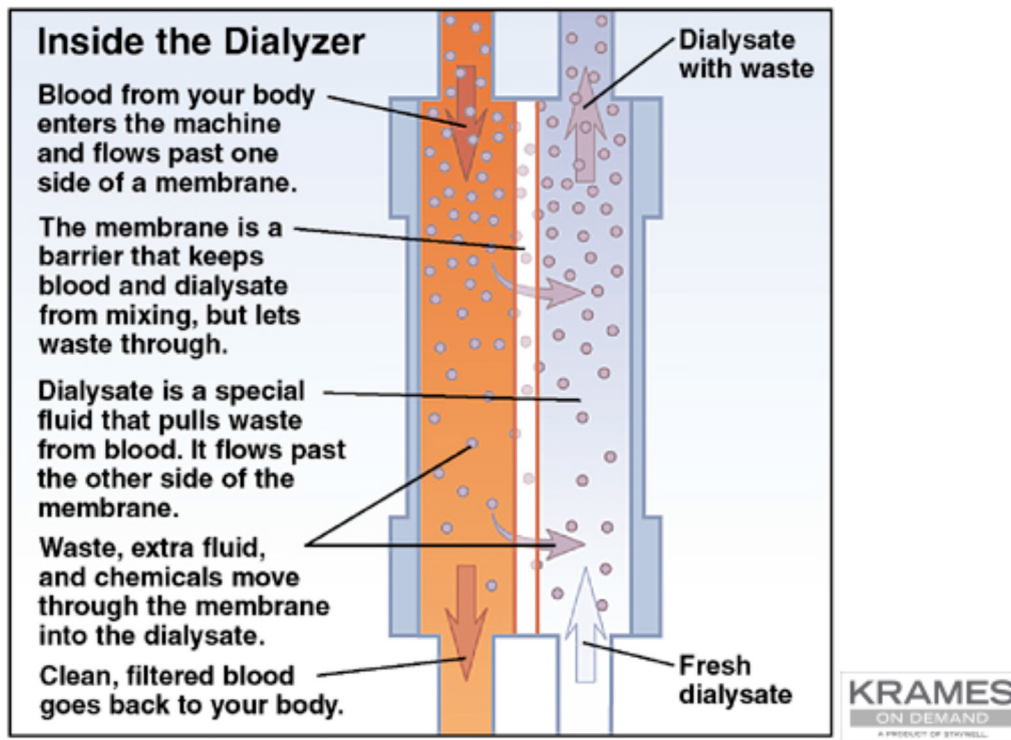
Ask your doctor or dialysis nurse to learn more about peritoneal dialysis.

Hemodialysis

How Hemodialysis works

It is the process of removing fluids and wastes from the blood after the kidneys stop working.

- Blood is removed from your body and sent to the dialysis machine.
- Your blood then goes through a filter. It is cleaned and returned to you.
- This happens many times during the dialysis treatment.



The blood is cleaned in an artificial kidney or special filter called a dialyzer.

- The dialyzer has 2 compartments:
 - One for blood
 - The blood flows inside hundreds of straw-like fibers.
 - One for dialysate
 - Dialysate is a special dialysis solution that cleans the blood.
 - It flows around the outside of the straw-like fibers.
- The blood and dialysate never touch or mix.
- The straw-like fibers in the dialyzer have many tiny holes, called pores.
 - The pores only let certain size molecules pass through.
 - It is called a semi-permeable membrane because some molecules go through the pores; others do not. It is like the coffee filter that allows the water but not the coffee grounds to go through.

- Fluids and wastes that are small, like urea and creatinine, easily fit through the pores.
- Large molecules, like blood cells and protein, are too big to go through the pores.

The dialyzer does 2 basic jobs that your kidneys no longer do. The dialyzer removes wastes and extra fluid from your blood. The fluid goes down the drain with the wastes.

Monitors and Alarms

The dialysis machine moves your blood to the dialyzer where it is cleaned and returned to you. The dialysis machine has a blood pump, dialyzer, and many monitors that measure different functions.

- Monitors and alarms make sure your dialysis treatment is safe.
- Alarms with flashing lights or beeping sounds alert the staff if there is a possible problem.
- In most cases, alarms are not dangerous and can be simply corrected.
- The monitors and alarms are checked before and during each treatment.

Arterial and Venous Pressure Monitors

They measure the pressure of the blood flow to and from the machine.

- Arterial alarms measure the blood flow from your access going to the machine.
- Venous alarms measure the blood flow returning from the machine to your access.
- An alarm may mean:
 - There is a kink or blockage
 - The needle is out of the access
 - You moved your arm and the flow stopped.

Transmembrane Pressure (TMP)

This tells how much pressure is used to take the extra fluid out of your body. This protects the dialyzer from breaking and causing the blood to leak.

Conductivity Monitor

This measures the makeup of the dialysate.

- If the dialysate is too strong, it can damage the blood cells.
- If the dialysate is too weak, the dialysis treatment may not be effective.
- This alarm allows the blood to bypass the dialyzer until the dialysate is correct.

Temperature Monitor

This monitor makes sure the dialysate is the right temperature.

- The right temperature helps your blood pressure.
- Blood cells break if it is too hot or too cold.

Blood Leak Detector

Blood and dialysate should not mix.

- Blood flows inside the fibers in the dialyzer.
- Dialysate flows around the fibers in the dialyzer.

If the fibers tear or break, the blood and dialysate can mix. The mixing is called a blood leak because blood leaks into the dialysate. This can be very serious.

- The machine will stop if this alarm goes off.
- The dialysis staff will check for a leak. If a leak is found, a new dialyzer must be used to finish the treatment.

Air Detector

This monitor checks for air in the tubing as the blood goes back to you. If air is found:

- The machine will stop.
- The dialysis staff will take the air out.
- The alarm must be reset before the treatment can start again.

Blood Pump

This is a pump that controls how much blood goes through the bloodlines and dialyzer.

- The blood pump speed makes sure your blood goes through the dialyzer and is cleaned. Staff will run the pump as fast as possible to give you the best treatment.
- The speed is called the Blood Flow Rate (BFR).

Heparin Pump

- Heparin is a medication that prevents your blood from clotting in the dialyzer. The alarm will go off if the syringe runs out of heparin.

Vascular Accesses

A vascular access is a way to move your blood to the dialyzer and return it to you.

- An access is generally placed surgically in your:
 - Neck
 - Chest
 - Arm
- The 3 types of accesses used are:
 - Catheter
 - Fistula
 - Graft

External Access

A small flexible tube (catheter) is an external access. That means part of it is outside your skin.

- The catheter is often in a vein in the neck or chest.
- It may be used for a short time, like 1-2 months.
- A catheter may be used if someone needs to start dialysis right away.
- Sometimes a catheter is used when an internal access is not ready to use.
- It may be used for longer periods when there are no other options for long-term access.

There are 2 types of catheters: non-cuffed and tunneled cuffed.

- Non-cuffed
 - Used in emergencies
 - Used for short periods of time
 - Can be put in at the bedside
- Tunneled cuffed
 - Used when a catheter is needed for a short time
 - Placed in surgery or x-ray

Caring for your catheter

- Catheters are the leading cause of infection in dialysis patients.
- How to care for your catheter:
 - Your catheter must stay clean and dry to help prevent infection.
 - You may take baths or tape a plastic wrap over the dressing area when showering.
 - Some catheters need a dressing.
 - Do **not** get the dressing or exit site wet.
 - Do **not** go swimming or in a hot tub.

- Do **not** take the dressing off if you have one. The hemodialysis staff will change the dressing.
- Do **not** remove the caps.
- Do **not** kink or bend the catheter.
- Make sure the catheter clamps are **always** closed.

When to call your doctor or dialysis department:

- If your catheter site shows signs of infection:
 - Feels tender
 - Looks red
 - Has drainage
- If you have any questions or concerns.

Internal Hemodialysis Accesses

Fistulas and Grafts are 2 types of internal accesses.

- That means they are inside your body.
- The only time something is connected to the outside is during the treatment.
- A fistula is the first choice for long-term use.

Arterio-Venous Fistula

This fistula is a type of access that is made by surgically connecting an artery and a vein.

- A fistula is usually in the arm.
 - It can be in the groin if the arm vessels will not work.
- It takes about 2 months after the fistula is placed before it can be used.
- Fistulas are the best type of access for most people.
 - They have fewer infections.
 - There are fewer problems with blood clots.
 - They allow more blood to be cleaned.
- Fistulas can last for many years.

Fistula Exercises

Exercises help the fistula get stronger and bigger. This makes blood flow from the artery to the vein. Over time, this makes the vein wall grow bigger and stronger.

You will start exercising your arm with the fistula about one week after surgery. The dialysis staff will show you how to do fistula exercises.

- Hold the squeeze ball in your hand with the new fistula.
- Press down with your other hand above the fistula.
 - Make sure you are above, not on, the fistula.

- Open and close your hand to squeeze and hold the ball about 10 times.
- Do this 6 to 8 times a day.

Sometimes the doctor wants patients to use a tourniquet to help the fistula get bigger. Be sure to use this if you are told to do so.

Arterio-Venous Graft

This is a type of dialysis access that is made by surgically joining an artery and vein with a special tube. The tube allows the dialysis nurses to access your blood for the dialysis treatment. A graft may be used when vessels are too small for a fistula.

- A graft is usually just under the skin in your arm.
- It can be used for hemodialysis a few weeks after the doctor puts it in.

Caring for your fistula or graft

You must learn how to take care of your access.

- Check your access every day for a pulse. This will:
 - Check for blood flow problems
 - Help you watch for signs of infection
- To feel for a pulse:
 - Put your fingers over the thumb side of your wrist.
 - Gently push down.
 - You should feel a pulsing sensation.
- **If you have a fistula**, you will need to feel for a thrill. To feel for a thrill:
 - Put your fingers on the top of your access.
 - You should feel a “purr” or pulsing sensation (thrill).

**If the pulse or thrill is not there,
call your doctor or hemodialysis department.**

- Keep your access clean to help lower the chance of infection.
 - Wash your access arm with soap and warm water every day and before you go to the dialysis chair.
 - The nurse will clean the area with special soap and let this dry before the needle is put in.
 - Wear gloves when you are holding your sites after the needles are taken out.
 - Clean your hands before you leave dialysis.
- Protect your dialysis access:
 - Be careful **not** to hit, bump or cut your access arm.
 - Do **not** use a dressing that puts pressure on the access site.

- Do **not** wrap anything tight around the access arm.
- Do **not** wear tight clothing or jewelry around your access. That includes a watch or tight sleeves.
- Do **not** sleep on your access arm.
- Do **not** lift heavy objects with your fistula arm.
- Do **not** let anyone use your access arm to:
 - Draw blood
 - Take blood pressures
 - Place IV's in your access arm

Access Bleeding Emergencies

Your dialysis nurse will teach you how to hold pressure on your vascular access to control bleeding. If you have bleeding from your vascular access:

- Immediately apply direct pressure to where it is bleeding and press firmly.
- Cover it with a dressing or clean cloth.
- If you can control the bleeding, apply pressure directly on the needle site for 15 to 30 minutes. Do not peek.
- If you cannot control the bleeding, immediately call 911 or your local Emergency Department.

Call your doctor or hemodialysis department if:

- You do **not** feel a pulse or thrill in your fistula or graft.
- You have pain or numbness in your access arm.
- There is bleeding from your fistula or graft.
- Your access site:
 - Feels warmer or colder
 - Looks red
 - Is more swollen than normal

Keep your dialysis staff informed about any bleeding event.

Feeling Your Best

Activity

Exercise regularly for 30 minutes at least 3 times each week. This may include:

- Walking
- Treadmill use
- Cleaning
- Climbing stairs

Benefits will include lighter mood, improved appetite, weight and glucose control, and decreased chance of complications. Restricted activity will depend on blood pressure and other factors.

Intimacy

Dialysis and kidney failure can affect sexual function and how you feel. You may want to experience the comfort of being close, or you might lack desire for intimacy.

Talking to your partner will help both of you to cope. Begin slowly and give yourself time. Try hugging, kissing, or touching at first. Speak to your doctor if you have problems with vaginal dryness or getting an erection. There may be products or medicines to help.

If you want to become pregnant or avoid a pregnancy, talk to your nephrologist.

Medical Problems Related to Hemodialysis and Kidney Disease

Possible Medical Problems

Let your hemodialysis staff know how you are feeling. You could be at risk for medical problems because your kidneys do not work. Some of these may be life-threatening. Do **not** ignore signs that there may be a serious problem.

Be sure to tell the dialysis staff if you:

- Have pain in your chest or arm
- Feel short of breath
- Feel dizzy or lightheaded
- Feel anxious or nervous

Some problems are due to your kidney disease; others may be from possible dialysis complications.

Anemia

This happens when you do not have enough red blood cells. It is sometimes referred to as “low blood.”

Hemoglobin

- A blood test to check for anemia
- Blood is also checked for iron levels
- Red blood cells carry oxygen to the body
- When there are not enough red blood cells, you may:
 - Feel tired or weak
 - Feel short of breath
 - Have low blood pressure

Causes of Anemia

- The most common cause of anemia is that diseased kidneys do not make enough erythropoietin. This hormone helps the body make red blood cells. Erythropoietin needs iron to work.
- Blood loss
- Not enough iron in the body

Treatment

- Medication called Aranesp or Epogen
 - An artificial form of erythropoietin
 - Given during your dialysis treatment
- Iron supplements
 - Given during your dialysis treatment
- Blood transfusion to get more red blood cells

Bone Disease

Healthy kidneys help keep bones strong. When the kidneys do not work well, your bones will become weak and brittle.

Falls

You are at more risk of falling due to dialysis and kidney disease. Be aware some medicines may cause you to be unsteady. Always rise slowly. Avoid throw rugs and hazards in your home that may lead to falls. Consider using devices to make you safer such as canes, walkers, or safety bars. Ask for help when you do not feel steady.

Congestive Heart Failure (CHF), Heart Inflammation, Abnormal Heart Rhythms

Heart problems can occur as a result of kidney disease or other medical problems. The body can have too much fluid which causes added stress on the heart.

Volume Overload

When the kidneys do not remove enough water, you have too much fluid for your heart to pump. This may lead to:

- Extra fluid in your tissues.
 - Swelling (edema) of your hands, ankles, feet or face
- Extra fluid in your lungs.
 - Can cause shortness of breath or chest pain
- With volume overload, blood pressure may go up.

Dialysis is the only treatment for volume overload.

- It is important to prevent volume overload and limit your fluid intake as your doctor orders.
- Dialysis may remove some of the extra fluid but not always all of it.

The goal with dialysis is to get you to your “dry weight”:

- Dry weight is what you weigh when all the extra fluid is removed.
- Your doctor will decide your dry weight.
- Dry weight is used to figure out how much fluid needs to be removed at dialysis.

Constipation

This is common among people who are on dialysis.

- Bowel movements may not be complete or not very often.
- Stools may be hard, dry and hard to push out.

Common causes of constipation are:

- Medications
- Limited activity
- Diet
- Fluid restrictions

Treatment

Eat foods allowed in your diet that are high in fiber. Be aware that many high fiber foods are also high in phosphorous or potassium.

Things that may help with constipation:

- Eat regular meals.
- Chew your food well.
- Use the toilet on a regular schedule.
- Allow enough time in the bathroom.
- Always respond to urges to go.
- Increase physical activity.

Talk to your dietitian if you have questions.

There are many over-the-counter medications for constipation.

- Many are **not** for dialysis patients.
 - Some are high in phosphorous or aluminum. They could be dangerous if you take them.

Talk to your dialysis doctor, dialysis nurse or dietitian before you take any over-the-counter medication for constipation.

Cramps

Muscle spasms or “charley horse” of the hands, arms, feet, legs, or stomach can occur. Most often, this happens during dialysis. Cramping can occur in the hours after dialysis also.

Pressure or rubbing to the affected area may help. Staff may also adjust the machine if needed.

Stomach upset (Nausea)

This can happen with a drop in blood pressure during dialysis. If your stomach feels upset, tell your nurse. Staff may make adjustments to the chair, dialysis machine, or give medication.

Low Blood Pressure (Hypotension)

Low blood pressure is common during dialysis treatments. It can be caused by:

- Removing too much fluid
- Not taking blood pressure medicines correctly

If your blood pressure is too low, the staff can do things that will help make your blood pressure more stable:

- Change the machine settings
- Change your chair position
- Give fluids

Signs of low blood pressure are:

- Nausea and vomiting
- Sweating
- Sudden, warm feeling
- Yawning
- Feeling anxious or suddenly nervous
- Feeling dizzy, lightheaded or faint
- Ringing or plugging in ears

If any of these happen at home after dialysis, tell the hemodialysis staff at your next treatment. If symptoms are severe, call your doctor or go to your local Emergency Department.

High Blood Pressure (Hypertension)

High blood pressure is a serious health concern for some dialysis patients. You may have no symptoms or you may feel not well or have a headache.

High blood pressure can cause serious damage to your body such as:

- Heart failure
- Heart attack
- Stroke
- Aneurysm (a weakened area in a blood vessel that stretches)
- Damage to tiny blood vessels in the kidneys that can lead to kidney failure.

Kidney failure can also cause high blood pressure. The effects of high blood pressure are long-term.

Causes of high blood pressure can be:

- Too much renin
 - Renin is a protein your body makes to help control your blood pressure. In kidney disease, too much renin is released. This increases your blood pressure.
- Too much fluid weight gain between hemodialysis treatments
- Using too much salt
 - Salt makes you thirsty and you want to drink more.

Drinking too much fluid

The extra fluid collects in your body tissues and blood vessels. This can cause swelling and fluid around the heart and lungs.

- Your heart has to work harder to move the fluid through your body.
- Your blood pressure goes up because your heart is working harder.

Hepatitis

Hepatitis is a serious liver infection spread by a virus through the blood. Dialysis patients have a high risk of getting one of these viruses due to risk of blood contact in the dialysis department.

There are several types of hepatitis. Two types are more common in dialysis patients.

Hepatitis B

- This virus can cause liver damage or death.
- All patients are checked for Hepatitis B when starting dialysis and then once a year.
- Hepatitis B vaccinations are highly recommended for dialysis patients.
 - Vaccinations stop the spread of this virus.
 - A series of 3 shots is given over 6 months.
 - They can be given in the dialysis department.

Signs and symptoms:

- In the early stages, there may not be any symptoms.
- In the late stage, signs and symptoms are:
 - Light, clay colored stools
 - Orange to yellow-colored skin
 - Whites of eyes look yellow
 - Dark, tea-colored urine
 - Pain in the liver area (right side of the abdomen)

Hepatitis C

- Spread by contact with infected blood
 - Commonly spread by shared needles or illegal drugs
- A major cause of liver cirrhosis
- No vaccine at this time

Infections

Infections are common in hemodialysis patients.

- Infections are the second leading cause of death in dialysis patients.
- Infections can become very serious in a short time.
- Dialysis patients can end up in the hospital 1 to 2 times a year for an infection.
- The most common infections are due to a catheter.
- About 1 out of 3 patients with a catheter die from an infection.
- Some antibiotics cannot be used because of kidney disease.

Tell the dialysis staff if you injure yourself or have any signs of infection including:

- Pain
- Redness
- Drainage
- Swelling
- Fever
- Cough with thick sputum
- General weakness

Dental Care

There are many bacteria in the mouth.

- You may need antibiotics before routine dental work or cleaning.

Tell your doctor or dialysis nurse about any dental appointments you have.

Itching (Pruritus)

Some patients have severe itching. This may be due to dry or irritated skin.

Itching can be caused by:

- Decreased sweating
- A buildup of phosphorous and toxins in the skin or blood

Things that may help:

- Medications may help you feel more comfortable.
- Keep your phosphorus levels within normal limits.
 - Phosphate binders will help lower phosphorous levels.
- Mild soaps or creamy lotions may decrease itching.

Neuropathy

Numbness or tingling in the hands or feet can be a side effect of kidney failure. This can be permanent due to nerve ending damage. Medications may give some relief.

Restless Leg Syndrome (jumpy legs)

- A dull, aching pain in your legs
- No known cause
- Can happen during rest, sleep or hemodialysis
- Talk to your doctor or dialysis staff if this happens to you.

Treatment

- Moving your legs often
- Exercise like walking or biking
- Medications

Medications

Many medications can be used for people with Chronic Kidney Disease. What is right for you may not be right for another person.

- Take your medications as instructed.
 - Some medications must be closely monitored.
 - Some medications will not work if they are not taken correctly.

Do **not** take any medications without talking to your nephrologist and/or dialysis pharmacist first. This includes medications and herbal supplements that you can buy without a prescription.

- Drugs can build up toxic levels because your kidneys are not working.
- Drugs may react with each other and cause serious problems.
- Kidney disease changes how your body uses and breaks down drugs.
- Your nephrologist will order the right drug and dosage for you.

Anticoagulants

These are sometimes called blood thinners. They can prevent blood from clotting.

- Tell your doctors and other providers if you are using this medication before you have any treatment or procedure.
- Sometimes these medications are given to treat other medical conditions.

Heparin

- This is given slowly during your dialysis treatment so your blood does not clot in the dialyzer.
- It stays in your body 4 to 6 hours after dialysis.

Warfarin (Coumadin, Jantoven)

- You may take this to prevent your access from clotting.
- It may also be given for a fast heart rate or other clotting problems.
- Warfarin stays in your body for several days.
- Take it at the same time every day.
- It is recommended with the evening meal.

Aspirin

- This may be used to prevent your access from clotting.
- Some people take it to protect their heart.
- Take this with food to prevent stomach irritation.
- Take it after dialysis.
- Do **not** use aspirin for pain or headache.

Do **not** take:

- More aspirin
- Ibuprofen (Advil or Motrin)
- Naproxen (Aleve)

They can cause you to bleed more.

Things to know if you are using an anticoagulant:

- A minor fall, cut or other injury can cause serious bleeding.
- Be careful when you are using sharp objects so you do not cut yourself.
- If you hurt yourself and you are bleeding, hold firm pressure over the bleeding area with a clean dressing or cloth.

If you cannot stop the bleeding, call for help or go to the local emergency department. Do not drive yourself.

Call your doctor if you have:

- Frequent bruising
- Bloody nose
- Too much bleeding from your gums or needle sites
- Blood in your urine
- Black, tarry stools
- Foul-smelling stools

Anemia Medications

Erythropoietin

This is a hormone that healthy kidneys make.

- Dialysis patients receive an artificial form of erythropoietin. It helps your body produce red blood cells:
 - To increase your hemoglobin levels
 - To prevent anemia

Erythropoietin is given:

- As a shot under the skin
- Into your vein through the dialysis machine

Erythropoietin has different names depending on what company makes it.

- EPO
- Aranesp
- Darbepoetin
- Epogen
- Procrit

It is important to keep your hemoglobin at a safe level.

- The dose of erythropoietin is based on your hemoglobin.
 - Erythropoietin should not be given if your hemoglobin is greater than 12.

Tell the doctor or dialysis nurse if you have:

- Chest pain
- Trouble breathing
- Coolness, paleness or weakness in one arm or leg

Iron

This helps your body make hemoglobin. If you do not have enough iron in your body, erythropoietin will not work.

- Blood tests check your iron levels.
- Hemodialysis patients may get iron supplements in the vein during dialysis treatments.
- PD or home hemodialysis patients may take iron pills by mouth.
- Home hemodialysis patients may need iron supplements given in the vein at the dialysis center.

Iron has different names depending on what company makes it. Iron may be called:

- Ferrlecit
- Venofer
- Niferex
- Nulecit
- Ferrous Gluconate
- Ferrous Sulfate

Bone Medications

Activated Vitamin D

This helps the body absorb calcium from food.

- It is used so calcium is not lost from the bones.
- It is usually given in the vein during hemodialysis.
- Activated Vitamin D may be called:
 - Calcitriol
 - Calcijex
 - Hectorol
 - Zemplar
 - Rocaltrol
- PD or home hemodialysis patients may take a Vitamin D pill by mouth.

Phosphate Binders

A phosphate binder is a medication used to decrease the absorption of phosphorus from food. These binders attach to phosphorus before it can be absorbed in the body. Phosphate is removed through bowel movements (poop).

Phosphate binders are to be taken with **all** meals and snacks.

Too much phosphorous in your diet will increase your phosphorous level.

- A high phosphorous level lowers your calcium level.
 - Low calcium can make your bones weak and more likely to break.
- High phosphorus causes calcium to deposit in the kidney, heart, eyes, blood vessels, lungs, brain, joints, and skin. This is called calcification.

Some phosphate binders are:

- Phoslo (calcium acetate)
- Fosrenol (lanthanum carbonate)
- Renvela (sevelamar carbonate)
- Velphro (sucroferric oxyhydroxide)
- Auryxia (ferric citrate)

Vitamins

Check with your doctor before starting any vitamin or supplement. Your doctor may order a special multivitamin for people with kidney disease.

Antibiotics

Antibiotics are medications that fight infections. They:

- Can be given in the vein or as a pill
- Are sometimes given at the dialysis center through the vein for infections that are related to dialysis access

Tell every doctor that you are a dialysis patient. Dialysis patients:

- Cannot take some antibiotics because their kidneys do not work
- May need a lower dose

Blood Pressure Medications

High Blood Pressure (Hypertension)

Many people do not know they have high blood pressure until it is too late to prevent damage.

- High blood pressure damages the tiny blood vessels in the body.
 - The kidney has many tiny blood vessels.
- Kidney disease can occur when the blood vessels are damaged.
- Kidney disease can also cause high blood pressure.
- It is important to control blood pressure to prevent complications.

Many different kinds of pills are used to control blood pressure. Most people take more than one.

- Blood pressure pills can make your blood pressure go too low before, during, or after dialysis.
- Ask your doctor when you should take them:
 - Blood pressure pills are usually taken after dialysis.
 - Your doctor may want you to take your blood pressure pills before dialysis if your blood pressure is normally very high.

Low Blood Pressure (Hypotension)

Some patients feel dizzy or lightheaded if their blood pressure is too low.

Midodrine (Proamatine) may be given to patients who have low blood pressure during dialysis treatments.

- It makes the blood vessels get narrow and smaller which:
 - Makes the blood pressure go up
 - Allows for better fluid removal during your dialysis
- It is usually taken 30 minutes before dialysis and again in the middle of the treatment.

Other Medications

Kayexalate

This is used to treat a high potassium level. High potassium can be life-threatening.

- Kayexalate removes potassium from the body through the stool.
- It is very rare but some patients may have this if they are not able to get to the dialysis center.
- Do not take Kayexalate:
 - Unless your doctor or dialysis nurse tells you to
 - At the same time as you take antacids or laxatives

Anti-Diarrhea Medications

These are given for frequent loose stools.

- They are taken as needed.
- Examples are loperamide and Imodium-AD.

Constipation

Constipation is common in dialysis patients due to diet and fluid limits.

- Stool softeners make the stool soft so they move easier.
- Laxatives make the bowels move.

Things you need to know:

- Powder laxatives need to be mixed with liquids. This must be included in your fluid limits.
- Many laxatives and stool softeners have aluminum or magnesium. They can cause serious problems for people with kidney disease.

Do **not** take:

- Milk of Magnesia
- Gaviscon
- Maalox
- Magnesium Citrate
- Fleets or other enemas

For the best options, check with your doctor, dietitian, or dialysis nurse before taking over-the-counter laxatives or stool softeners.

Over-the-Counter Medications

Check with your doctor before taking any medication you can buy without a prescription. Some over-the-counter medicines and herbal supplements are dangerous when you have kidney disease.

Analgesics and Pain Relievers

These are used to treat pain, fever and inflammation.

- Do **not** take aspirin, ibuprofen (Advil or Motrin) or naproxen (Aleve) unless prescribed by your doctor.
 - These can cause bleeding in the stomach and damage your kidneys.
- Use acetaminophen (Tylenol) for minor aches, pains or headaches.
 - Ask your doctor about how much to take.
- Narcotics are used for severe pain.
 - Use these with caution.
 - They may cause breathing problems or seizures in high doses.

Cold medicines

Often the over-the-counter cold medicines have decongestants in them. This will help to clear a stuffy nose.

- They can raise your blood pressure to very high levels.
- Ask your doctor or pharmacist which ones are best for you to take.

Natural or Herbal Remedies and Nutritional Supplements

Many natural or herbal products and nutritional supplements are used to treat health problems.

- Some may be harmful to people with kidney disease.
- Some could interact with medications you are taking now.
- Many are not well studied in dialysis patients.
 - It is not known whether they are safe or if they will hurt those with kidney disease.

Talk with your doctor, dialysis pharmacist, nurse or dietitian before taking any natural or herbal products or nutritional supplements.

If you have any questions or concerns about your medications, contact your doctor, dialysis pharmacist or dialysis staff.

Nutrition and Fluids

Nutrition is an important part of your dialysis treatment.

- Healthy kidneys remove wastes and extra fluids. Some of this comes from what you eat and drink.
- When kidneys do not work right, wastes and extra fluids build up in your body and make you feel sick.

People with kidney disease have special dietary needs.

- What you eat will affect your health and how you feel.
- You will need to limit what you drink.
- A dietitian will:
 - Review your nutrition needs
 - Provide education about your new diet
 - Consider your own food likes when helping you make food choices

Remember: The dietitian and dialysis team will teach you the best choices to eat and drink. Only you can control what you take in.

What You Need to Do

Most dialysis patients need to:

- Eat more protein
- Eat less potassium
- Eat less sodium/salt
- Eat less phosphorus
- Drink less fluid
- Control your blood sugar if you have diabetes

Why do I need Protein?

Protein is needed for the body and the tissues (like bones, muscles, hair, and skin) to heal and grow.

- Protein helps the body:
 - Fight infections
 - Heal wounds
 - Balance fluid
- People who do not get enough protein:
 - Have less energy
 - Heal slower
 - Have more infections
 - Are in the hospital more
 - Have a higher death rate

Some protein is lost during every dialysis treatment. It is important to replace what is lost by eating protein at every meal 3 times each day.

If you are interested in taking a nutritional supplement, talk with your dietitian first. Some supplements are dangerous for people on dialysis.

Good protein sources are:

- Beef
- Poultry
- Pork
- Fish
- Eggs

Why Should I Limit Potassium?

Potassium is a mineral found in many foods. The body needs potassium to help muscles and nerves work. Because the kidneys do not work, potassium builds up in the blood.

- High potassium levels may cause weakness, tingling or numbness.
- Dialysis will take some of the potassium out of your blood.
- Limiting potassium in the food you eat will help keep your potassium at a safe level between dialysis treatments.

Some high potassium foods are:

- Oranges and orange juice
- Bananas
- Tomato and tomato products
- Potatoes
- Milk
- Baked beans
- Prunes and prune juice
- Low sodium foods with added potassium

Too much potassium can be dangerous. It can cause your heart beat to change or even stop (cardiac arrest).

Your dietitian will teach you about foods containing potassium. Together you will work these foods into your diet plan.

Why Should I Limit Sodium/Salt?

Sodium has an important role in fluid balance in your body.

Too much sodium may:

- Make you thirsty
- Make you short of breath
- Cause swelling in your hands and feet (edema)
- Increase your blood pressure
- Make your heart work harder. This could lead to heart failure

Salt is found in table salt, processed foods, and restaurant foods.

Tips to help limit your sodium intake:

- Take the salt shaker off the table.
- Check labels for sodium additives and amounts.
 - Choose foods that have 200 milligrams of sodium per snack and less than 600 milligrams of sodium per meal.
- Avoid salty foods and snacks such as:
 - TV dinners
 - Chips
 - Pretzels
 - Luncheon meats
 - Bacon
 - Pickles
 - Canned soups
 - Canned vegetables
- Try using herbs and different spices for added flavor such as garlic or onion. Herb blends such as Mrs. Dash are safe to use.
- Do **not** use salt substitutes. Salt substitutes are high in potassium.

Why Should I Limit Phosphorus?

Phosphorus is a mineral found in many foods. A high phosphorus level in your blood can cause serious problems.

- Healthy kidneys remove phosphorus from the blood and help absorb calcium from food.
- Phosphorous and calcium depend on a balance to work
- When kidneys do not work right, phosphorus builds up in the blood. This upsets the balance between phosphorus and calcium.
- When phosphorus levels are too high in your blood, calcium is pulled from your bones.

Two things can happen when calcium is pulled from your bones.

- Your bones get weak and are more likely to break.
- Calcium can travel through your body.
 - Extra calcium can stop where it does not belong like in your heart, arteries and skin. This is called calcification.
 - Calcification can cause:
 - Itchy skin
 - Red eyes
 - Painful joints
 - Painful, open skin wounds called calciphylaxis

To control phosphorus, you need to:

- Limit foods that are high in phosphorus:
 - Milk
 - Cheese
 - Ice cream
 - Nuts
 - Peanut butter
 - Dark colored sodas
 - Chocolate
 - Processed foods
 - Luncheon meats
- Take a phosphate binder when you eat
- Come to your dialysis treatments

Your dietitian will discuss ways to help keep your phosphorus at a safe level.



Diabetes Control (for those with Diabetes)

Diabetes is the most common cause of kidney disease.

- If you are diabetic, you need to:
 - Check your blood sugar to prevent problems while on dialysis.
 - Eat a small snack that includes carbohydrate and protein before coming to dialysis.
 - Have a doctor or Diabetes Educator manage your diabetes.

The dietitian will help you learn about your diet. You may be taught to combine parts of different diets to manage your health.

Fluid Balance

Why should I limit my fluids?

Healthy kidneys remove extra fluid from the body. In kidney failure, the kidneys do not remove the extra fluid.

- Dialysis can remove some of the extra fluid; it may not remove all of it.
- The dialysis staff will check your weight before and after each dialysis treatment.

Your nephrologist will determine what is called a dry weight or target dry weight.

Dry weight is:

- Your weight without extra fluid
- Used as a target to reach at each dialysis treatment

The weight gained between dialysis treatments is called fluid weight gain.

Why is this important?

- The dialysis staff uses your weight and dry weight to figure out how much fluid to remove at dialysis.
- The goal is to get you back to your dry weight after dialysis.
 - As an example, when you come to dialysis, your weight is 73 kg.
 - Your dry weight is 70 kg.
 - You have 3 kg fluid weight gain between treatments.
 - The staff will set the dialysis machine to remove 3 kg of fluid weight during your treatment.
- When you have more fluid weight gain between dialysis treatments, more fluid must be removed.
- It is important to keep your fluid weight gain to less than 4% of your dry weight.
- Your nephrologist or dietitian can help you figure out how much fluid you should drink based on your dry weight.

What happens if I have too much fluid?

Too much fluid can harm your body. It may cause:

- Swelling (edema) in your eyes, hands or legs, face, or abdomen
- High blood pressure
- Tiredness
- Shortness of breath because extra fluid shifts to your lungs
- Headaches
- Nausea

If you gain too much fluid, your treatment may be more difficult.

- The more you gain, the harder it is on your body to remove the extra fluid.
 - Your blood pressure may drop.
 - You may have cramping.
- It may take some time after your treatment before you will feel better and want to resume your normal activities.

What counts as fluids?

- Any liquid you drink
- Anything that melts to a liquid at room temperature including:
 - Water
 - Coffee
 - Soda
 - Milk
 - Ice
 - Ice cream
 - Jello
 - Pudding
 - Soup

How much fluid can I have?

Your fluid limit is 32 to 48 ounces (1 to 1.5 Liters) daily. Your dietitian or nephrologist will advise you on how much you should drink each day. This will be based on the amount of urine you make.

- Measuring fluids will help you stay within your fluid limit.
- The dietitian and dialysis staff will give advice on how you can stay within your fluid limit.

Lab Tests and Values

Blood tests help measure and evaluate how well your dialysis treatments are cleaning your blood. **Normal ranges can vary by clinic.**

- Blood tests are generally done on a routine schedule before your hemodialysis treatment.
- The results can be used to make changes to your diet or medications.

The dialysis staff and dietitian will review your lab test results with you.

Potassium

Potassium is important for your heart and muscles to work properly.

- This mineral is found in many foods.
- Healthy kidneys can get rid of extra potassium.
- In kidney failure, potassium builds up in the blood. Dialysis patients usually have high levels of potassium.
- Dialysis treatments will help take potassium out of the blood.

High or low potassium levels effect the way you feel.

- You may feel weakness, numbness or tingling.
- Signs your potassium may be too high include:
 - Upset stomach
 - Cramps
 - Diarrhea
 - Tingling in fingers and toes
 - Poor muscle function such as wobbly legs

If your potassium is too high, your heart can stop beating.

Most hemodialysis patients need to limit how much potassium they eat. Talk to the dietitian about potassium in your diet.

Calcium

Calcium is a mineral found in many foods. It is common in dairy products. Healthy kidneys help your body absorb the calcium from the foods you eat.

- Calcium is important for:
 - Teeth formation
 - Bone growth
 - Blood clotting
 - Muscles

In kidney failure:

- Your body does not absorb calcium from the food you eat.
 - The calcium level in your blood will be low.
 - Calcium can be pulled from the bones.
 - Bones will become weak and break easily.
- Do **not** eat foods that are high in calcium because they are usually high in phosphorous, too.

Low calcium levels can cause:

- Muscle twitching
- Seizures
- Cramps
- Hair loss

High calcium levels can cause:

- Loss of appetite
- Bone pain
- Confusion

Your nephrologist can prescribe a calcium supplement to keep your calcium level normal.

Phosphorus

This is a mineral found in many foods. It is needed for muscles and digesting food.

- Phosphorus and calcium work together to make bones and teeth hard.
- Phosphorous and calcium must be kept in balance with each other.

Most dialysis patients need to take a phosphate binder and limit the amount of phosphorous they eat. This prevents the phosphorous from getting too high.

High and low phosphorous levels can cause:

- Bone pain
- Bone weakness and breaking

Low phosphorous levels can cause:

- Tiredness
- Weakness
- Irregular heartbeat

If your blood phosphorous level gets too high, it acts like a magnet and pulls calcium from your bones. That makes your bones weak and more likely to break.

Sodium

This is a mineral found in salt and many foods. Increased sodium in your diet makes you thirsty. You will want to drink more fluids.

Too much fluid and sodium can cause:

- Swelling
- High blood pressure
- Shortness of breath
- Fluid buildup in your lungs
- Your heart to work harder

Sodium is added as a preservative in many processed and packaged foods. The dietitian will help you learn how to avoid foods high in sodium or salt.

Creatinine

Dialysis patients have higher creatinine levels that can vary from 10 to 20 mg/dL.

People who are very active or have more muscles have a higher creatinine level.

Creatinine is a waste product formed from muscle breakdown and normal muscle function. It:

- Measures kidney function
- Goes up as kidney function goes down
- Checks how well your dialysis treatments remove wastes from your blood

Blood Urea Nitrogen (BUN)

This is the amount of urea in the blood. Urea is a waste product made when the protein in food breaks down.

- BUN is used to measure how well your dialysis treatments clean your blood.
 - It compares the BUN levels before and after your treatment.
- Too much urea in the blood can make you feel sick. You may have:
 - Nausea
 - Vomiting
 - A bad taste in the mouth
 - Tiredness
 - Cannot sleep

Hemoglobin

The normal range of hemoglobin is different for men and women.

- The range is 14 to 16 grams/100 mL for women.
- The range is 15 to 18 grams/100 mL for men.
- The goal for dialysis patients is 10 to 10.9 grams/100 mL.

Hemoglobin (Hgb) is found in red blood cells. Low hemoglobin is called anemia.

- Hemoglobin carries oxygen to all parts of the body.
- If you do not have enough red blood cells you may:
 - Feel tired
 - Feel cold
 - Look pale
 - Lack energy
 - Be short of breath
 - Have chest pain

Dialysis patients generally have low hemoglobin values for several reasons:

- Healthy kidneys make a hormone called erythropoietin.
 - This tells the body to make red blood cells.
 - People with kidney disease do not make as many red blood cells. This is because they do not make as much erythropoietin.
- Dialysis patients bleed more.
 - Medications that slow blood clotting during dialysis may cause bleeding during or after dialysis.
- The buildup of waste products in the blood harms the red blood cells and they do not live as long.
- Some red blood cells break during every dialysis treatment because of the mechanical operation of the dialysis machine.

Most dialysis patients get an artificial form of erythropoietin to help their bone marrow make more red blood cells.

- Hemoglobin levels determine the dose of erythropoietin needed.
- It is important that the hemoglobin levels do not get too high.
 - There is a high risk of a heart attack or stroke in dialysis patients who have a normal or high hemoglobin.

Iron Studies

Iron Studies are several blood tests to check iron levels in the body. Iron is:

- A mineral found in food and vitamins
- Needed to make red blood cells
- Needed for erythropoietin therapy to work

If your iron studies are low, you do not have enough iron to make more red blood cells.

- You may need to take iron pills or get an iron infusion during dialysis.

Serum Iron

This test measures the amount of iron in the blood.

Ferritin

Ferritin is needed to make red blood cells. It is a protein that stores iron in the liver.

This test tells how much iron is stored in your body.

Transferrin saturation (TSAT)

This test measures a protein called transferrin. It shows how much iron is available to make red blood cells.

Total Iron Binding Capacity (TIBC)

This measures the total amount of transferrin that can hold more iron.

Dialysis Adequacy

Each month blood tests are done to see if you are getting enough dialysis. This test is called “Adequacy.” The test confirms that your blood is cleaned well. This test will let your doctor know if:

- You are getting enough dialysis
- The machine settings need to change
- You need more or less time on the machine

Social Services

Social Workers

They are members of the health care team.

- They work closely with the rest of the team to improve your care and make sure it fits you and your needs.
- Social workers provide counseling and support to help you:
 - Cope with stresses
 - Handle concerns
 - Solve problems related to kidney failure and chronic disease

Chronic Kidney Disease (CKD) can cause major changes in your life. These changes may affect your daily routines. This can affect your:

- Emotions
- Friends and family
- Fun activities
- Financial status

Talks with the social worker are private. The social worker may share information with other members of the health care team if you agree.

You can reach the social worker by calling the dialysis department. You can also ask to talk to the social worker when you come for your dialysis treatment.

You may want to talk to a social worker about:

- Anxiety or depression
- Family-related stress
- Changes in housing
- Transportation to and from dialysis
- Financial or insurance questions (Medicare, Medicaid, or county social service)
- Information on employment or education programs
- Dialysis at another facility when away from home
- Home assistance
- Community resources such as home health and meals-on-wheels.
- End-of -life issues such as information about or help with Advance Care Planning which includes a Power of Attorney for Health Care or an Advanced Directive.

The social worker is a good person when you just need someone to talk to.

Infection Prevention

Preventing the spread of infection is one of the most important things that we can do to help keep our patients and staff healthy. We need you to partner with us to make it work.

Heart disease and infections are the leading causes of death in dialysis patients. Many infections are related to the type of access used for dialysis treatments. This is why you see the dialysis staff using caution and care when working with your access.

Those providing your care will follow safe infection prevention practices. It is your right and responsibility to speak up if you have questions or concerns about your care.

You can keep yourself healthy by taking an active role in your care. That will keep you out of the hospital and feeling better.

Hand Washing – A Healthy Habit

Washing your hands is the single most important way to help fight the spread of infections. Hands pick up germs when we touch other people or surfaces like door handles, faucets and animals. Washing hands with soap and water removes viruses and bacteria that we cannot see with the naked eye.

When should I wash my hands?

Wash your hands as often as you can, especially:

- After using the bathroom
- Before touching or preparing food
- After petting or touching animals
- After sneezing or coughing
- When your hands are visibly dirty

How should I wash my hands?

Washing your hands the right way will take away 99% of the germs. Follow these steps:

1. First, wet your hands with clean, warm water.
2. Apply soap.
3. Rub your hands together for at least 20 seconds. (Be sure to rub all over your hands. Do not forget between your fingers, the back of your hands, your thumbs and under your fingernails.)
4. Rinse the soap off your hands with clean, warm water.
5. Use a clean cloth or paper towel to dry your hands.
6. If your hands are dry, use a lotion on your clean hands.

What about the gels or foams?

Alcohol-based hand gel or foam is a good choice if soap and water are not available.

- Alcohol-based hand cleaners are available at most stores.
- Be sure to use enough and rub all over your hands until they are dry.
- You should use soap and water if you can see that your hands are dirty.

Cover your cough

Many things like the common cold and flu spread through droplets in the air. Other more serious diseases like SARS and tuberculosis are spread the same way.

- Cover your nose and mouth with a tissue when you sneeze or cough.
- Covering your cough reduces the germs that go out into the air.
- Be sure to throw the tissue away in the wastebasket.
- Wash your hands or use an alcohol-based hand cleaner.

Infection Prevention in the Dialysis Department

Standard Precautions

Dialysis staff members use caution to stop the spread of infections.

- Staff members wear gloves, masks, face shields and gowns when they are putting patients on and off the dialysis machines.
- Staff members clean their hands every time they enter and leave the dialysis station.
 - You can remind dialysis staff to clean their hands if you do not see them do that.
- The equipment in the station is cleaned with a special solution to prevent the spread of disease.
- All the chairs, bedside tables and machines are cleaned between patients.

Patient Isolation

Some medical conditions require patients to dialyze away from other patients to prevent the spread of disease. Patients may dialyze in an isolation room or an area away from other patients.

- Diseases that need isolation include:
 - Hepatitis B
 - Delta Hepatitis
 - Tuberculosis
 - C. Difficile
- Not every patient who dialyzes in an isolation room has a serious condition.
 - Some dialysis departments need to use the space for regular dialysis patients.

What else can I do to stop infections?

- Clean your hands often with soap and water or alcohol-based cleaners.
- Take a bath or shower every day.
- Learn the signs and symptoms of infection. Tell your doctor or dialysis nurse if you have:
 - Fever
 - Chills
 - Pain
 - Redness
 - Swelling
 - Drainage from a surgical wound or catheter site
- Keep your dialysis dressings clean and dry. If they become loose, know how to care for your site.
- Know when to call your doctor or dialysis center.

Catheters

- Dialysis catheters have high infection rates.
- Most dialysis patients with catheters get 1 or 2 infections every year.
- About 1 out of 3 dialysis patients with catheters die from infections.
To help prevent infection of your catheter:
 - Keep the dressing clean and dry.
 - Report any discomfort, redness, or drainage.
 - Do not take the caps off.

Fistula and Grafts

- Wash your fistula or graft site with soap and water before you go to your dialysis chair.
- Wear gloves if you hold your sites after needles are taken out.
 - Wash your hands when you take your gloves off.

Peritoneal Dialysis Catheter

- After it is healed, clean your peritoneal dialysis catheter every day in the shower.

You are a part of the team. Do **not** be afraid to remind doctors and nurses to wash their hands or use an alcohol-based hand cleaner.

Keep your immunizations up to date, including Hepatitis B and Pneumovax.

Remember to have a flu shot **every** year.

Tobacco Use

While everyone seems to know that smoking and tobacco use is dangerous to your health, few seem to know what to do about it.

- Studies show that most tobacco users really do want to quit.
- Most people do not know **how** to quit.

This section talks about:

- Tobacco and how it affects:
 - Kidney disease
 - Diabetes
 - High blood pressure
 - Kidney transplants
- How to quit smoking

Tobacco and Kidney Disease

Heart disease is the leading cause of death in kidney patients. Tobacco use can cause heart disease. Kidney failure and dialysis can also increase heart disease. The combination can be deadly.

Stopping the use of tobacco is one of the most important things you can do for your health.

- Smoking hurts your kidneys and other organs in the body.
- Smoking speeds up kidney disease.

All tobacco products have nicotine. Nicotine is very addictive. It is said to be more addictive than cocaine or heroin. This makes quitting smoking one of the most difficult things to do.

What does nicotine from tobacco do to the body? It:

- Increases blood pressure and heart rate
- Decreases blood flow to the kidneys
- Damages the tiny blood vessels in the kidney
- Speeds up the loss of kidney function

Smoking and diabetes

- Diabetes is the leading cause of kidney disease.
- People who smoke and have diabetes have a very high risk for kidney disease.
- Both smoking and diabetes decrease blood flow to the kidneys. This means the blood does not get cleaned as well.

Smoking and high blood pressure

High blood pressure is the second leading cause of kidney disease. If you have high blood pressure, smoking will cause your blood pressure to increase.

- High blood pressure damages the tiny blood vessels in the kidney.
- Smoking interferes with high blood pressure medications.
 - Your blood pressure medicines may not work as well.
- Smoking increases the risk of heart attack and strokes in people with high blood pressure.
 - The heart has to work harder to move blood through the body which can lead to heart failure.

Smoking and kidney transplant

Patients who smoke after a kidney transplant have a higher risk of organ failure and heart problems.

- Some transplant centers will not accept patients who smoke.

Benefits of not smoking

Even if you have smoked for years, you can improve your health if you stop smoking.

- When you stop using tobacco, it helps your:
 - Heart
 - Lungs
 - Blood vessels
 - Kidneys
- When you stop smoking it lowers your risk of:
 - Heart attack
 - Stroke
 - Cancer
 - Lung diseases

It is not easy

Many people have to try several times before they are able to stay tobacco free.

Why is it so hard to quit?

- Nicotine creates a pleasure and reward system in the brain. Human beings really like this! That is part of addiction.
- Tobacco products have other chemicals commonly called tar.
 - Tar is very dangerous to our bodies, too.
- The combination of tar and nicotine makes smoking dangerous.

How to stop using tobacco

There are medications and products out there to help. A word of caution: Some of these **cannot** be used with kidney disease. Talk to your doctor before you use any product to help you stop smoking.

Think about using nicotine replacements. They are available over-the-counter at many stores.

- They do not have tar so they do not harm you like cigarettes.
- You slowly stop using nicotine so you do not go through nicotine withdrawal and feel miserable.

Check with your doctor about what may work for you. Your health insurance may pay for some products to help you stop smoking.

Attempts to quit tobacco do not always work on the first try. Motivation (desire) helps a lot. Try again if you are not successful.

Who can help

Support is available through toll-free phone numbers and online websites all along your journey. For more information, contact the smoking quit line for your state. They:

- Help you create your own plan to quit smoking
- Offer phone-based or web-based support
- Do not judge or preach
- Have many other resources to provide medications to help you quit

For more information

Smokefree.gov/talk-to-an-expert

(800) QUITNOW / (800) 784-8669

State Quitlines:

Iowa: www.quitline.iowa.org/ (800) QUIT NOW / (800) 784-8669

Minnesota: www.quitplan.com/ (888) 354-PLAN / (800) 354-7526

Nebraska: www.quitnow.ne.gov (800) QUIT NOW / (800) 784-8669

North Dakota: www.ndhealth.gov/ndquits (800) QUIT NOW / (800) 784-8669

South Dakota: www.sdquitline.com (866) SD-QUITS / (866) 737-8487

National Cancer Institute Smoking Quitline: (877) 44U-QUIT / (877) 448-7848

Sanford Dialysis Locations

Bismarck, ND

209 N. 7th Street
Bismarck, ND 58501
Hemodialysis and Home Dialysis (701) 323-2800

Fort Yates, ND

10 N. River Road, Box J
Fort Yates, ND 58538
Hemodialysis (701) 854-7553

Jamestown, ND

300 Second Avenue NE
Jamestown, ND 58401
Hemodialysis and Home Dialysis (701) 952-4872

Sioux Falls, SD

1305 W 18th Street
Sioux Falls, SD 57117
Hemodialysis (605) 333-6350
Home dialysis (605) 333-7443

Madison, SD

323 10th Street SW
Madison, SD 57042
Hemodialysis (605) 256-8870

Chamberlain, SD

300 S Byron Blvd
Chamberlain, SD 57325
Hemodialysis (605) 734-7273

Hospers, IA

112 Sunrise Drive
Hospers, IA 51238
Hemodialysis (712) 752-8330

Worthington, MN

1018 6th Avenue
Worthington, MN 56187
Hemodialysis (507) 372-3279

Canby, MN

112 St Olaf Avenue S

Canby, MN 56220

Hemodialysis (507) 223-7277 ext. 162

Fargo, ND

2801 University Drive S.

Fargo, North Dakota 58103

Hemodialysis (701) 234-8400

Home dialysis (701) 234-8410, Toll Free (888) 749-3447

Bemidji, MN

1300 Anne Street NW

Bemidji, MN 56601

Hemodialysis (218) 333-5460

Home dialysis office (218) 333-6370

Detroit Lakes, MN

113 East Frazee Street

Detroit Lakes, MN 56501

Hemodialysis (218) 847-0825

Home dialysis office (218) 846-7085

Morris, MN

Stevens Community Medical Center

400 E. 1st Street

Morris, MN 56278

(320) 589-2832

Red Lake, MN

Indian Health Services Hospital

23990 State Highway 1 East

Red Lake, MN 56671

(218) 679-3117

Located in Indian Health Services (IHS) Hospital in Red Lake, MN

Only Native American patients per IHS regulations

Thief River Falls, MN

120 Labree Avenue S.

Thief River Falls, MN 56701

Hemodialysis (218) 683-4246

Home dialysis (218) 683-4248

Helpful Websites

There are many websites with dialysis information. Here are some websites that may be helpful to you. This list is provided for your own use.

Other resources do not replace medical care. Be sure to ask your care team members any questions.

Sanford Health

www.sanfordhealth.org

Click on the “Health Information” tab at the top of the page. Click on “Conditions and Treatments”. You can search for many topics using the search box. Or just click on the letter D (for dialysis) or the letter K (for kidney). Scroll down to the topics you want.

My Sanford Chart

www.sanfordhealth.org

Kidney School

www.kidneyschool.org/

Kidney School is a great website for patients, families, and professionals. There are short learning modules that can be read online or downloaded and printed. The modules are available in an audio format, too. The site is easy to use and the information is easy to understand. Some information is available in Spanish.

National Kidney Foundation (NKF)

www.kidney.org/

The NKF is a national organization. They work to prevent kidney disease and improve the health of people with kidney disease. There are many patient education resources available and easy to find. Start at the Kidney Disease or Patients tab at the top of the page. Look at the Kidney Kitchen tab to find good recipes. NKF has a lot of professional information including regulations and standards. Some information is available in Spanish.

Life Options

www.lifeoptions.org/

Life Options is a program that helps people live a long time with kidney disease. There are many patient education resources available. Free material includes audio and video presentations. Many things can be downloaded and printed. It has a glossary that is easy to understand.

Fistula First

<http://www.fistulafirst.org/ffcl/>

Fistula First works to increase the use of fistulas and improve the care of dialysis patients. There is a lot of free patient information that is easy to download and print. There are also links to other resources and professional information.

National Kidney Disease Education Program

www.nkdep.nih.gov

This site is part of the United States Department of Health and Human Services. It has many education resources and information on living with kidney disease. Free brochures can be ordered or downloaded. Information is also available in Spanish.

Dialysis Facility Compare

<http://www.medicare.gov/Dialysis/Include/DataSection/Questions/SearchCriteria.asp?version=default&browser=IE%7C7%7CWinXP&language=English&defaultstatus=0&pagelist=Home>

This site lets you compare dialysis centers. It is based on quality indicators reported to Medicare. It tells what services each unit offers. There is also patient information on kidney disease.

Dialysis Finder

www.dialysisfinder.com

Use this website to find dialysis centers anywhere in the United States. This site would be useful if you are planning to travel.

Kidney Community Emergency Response Coalition (KCER)

<http://www.kcercoalition.com/>

This site is dedicated to emergency planning. It has resources on how to prepare for and respond to an emergency. Information is easy to read and download. This is a good site for everyone to look at. It includes phone numbers for national kidney agencies.

Renal Network 11

<http://www.esrdnet11.org/>

Renal Network 11 is one of 18 federal networks that monitor dialysis quality and transplants. It has many facts for dialysis centers within the network. Renal Network 11 will also help with patient complaints and concerns.

Renal Network 12 Heartland Kidney Network

<http://heartlandkidney.org/>

Heartland Kidney Network is a non-profit corporation under contract with the Centers for Medicare and Medicaid Services (CMS) to oversee the End Stage Renal Disease Program in Kansas, Missouri, Nebraska, and Iowa. There are 17 other Networks with the same purpose across the United States.

Words to Know

Access – see vascular access.

Acute Kidney Injury (AKI) or Acute Renal Failure (ARF) – both terms mean a sudden loss of kidney function. This may be caused by an injury, surgery, medication or other reasons. Sometimes kidney function will come back after treatment. Sometimes it does not.

Anemia – a condition where the body does not have enough red blood cells to carry oxygen. Sometimes it is called “low blood.” Patients with kidney disease often have anemia because they do not make erythropoietin.

Aneurysm – a weakened area in a blood vessel that stretches.

Antibiotics – medications that kill bacteria and fight infection.

Anticoagulant – medications that prevent the blood from clotting in the dialyzer. They are sometimes called blood thinners.

Arterio-Venous Graft (AVG) – see graft.

Arterio-Venous Fistula (AVF) – see fistula.

Artery / Arteries – a blood vessel that carries blood from the heart to the body.

Artificial Kidney – see dialyzer.

Binders – see phosphate binders.

Blood Flow Rate (BFR) – how fast the blood goes through the dialyzer per minute.

Blood Pump – part of the dialysis machine that moves the blood through the dialyzer and back to you.

Blood Urea Nitrogen (BUN) – a blood test that tells how much urea is in the blood. This measures how well the kidney is working. See urea.

Bruit – a swish sound heard when listening with a stethoscope over a fistula or graft.

Calcification – calcium deposited in the skin and blood vessels due to too much phosphorus in the blood stream.

Calciophylaxis – Painful open skin wounds caused by high phosphorous levels in the blood.

Calcium – a mineral found in many foods. People with kidney disease cannot absorb calcium from the food they eat. As a result, the body may take calcium from the bones making them weak.

Catheter – a small tube outside the skin used for short-term vascular access. It is usually placed in the neck or chest.

Chronic Kidney Disease (CKD) – This is a slow, progressive, permanent loss of kidney function over months or years. It is also called chronic renal failure.

Creatinine – a waste product the body makes from muscle breakdown. It is used to tell how well the kidneys are working.

Diabetes Mellitus – a disease that causes high blood sugar levels. High blood sugar levels damage the tiny blood vessels in the kidney.

Dialysate – a special solution used in the dialysis machine to take out the wastes and extra fluid in the blood. It is sometimes called the bath.

Dialysis – a process to take wastes or fluids out of the blood through a filter. See also hemodialysis and peritoneal dialysis.

Dialyzer – a special filter used to take wastes and extra fluids from the blood. This is also called an artificial kidney.

Dietitian – a member of the dialysis team who is an expert in nutrition.

Dry weight or Ideal dry weight – body weight without extra fluid.

Edema – swelling of the body caused by too much fluid.

Erythropoietin – a hormone healthy kidneys make that tells the body to make red blood cells. Not enough red blood cells causes anemia.

End Stage Renal Disease (ESRD) – damage to the kidneys that does not go away.

Exit Site – the place where a catheter leaves the body.

Fistula – a type of vascular access made by surgically joining an artery to a vein. This is also called Arterio-Venous Fistula (AVF).

Fluid Overload – too much fluid in the body. It causes shortness of breath, swelling and high blood pressure.

Glomerular Filtration Rate (GFR) – a test that measures kidney function.

Graft – A type of vascular access made by surgically joining an artery and vein with a special tube. This is also called Arterio-Venous Graft (AVG).

Healthcare Directive – a legal, written document. It may include a Living Will and/or Power of Attorney for Healthcare. A Living Will tells a patient’s doctor and family their wishes for healthcare if the patient is not able to do so. A Power of Attorney for Healthcare names a person to make healthcare decisions if the patient is not able to do so. A copy is kept with the patient’s medical records. It can be changed at any time. It may also be called an Advance Directive. Advance Care Planning is encouraged. This is deciding and making your plans known.

Hemodialysis – the use of a machine and dialyzer to take wastes and extra fluid out of the blood.

Hemoglobin – part of the red blood cell that carries oxygen in the body.

Heparin – a medication used during hemodialysis to prevent blood from clotting. See anticoagulant.

Hepatitis – a liver infection spread by a virus in the blood.

Home Hemodialysis – the patient and a helper do hemodialysis treatments in their home 5 to 6 times a week.

Hypertension – high blood pressure.

Hypotension – low blood pressure.

Immunosuppressant – a medication used after a kidney transplant to prevent the body from rejecting the new kidney.

Insulin – a medication used to treat diabetes and lower blood sugar.

Kidney – a bean shaped organ that takes wastes and extra fluid out of the body.

Kidney transplant – surgical placement of a donor kidney into a person with kidney disease.

Living Will – see Healthcare Directive.

Nephrology – the study of diseases of the kidney.

Nephrologist – a doctor who specializes in kidney disease.

Nurse Practitioner (NP) – a registered nurse with advanced education and clinical training who works with the dialysis team to provide your care.

Obstruction – a blockage.

Peritoneal Dialysis – a type of dialysis that uses the peritoneal membrane in the abdomen to remove wastes and extra fluid from the body.

Peritoneal Membrane – the inside lining of the abdomen.

Pharmacist – a member of the dialysis team who specializes in medications.

Phosphate Binders – a medication taken with food that helps the body get rid of the phosphorous in foods. They are also called binders.

Phosphorous – a mineral found in many foods. Too much phosphorous can make bones weak.

Physician Assistant (PA) – a member of the dialysis team with advanced medical training who works directly with the doctors to provide your care.

Potassium – a mineral found in many foods important for nerves and muscles. Too much potassium can make your heart stop.

Renal – related to the kidney.

Restless Leg Syndrome – a dull, achy, or jumpy feeling in the legs that can happen during dialysis or at rest.

Semi-permeable membrane – a special filter that lets only certain things through it. The dialyzer uses this to filter wastes and extra fluids out of the blood.

Social Worker – a member of the dialysis team who provides support related to treatment and lifestyle changes due to kidney disease. They also offer resources or referrals for community services.

Sodium – a mineral in many foods important for fluid balance in the body. Too much sodium makes the body hold on to fluid. This can increase blood pressure and make dialysis harder.

Target weight loss – the goal amount of fluid to remove during dialysis. It is found by subtracting dry weight from weight at the start of dialysis.

Thrill – a vibration felt when lightly pressing down over a fistula or graft.

Toxins – another term for waste products that build up in the body.

Transmembrane Pressure – the difference in pressure inside the dialyzer that causes the movement of wastes and extra fluids from the blood to the dialysate.

Transplant – movement from one location to another.

Urea – a waste product the body makes from muscle breakdown and digestion of food. It is measured by the BUN.

Vascular Access – a way to move blood from the body to the dialyzer and then return it to the body. There are 3 types: fistula, graft, and catheter. This is also called access.

Vein – a blood vessel that carries blood from the body to the heart.

Volume overload – see fluid overload.

