

In-Center Hemodialysis

Kidneys function by filtering toxins and liquids from your blood, which are then disposed through urine. If the kidneys fail, dialysis treatment or a kidney transplant must occur to replace kidney function. Dialysis is the process of filtering a patient's blood through an artificial kidney or dialyzer in order to remove waste and toxins. Hemodialysis (HD) is the most popular method of treatment for patients whose kidneys have failed. In-center hemodialysis occurs in a dialysis facility three times a week, with each treatment lasting around four hours.

Process

With in-center hemodialysis, a patient goes to a dialysis center where a staff of nurses and technicians administer the treatment. During this type of treatment, the blood is removed from the body through an access point (see the options below). The blood is then filtered through an artificial kidney, or dialyzer, and returned back to the body through the access point. The blood is filtered many times during treatment to remove wastes and maintain the body's chemical balance.

Generally, **in-center hemodialysis** occurs three days a week for between three to five hours per session. The treatment is done during the day.

As in-center hemodialysis occurs during the day, **nocturnal in-center hemodialysis** is administered during the night at a dialysis facility. The total process usually lasts for eight hours and is done three nights a week. For this particular treatment, the hemodialysis machine is set at a lower pump speed for better comfort levels for the patient. This type of treatment allows patients to have their days free.

Access Options

There are three types of access points available: a fistula, a graft or a catheter.

A **fistula** is created through a surgical process that attaches an artery and a vein, usually inside the forearm. After surgery, it normally takes six to eight weeks for the fistula to thicken and mature enough to be ready for dialysis. Fistulas are less likely to form blood clots or become infected and have been found to last longer than other access points.

A **graft** is an artificial tube used to attach a vein and an artery through surgery. Like the fistula, this access point also takes some time to mature enough for dialysis. A graft can be prone to blood clots due to the vessels narrowing over time.

When using a graft or fistula, two needles are inserted, one removes the blood and the other returns the cleaned blood. While the needle sticks can be painful, many patients have said that the sting lasts only for a moment and become accustomed to it. In addition, a technique called the buttonhole can be used with a fistula. With the buttonhole technique the exact same

puncture site is used for every hemodialysis treatment. By using the same puncture site, and holding the needle at the same angle, over time scar tissue develops making it easier and less painful to stick the access.

A **catheter** is a thin tube placed in a vein on the neck, chest or groin. Unlike a fistula or graft, a catheter allows for immediate dialysis care. Tubes from the dialyzer are attached to the catheter, one to take blood from the body and another to put the blood back in. Catheters are recommended to be used only for a short period of time or in emergency cases where dialysis needs to be administered right away. Catheters have a much greater chance of infection and it is highly recommended to only use this type of access in the short term.

Relevant Articles:

- [The history of hemodialysis sheds light on the ethical use of limited medical resources](#) [1]
- [Novel Hemodialysis Access System Demonstrates High Suitability For Dialysis In Clinical Trial](#) [2]

Kidney Citizen:

- [Hemodialysis Access for Patients](#) [3]

E-Newsletter Coverage:

- [Study shows CDC intervention tools decrease infection rates for hemodialysis patients](#) [4]

Hemodialysis (HD)

Hemodialysis is the most common treatment for people whose kidneys have failed in the United States. Kidney failure is also called end stage renal disease end-stage renal disease (ESRD), also known as kidney failure.

Hemodialysis uses a machine and a filter called a dialyzer that acts as an artificial kidney to remove waste products or toxins and water from the blood.

Most people on hemodialysis go to a dialysis center for treatment, but home hemodialysis (HHD) is becoming more popular.

- Nocturnal hemodialysis (NHD) is a therapy that is done at night while you sleep.
- Short daily hemodialysis (SDHD) is done more often and almost every day, but for less time. Nocturnal hemodialysis and short daily hemodialysis are becoming more popular but may not be available everywhere.

Talk to your doctor about what type will work best for you.

-HD summary:

	How often	How long	Equipment	Location
Conventional (CHD)	3 times per week	3-4 hours?	Large machine built for in-center use	Dialysis center or at home
Short Daily (SDHD)	5-6 times per week	2 ½ - 3 hours?	Small machine built for home use	Home
Nocturnal (NHD)	3-6 times per week	7-8 hours?	Both types of machines	Dialysis center or at home while sleeping

?On average; treatment times will vary based on each patient?s situation.

HD ACCESS

In order for the blood to be cleaned, there must be a way to get it from the body to the machine. There are three ways that the blood can be ?accessed?: Arteriovenous (AV) fistula, AV graft, and catheter. The fistula is often considered the gold standard because it has fewer problems and usually lasts much longer than the other options. Care must be taken to prevent infection with any type of dialysis access.

The access is connected to the HD machine using two needles. A small amount of the patient?s blood at a time flows through one needle to the hemodialysis machine through special tubing. In the machine the blood goes through the dialyzer (filter) where waste products and extra fluids are removed. The blood then goes back into the body through the second needle, and the cycle continues for the length of the treatment.

AV fistula is made during outpatient surgery by connecting an artery to a vein to increase blood flow. This causes the vein to get larger and stronger, so that the dialysis needles can be used for every treatment. The fistula is usually placed in the lower arm, but can also be in the upper arm or thigh. Fistulas are the ?gold standard? of hemodialysis access because they have much less chance of clotting and infection, and they typically last longer than other types

of access. A fistula needs to "mature" for 2-3 months before it can be used for dialysis.

AV graft, a synthetic or artificial tube is used to connect an artery and vein under the skin. Grafts are normally used when veins are too small or fragile to make into fistula. Problems can include clotting and infection, and the graft may need to be replaced if the problems cannot be fixed. A graft can be used for treatment 2-3 weeks after placement.

A catheter is a tube normally inserted through the skin near the collar bone and connected to the large vein from the heart. A catheter is sometimes needed when dialysis first starts, while a fistula is maturing, or if there are no other access options. **These are normally for short term or temporary access only** because of problems such as infection, clotting and poor dialysis treatments. A catheter can be used right away.

To learn more about hemodialysis access, go to the National Kidney and Urologic Diseases Information Clearing House at <http://kidney.niddk.nih.gov/kudiseases/pubs/vascularaccess/> [5] or Fistula First at <http://www.fistulafirst.org/> [6].

Home Hemodialysis 101

History and Overview of HHD

History

In the 1960's during the early days of home hemodialysis, most treatments were done in the home, primarily because of the lack of hospital or clinic-based facilities. By 1973, 40% of dialysis patients were doing their treatments at home.

Decline of Home Hemodialysis

The percentage of home hemodialysis patients began to drop after 1973. Today the situation has almost reversed and most people on dialysis (90%) get their treatments at a dialysis center.

The drop in home hemodialysis was caused by the following:

- In 1972, Congress passed legislation that created a Medicare program to pay for dialysis treatment. This program made in-center hemodialysis financially more attractive to providers so dialysis centers started being built. These new centers were staffed by nurses and technicians. Centers could pay for these costs by treating more patients.
- As more people got dialysis they were able to live longer. Since they lived longer they began to develop other chronic conditions and complications.
- Throughout the 1970's and 80's, peritoneal dialysis (PD) began to become more popular, which led to less people choosing home hemodialysis.

- Until recently, all hemodialysis machines were built for use in the dialysis center. They were large, considered hard to use, and believed to be too expensive to be used at home.
- As the number of people getting treatment in centers grew, the number of centers that could offer home hemodialysis began to shrink.

New Interest in Home Hemodialysis

Home Hemodialysis is growing more popular among patients and doctors for the following reasons:

Doctors now recognize that home hemodialysis can give patients more benefits:

- Treat more patients more cost-effectively
- Reach more patients from rural regions
- Add a valuable new service to an existing in-center program
- Bring many of their patients improved quality of life

Patients understand that hemodialysis might help them:

- Feel better, maintain their lifestyle and help them have control over their disease
- Keep working and be more active
- Have freedom and flexibility to travel with their therapy with newer, portable machines

New data has shown that more frequent home hemodialysis may lead to better health with fewer problems, and because of new technology the number of people choosing home therapy has grown significantly.

To find if home hemodialysis is right for you, talk to your health care team about home hemodialysis. To find a home hemodialysis provider in your area go to www.homedialysis.org/locate [7] or www.nxstage.com/find-a-center [8].

Benefits of HHD

Is More Frequent Hemodialysis Better?

Since the early days of dialysis, doctors quickly learned that 1-2 treatments per week did not clean the blood well enough. Many patients seemed to do well with a treatment schedule of three times per week so that was set as the established regimen. However, we have known since the 1980's that the mortality ,rate of death, for dialysis patients is high. Recent studies have suggested that more frequent and longer treatments may offer significant benefits to health and well being.

In order to provide treatments more often or for longer time periods, patients have to be cared for in a different way. A "one-size fits all" treatment system does not work for many people and may cause complications such as heart disease.

Worldwide, very few dialysis patients receive treatments five or more times per week even though reports show that patients receiving more frequent dialysis experience fewer deaths and improved health. Dialysis center schedules are set to do treatments three times per week so it is generally much easier to schedule more frequent treatments at home.

Benefits that may be experienced include:

- A significantly lower risk of death.
- Reduced stress on the heart caused by fluid buildup.
- Significant, lasting improvement in symptoms of depression.
- An 85% improvement in the time it takes to ?recover? after each treatment, from nearly nine hours to about one hour, on average.
- Fewer problems with high blood pressure, putting less strain on the body and heart. Many patients and doctors report being able to cut down or eliminate the amount of medicines needed.
- Improvement in health-related quality of life scores, including physical and mental functioning.
- Improved appetite with fewer fluid and dietary limits.
- Increase in energy and vitality so that patients can go back to work and take care of their families.

Quality of Life Benefits of More Frequent Home Hemodialysis:

- Due to the shorter post-treatment recovery time patients may gain a day or more of quality time per week.
- More control, freedom and flexibility with treatment scheduling. This means patients can fit dialysis into their lives, rather than fitting their life around treatment.
- Ability to travel without having to schedule in-center treatments along your route, with newer, portable machines.

Is Daily Home Hemodialysis Right for you?

Daily Home Hemodialysis (HHD)

Daily home hemodialysis (HHD) is not for everyone. It requires both a patient and partner who are committed to being trained on and following the guidelines for proper system operation.

If you choose to do daily home hemodialysis you must carefully follow your dialysis prescription, which may call for daily treatments up to six times per week. Each treatment can take about 2.5-3 hours or more including set up and tear down.

To be successful with home hemodialysis you must make sure you have a clean and safe place to do your treatments. You will also need to have space set aside in your home to store your supplies.

You and your partner will be responsible for tasks that would normally be taken care of by the

in-center dialysis staff. You will perform all of the dialysis treatment tasks from start to finish, including setting up the machine and tubing, inserting the needles, responding to and solving all system alarms, and doing all of the clean up at the end of treatment. You will learn how to take your blood pressure, follow infection control procedures and how to follow the step by step instructions given to you by your training nurses. You and your partner will also be trained to respond to any health emergencies that might happen during treatment at home, including dizziness, nausea, hypotension (low blood pressure), and fluid or blood leaks.

Thousands of patients are performing daily HHD and enjoy the improved health, quality of life and freedom it provides.

Terminology and Glossary

HHD Glossary

A

Access: In dialysis, the natural or artificial blood vessel used to get blood in and out of the dialysis filter.

Adverse reaction: An unexpected and undesirable reaction to a drug or treatment that may be serious or life threatening.

Anticoagulation (ant- eye-KO-AG-you-lay-shun): The process of administering a substance, such as heparin, to prevent the blood from clotting.

Artery (AR-ter-ee): Blood vessels that carry blood away from the heart.

Arteriovenous (ar-TEER-ee-oh-VEE-nus) fistula (FIST-yoo-lah): Also called an AV fistula. Surgical connection of an artery directly to a vein, usually in the forearm, created in patients who will need hemodialysis.

Arteriogram: An X-ray of the arteries taken with the use of contrast dye; sometimes called angiography.

Artificial kidney: Another name for a dialysis filter or dialyzer.

Aseptic Technique (A-cept-ik Tek-neek): Practices that reduce the risk of infections.

B

Bacteria: Single cell organisms or "germs" that can cause infection or disease.

Bloodborne Pathogens: Organisms or "germs" that can live in the blood and can be spread to other people.

Blood Flow Rate (BFR): The volume of blood per minute flowing from and returning to the patient through the blood tubing and filter. Blood flow rate is measured in ml/min.

Bloodline: The tubing set that carried the blood from the patient to the HD machine and back to the patient.

Blood pressure: The force of blood exerted on the inside walls of blood vessels, expressed as a ratio (example: 120/80, read as "120 over 80").

Bolus: Giving a specific amount of IV fluid during dialysis. This is usually used to treat low blood pressure.

C

Catheter: A soft tube that is inserted into a large vein in the neck, chest, or leg to provide vascular access.

Chronic kidney disease (CKD): Damage of the kidneys from a variety of causes.

Convection: A process in which waste products are carried across a membrane or filter by the movement of fluid. This works kind of like a coffee maker.

D

Dehydration (dee-hy-DRAY-shun): The loss of too much body fluid through excessive urinating, sweating, diarrhea or vomiting.

Dialysis (dy-AL-ih-sis): The process of removing wastes and excess fluid from the blood artificially.

Dialysate: A special fluid mixture used to clean the blood during dialysis.

Dialyzer (DY-uh-LY-zur): The filter used in a dialysis system to remove wastes and fluid.

Diastolic (DY-uh-STAH-lik) blood pressure: The "bottom" number in a blood pressure reading (120/80), the blood pressure when the heart rests.

Diffusion (De-few-SHUN): Movement of waste products across a membrane or filter from a high concentration (the blood) to a low concentration (dialysate). This works kind of like making tea with a tea bag.

Disinfection (Des-in-Fek-shun): The process of cleaning to prevent the growth of bacteria that could lead to infection.

Dry Weight: The "ideal" weight for a person, at which blood pressure is normal and there is no swelling from extra fluid.

Dwell time: The amount of time dialysis solution remains in the patient's abdominal cavity during a peritoneal dialysis exchange.

E

Edema (eh-DEE-muh): Swelling caused by excess fluid and salt in the body.

Effluent: The filtered fluid containing waste products and excess fluid removed from the patient's blood.

Electrolytes (ee-LEK-troh-lites): Chemicals in body fluids including sodium, potassium, magnesium, and chloride.

End-stage renal (REE-nul) disease (ESRD): Total and permanent kidney failure.

Erythropoietin (eh-RITH-roh-POY-uh-tin): A hormone made by the kidneys that stimulates the body to make red blood cells.

F

Filter: See dialyzer.

Fistula (FIST-yoo-LAH): A connection created by surgery between an artery and vein to make a bigger blood vessel for dialysis access. The "gold standard" because it is easy to use, has low infection rates, and lasts a long time.

Fluid overload: A condition in which the body contains too much water and salt.

G

Graft: In hemodialysis, a vascular access surgically created using a synthetic tube to connect an artery to a vein.

H

Hemodialysis (HEE-moh-dy-AL-ih-sis): The process of using of a machine to remove wastes and fluid from the blood after the kidneys have failed.

Hypertension (HY-per-TEN-shun): High blood pressure.

Hypertensive (HY-per-TEN-siv): Having high blood pressure.

Hypotension (hy-poh-TEN-shun): Low blood pressure.

K

Kidney: One of two bean-shaped organs that filter wastes from the blood located near the middle of the back.

Kidney failure: Loss of kidney function.

M

Membrane: A thin sheet or layer of tissue that lines a cavity or separates two parts of the body, and that can act as a filter.

Modality (Mo-DAL-uh-tea): A type of treatment.

N

Nocturnal (Knock-turn-el): Happening at night, in dialysis this is treatment that is done at night while sleeping.

O

Oxalate: A chemical that combines with calcium in urine to form the most common type of kidney stone (calcium oxalate stone).

Over-The-Counter: Medications which can be sold and obtained legally without a doctor's prescription.

P

Phosphate: A substance in many types of foods.

Phosphate binders: Medication that helps prevent a build-up of phosphate in the blood.

Prescription (PRE-skip-shun): A doctor's written orders; can be for medicines or treatments like dialysis.

R

Renal (REE-nul): Having to do with the kidneys.

Rinse back: Using sterile fluid to rinse the bloodline and dialyzer of all the blood after dialysis.

S

Semipermeable Membrane (Semi-purr-Me-abul Mem-brain): A natural or artificial membrane that aids in the separation of substances and fluids and allows only certain types of substances to move across it.

Stenosis: A narrowing of a blood vessel or other organ.

Systolic (sis-TAH-lik) blood pressure: The first number of a blood pressure (120/80) or the pressure when the heart pushes blood out into the arteries.

Support group: An organized network of people with something in common who give and receive help, advice, friendship and emotional support.

T

Toxin: Something that is poisonous.

U

Ultrafiltration (Ull-trah-fill-TRAY-shun): Removes fluid from the blood, if not replaced removes excess patient weight.

Ultrafiltration Rate (Ull-trah-fill-TRAY-shun): The amount of fluid, measured in liters or milliliters per hour, removed from the patient across the filter to reach dry weight goal.

Universal Precautions (You-ne-VERSE-al PRE-kaw-shuns): A way of preventing infection by treating all blood and body fluids as if they contained infection. See aseptic technique.

V

Vaccine: A serum containing weakened or killed germs that protect against infections.

Vascular (VASS-kyoo-lur) access: A natural or artificial blood vessel used to move blood into and out of a dialysis filter.

Vein (VANE): A blood vessel that carries blood toward the heart.

Resources

Resources

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Choose Another Class

Congratulations, you've reached the end of the Home Hemodialysis class!

Things to Think About

There are pros and cons with each dialysis option. Each person is different and they need to work with their family and healthcare team to decide which will work best for them. For many, dialysis at home is more flexible than at a center, but there are also more responsibilities.

This chart compares each of the choices:

	In Center	Home	
	Conventional or Nocturnal	Conventional, Short Daily, or Nocturnal*	CAPD/CCPD (peritoneal dialysis)
Portable	No	Depends on machine	Yes
Travel possible	With advance planning	With portable machine	Yes
Needles used	Yes	Yes	No
Training time	None	4-6 weeks (depending on system)	1-2 weeks
Amount of storage space	Not applicable	Depends on machine from 10 to 80 boxes	Monthly supply shipments of 30-60 boxes
Bathing or swimming allowed	Yes, per doctor	Yes, per doctor	No or limited
Changes to home wiring or plumbing	Not applicable	Depends on machine	No

*There are currently no systems specifically indicated for nocturnal hemodialysis.

Paying for Dialysis and Summary

Paying for Dialysis

Dialysis treatments are covered by private employer group health plans, Medicare, and Medicaid. There may be some out-of-pocket costs (co-payments, etc.) depending on the insurance. To learn more about dialysis treatment coverage and payments talk with a social worker or another member of your health care team

Summary

Even though there will need to be a few changes people can keep working, volunteering, and caring for their families. Learn as much as you can so you can choose the treatment that is best for you

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Links

- [1] <http://www.medicalnewstoday.com/releases/306466.php>
- [2] <http://www.prnewswire.com/news-releases/novel-hemodialysis-access-system-demonstrates-high-suitability-for-dialysis-in-clinical-trial-300210911.html>
- [3] <http://dpcedcenter.org/hemodialysis-access-patients>
- [4] <http://dpcedcenter.org/study-shows-cdc-intervention-tools-decrease-infection-rates-hemodialysis-patients#overlay-context=dpc-education-center-staff-member-transplant-story-featured-television-news-report>
- [5] <http://kidney.niddk.nih.gov/kudiseases/pubs/vascularaccess/>
- [6] <http://www.fistulafirst.org/>
- [7] <http://homedialysis.org/locate>
- [8] <http://www.nxstage.com/find-a-center>
- [9] <http://www.who.int/cancer/palliative/definition/en/>