

Peritoneal Dialysis

Kidneys function by filtering toxins and liquids from your blood, which are then disposed of through urine. If the kidneys fail, dialysis treatment can take their place. Dialysis is when a machine does the kidney's job of filtering the blood in order to keep the person alive.

Peritoneal dialysis is a type of home therapy treatment.

Peritoneal dialysis (PD) utilizes your peritoneum, a membrane lining your abdominal cavity, as a filter to remove wastes from your body. This type of dialysis requires a care partner to help with the process. There are two ways to perform peritoneal dialysis, Continuous-Cycler Assisted Peritoneal Dialysis (CCPD) and Continuous Ambulatory Peritoneal Dialysis (CAPD), which are outlined below.

- Continuous cycling peritoneal dialysis (CCPD) is a method of performing peritoneal dialysis exchanges using a machine called a cycler during your sleeping hours. Generally, three to five exchanges are done each night. There is an option to drain directly to your toilet or a drain or into drain bags that you would empty when you wake up in the morning. This program frees up your daytime hours. Each nightly session lasts at least eight to ten hours. Some programs leave you with a set amount of dialysate at the end of your treatment that will dwell during the day.
- Continuous ambulatory peritoneal dialysis (CAPD) is a method of performing peritoneal dialysis exchanges using gravity to drain and fill your peritoneal membrane with solutions four times each day, spaced evenly throughout the day. It usually takes about 30 minutes to complete an exchange. The exchanges can be done in a clean environment and you are free to be active during each dwell.

This class provides more information on PD. To navigate the class, use the left and right arrows at the bottom of the page or the blue boxes to the left to jump around the sections. At the end of the class you will have options to view other related classes.

Introduction to Peritoneal Dialysis

Many prospective patients think that their only option for end-stage renal disease (ESRD) is dialysis in a center at least three times a week for an average of four hours a session. This however is not true and there are several other types of options available including peritoneal dialysis (PD), home hemodialysis and transplants. For more information on home hemodialysis options visit our [classhere](#)^[1].

Peritoneal Dialysis (PD) is a treatment that utilizes your peritoneum, a membrane lining your abdominal cavity, as a filter to remove wastes from your body. Your peritoneum does a similar

job as the dialyzer on a dialysis machine during treatment or that your kidneys do every day. Waste products and fluid pass through the membrane into dialysate (dialysis fluid) and the fluid is drained with the waste products. Your peritoneum is what separates your blood from the dialysis fluid and allows the process to occur. Each time fluid is added to the abdomen and extra fluid and wastes are removed is called an exchange. PD has been used in the United States since the 1980's and improvements continue to be made to ensure it is a safe and effective treatment (1). There are potential benefits and negatives to the treatment and those will be covered in the rest of the class. Upon completing this class, you should be able to make a more informed treatment decision.

1. National Kidney & Urologic Diseases Information Clearinghouse (NKUDIC). (2010), *Treatment Methods for Kidney Failure: Peritoneal Dialysis*. Retrieved from <http://kidney.niddk.nih.gov/kudiseases/pubs/childkidneydiseases/overview> [2].

Helpful Terminology for this class

Abdomen ? the portion of your body between your chest and pelvis. Commonly referred to as the belly.

Catheter ? rubber tubing that will serve as the access (entry and exit point) for PD.

Continuous ambulatory peritoneal dialysis (CAPD) - is where the blood is always being cleaned. It doesn't require a machine and fluid is added and removed throughout the day.

Continuous cycling peritoneal dialysis (CCPD) - is a form of PD where a machine helps cycle the exchanges while you are sleeping.

Cycler ? a device or machine that automatically performs PD exchanges.

Dialysate ? the solution that helps your body remove excess waste during dialysis.

Diffusion ? the mechanism that allows your body's peritoneum to filter materials from higher to lower concentrations

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

Exchange ? the entire process of adding clean dialysate and removing old solution during PD.

Membrane ? a thin layer of tissue that covers a surface.

Nocturnal ? happening at night, in dialysis this is treatment that is done at night while sleeping.

Peritoneum ? the membrane that lines your abdominal cavity that acts as your filter during PD.

Peritonitis ? inflammation of the peritoneum caused by an infection and is a situation that requires medical attention.

Sterile techniques/practices ? washing your hands and other surfaces using prescribed methods to help eliminate potential sources for infections.

I know the terms what is next?

Now that you know the basics of PD, you can learn the details of what makes it work. To prepare for PD therapy, you need to undergo a small surgical procedure to have a catheter inserted into your abdomen. The catheter is a small rubber tube that is placed into the wall of your abdomen and secured using Dacron cuffs. Generally two cuffs are used in adults and they help secure your catheter and prevent some forms of infections.¹ The catheter is your entry and exit point for dialysate and for waste products.

Catheter placement:

The surgery itself can be done in several different ways.² It can be done percutaneous, through a laparoscopic surgery or an open surgical route. The laparoscopic and open surgery techniques are preferred because there are additional risks such as bowel injury with the percutaneous method.

Laparoscopic surgery ? is a minimally invasive technique when the operation is performed through a small incision. A laparoscope (type of small camera) is used to view the operation site and place the catheter.

Percutaneous surgery ? involves a guidewire being placed inside of tube. The guidewire is then used to place the catheter into the correct spot and a tunnel is made under the skin to the exit site. This is also a less invasive technique, but could have complications due to the nature of the surgery.

Open surgery ? is where a scalpel is used to cut a tiny incision through your skin and muscle of your abdomen. The ?open? area allows the surgeon to place the catheter and the wound is stitched around it. This is the largest incision, but most common surgery.

A similar surgery that takes place in the chest as compared to the abdomen is the use of a presternal catheter. During surgery the longer catheter is placed into the chest using two small incisions. The device has two rubber tubes connected by a metal connector. Since the chest skin is less likely to move and thinner than the abdomen, this could be a good option for children or heavier adults. Patients are also able to bathe with these as long as water levels aren't up to the catheter.³

As with any surgery there can be complications including infections and bleeding. Working with your healthcare team to properly care for your catheter can greatly reduce complications.

The most common types of issues involve catheter placement, infections and blockages.

After your catheter has healed, you will begin training. Training differs from office to office, but the basics remain the same. At training you will learn how to:

- Prepare to do an exchange
- Practice safe sterile practice
- Do the exchange itself
- Order supplies you need and how to store
- Follow your fluid and diet restrictions
- Do basic troubleshooting and when to call for additional help
- Use your cyclor (if you have one)

Once you have been trained and feel comfortable doing PD, you will be ready to do exchanges yourself. [Here \[3\]](#) is a great animation of the process.

For those of you that prefer text over a video, here are the steps of a CAPD exchange.

(Please note this is a generalization and shouldn't replace the steps given to you by your medical team).^{4,5}

1. Wash your hands with proper antibacterial soap.
2. Clean the surface where you will place your supplies and check the expiration dates on your supplies.
3. Open up your bag of dialysate.
4. Wash your hands again after touching the dialysate bag.
5. Connect your protector to the dialysate's opening to prevent infection.
6. Hang the fresh dialysate solution bag at your station above your head.
7. Connect your catheter line to the protected end of the dialysate bags.
8. Open the clamp to the drain bag and the old fluid will begin to drain into the empty bag.
9. Allow the fluid that is currently in your abdomen to drain out into the empty bag placed on a low surface or on the floor. This process takes about 20 minutes.
10. Turn the position on the transfer set to allow fresh dialysate to drain into your abdomen, which takes about 5 minutes.
11. After the fill portion has completed, turn the close the clamp.
12. Use the disconnection cap to close off the open end of the catheter.
13. The bag of collected old fluid can be disposed of in the toilet.
14. The bag itself can be collected in a medical waste container.

15. The dialysate that was added will need time to dwell or rest and will remain in your abdomen until your next exchange or overnight if this was your last exchange for the day.
16. The process will be repeated anywhere from 3-5 times a day as prescribed by your physician.

1. Ellsworth, Pamela. MD. FACS. Peritoneal Dialysis Catheter Insertion. Retrieved from <http://emedicine.medscape.com/article/1829737-overview#a01> [4].
2. Twardowski ZJ., Prowant BF., Nicholas WK., Nolph KD., and Khanna R. Six-year experience with Swan neck presternal peritoneal dialysis catheter. *Peritoneal Dialysis International*. Nov-Dec; 18(6):598-602, 1998. Retrieved from <http://www.ncbi.nlm.nih.gov/pubmed/9932658> [5].
3. Peritoneal Dialysis ?Is it the right choice for me??. 2002 Retrieved from http://www.med.umich.edu/intmed/nephrology/docs/pd_book_11_30_02.pdf [6].
4. The University of Connecticut Health Center. Procedure for: Peritoneal Dialysis: Acute, Stay-Safe CAPD exchange procedure. Revised May 2010. Retrieved from http://nursing.uchc.edu/nursing_standards/docs/Peritoneal%20Dialysis%20-%20Acute,%20Stay%20Safe%20CAPD%20Exchange%20Procedure.pdf [7].

Types of PD

There are two main types of PD therapy and although many choose to do the therapy at home, there are also in-center options and combination therapies.

Continuous cycling peritoneal dialysis (CCPD) is just how it sounds. It uses a machine called a cycler to continuously/automatically do your exchanges at night while you sleep. Generally three to five exchanges are done each night and you empty the drainage bag when you wake up in the morning. This program gives you more freedom because you aren't hooked up to a machine during the day. Each nightly session lasts at least eight to ten hours. Some programs also have you start an exchange in the morning and the dialysate dwell lasts the entire day.

Benefits of CCPD:

- No exchanges necessary to do during the day.
- Some data indicate potentially lower risk of infections since there are less contact opportunities than with CAPD, however data is mixed.
- Potentially lower risk of infections if you do a dry day as compared to a full day dwell since an empty stomach could increase the immune response (1)

- Continuous ambulatory peritoneal dialysis (CAPD) doesn't use a machine and is something that you do during the day. Here you use gravity to move the dialysate through your abdomen with a series of exchanges. Normally patients need three to four exchanges each day with one longer dwell during the night. The exchanges can be done in any clean environment and you are free to be active during each dwell.
- Additional therapies exist that use a combination of CAPD and CCPD. This type of therapy allows exchanges between the day and the night. Combination therapy more closely mimics the natural activity of your kidneys that work 24/7/365. It also might not be covered under many health plans and your providers will be able to determine if this is the right plan for you.

Benefits of CAPD:

- More control as a patient since you primarily perform the exchanges and determine when and where you do them.
- You are also free to move around during dwells so less time spent dialyzing.
- Less equipment needed and less chance for mechanical failure.
- A combination therapy could allow for automated exchanges during the night and manual exchanges during the day. The potential benefit of combination therapy is that it is more constant dialysis, which more closely mimics your natural kidney functions and leads to less fluid and dietary restrictions.
- PD isn't an option for everyone and you and your team of doctors will determine what treatment plan works best.

1. Piraino, Beth Bernardini, Judith Brown, Edwina et al., ISPD Position Statement on Reducing the Risks of Peritoneal Dialysis- Related Infections. *Peritoneal Dialysis International* . 2011 Vol 31 no.6, 614-630. Retrieved from <http://www.pdconnect.com/content/31/6/614.full> ^[8]

Equipment needed

For CAPD

Adequate clean space to do your exchanges ? the room or area you choose shouldn't have a lot of traffic in or out, shouldn't have open windows and should if possible have enough room for your other PD supplies.

Normally delivered monthly, you will need space for around 30 boxes of supplies. Your supply company will help you, but you might need a helper to organize the boxes within your

residence. The boxes are pretty heavy and do need to be kept in a dry space.

You will also need:

- A chair ? this is where you will do your exchanges
- Table ? a clean surface that you can place your supplies on to perform an exchange
- Toilet ? used to dispose of dwell waste products
- I.V. pole ? or any other surface used to hang your dialysate bags from
- Heating pad ? to bring the dialysate up to body temperature. This provides both comfort and helps to speed along the exchange of fluids.
- Scale ? used to help track your weight and progress during treatment
- Disinfectant ? used to keep you and your work surfaces clean
- Masks ? needed for you and your partner to minimize the risk of infection
- Dialysis supplies (bags of dialysate, waste bags, connection devices) ? monthly supplies that you will use to do each exchange
- Supplies for documenting your care such as paper and pencil or a computer document

For CCPD

Similar equipment is needed for CCPD, but the main difference is the need for an automated cycling machine.

Machines currently available include:

- The Baxter HomeChoice and HomeChoice Pro information found [here](#) [9].
- The HomeChoice is a pump based cyler that helps you perform PD treatments at night.
- The HomeChoice Pro captures information during a dialysis session and sends this information to your providers. This allows your doctor to update your treatment and monitor your condition.
- The Fresenius Medical Care Liberty Cyler and Newton IQ Cyler information can be found [here](#) [10].
- The Liberty cyler features a large color touch screen and can be used for both time-based and cycle based programs.
- The Newton IQ Cyler works similarly to the HomeChoice Pro system and enables your providers to monitor your treatment progress and make updates based off of your information.

Beyond the machine you will also need:

- Dialysis supplies (larger bags of PD solution, drain bag or drain line, cassettes and tubing and other connection devices)
- Masks

- Disinfectant
- Space for your machine and supplies
- Scale
- Table
- Depending on the machine type, supplies for documenting your care such as paper and pencil or a computer document.

Benefits and challenges of PD

Benefits:

- Less travel expenses than in-center treatments
- Potential for higher care satisfaction compared to in-center treatments¹
- Choosing PD more closely mimics the natural action of your kidneys and is done more consistently than hemodialysis, which can lead to better health outcomes²
- Increased flexibility since treatments are either done as you sleep or can be completed at work and at your convenience
- Less dietary restrictions than hemodialysis
- You don't need a needle to engage in treatment
- Being at home means that you don't need to be around other patients that could be sick
- More flexibility to travel as compared to in-center dialysis
- Your blood stays in your body and does not go through a machine
- Works for patients that are not strong candidates for a fistula or an arterio-venous graft

Drawbacks:

- You do need substantial space to perform exchanges and to store supplies
- Catheters run a higher risk of infection (peritonitis), especially if they are not well maintained³
- Unless precautions are made, you can't take a bath above your waste or swim
- More control over the therapy does mean you are more involved and there are no full off-days
- Depending on the type of treatment, you might have to dwell during the day and this can make you feel bloated or impact your appearance
- The dialysate solution contains sugar, which can lead to weight gain if not closely monitored
- Due to dextrose used in the dialysate, diabetic patients might have trouble managing their disease. However, new substances are being used that have little impact on blood sugar levels

- Some patients also will need a dedicated caregiver or partner to help in exchanges or supply management
- Risk of changes to the peritoneum may cause patients to need to switch to hemodialysis
- Risk of back strain, hernias and muscle injuries caused by extra abdominal weight and pressure⁵
- Potential for a decrease in lean body mass and protein loss during treatments.⁶

1. Rubin Haya R., Fink Nancy E., Plantigna Laura C., et al. Patient Ratings of Dialysis Care with Peritoneal Dialysis vs Hemodialysis. *Journal of the American Medical Association*. 2004; 291(6): 697-703. Retrieved from <http://jama.jamanetwork.com/article.aspx?articleid=198181#qundefined> [11].
2. Chertow GM., Levin NW., Beck GJ., et al. In-Center hemodialysis six times per week versus three times per week. *New England Journal of Medicine*. 2011 Jan 6;364(1):93. Retrieved from <http://www.ncbi.nlm.nih.gov/pubmed/21091062> [12].
3. Lafrance Jean-Philippe, Rahme Elham, Iqbal Sameena, et al. Association of Dialysis Modality with Risk for Infection-Related Hospitalization: A propensity Score-Matched Cohort Analysis. *Clinical Journal of the American Society of Nephrology*. 2012. Published online at <http://cjasn.asnjournals.org/content/early/2012/08/15/CJN.00440112.full> [13].
4. Dasgupta Mrinal K., Management of Patients with Type 2 Diabetes on Peritoneal Dialysis. *Advances in Peritoneal Dialysis*. 2005 Vol 21. Retrieved from <http://www.advancesinpd.com/adv05/Adv20053d-1.pdf> [14].
5. Mahale AS., Katyal A., Khanna R., Complication of peritoneal dialysis related to increased intra-abdominal pressure. *Advances in Peritoneal Dialysis*. 2003; 19:130-5. Retrieved from <http://www.ncbi.nlm.nih.gov/pubmed/14763049> [15].
6. Stenvinkel Peter, Lindholm Bengt, Lonnqvist Fredrik., Increases in serum leptin levels during peritoneal dialysis are associated with inflammation and a decrease in lean body mass. *Journal of the American Society of Nephrology*. 2000 Vol 11:7 1303-1309. Retrieved from <http://jasn.asnjournals.org/content/11/7/1303.full> [16].

Staying healthy on PD

One of the most common problems with PD is the risk of peritonitis. This is when your peritoneum, that natural lining in your stomach, gets infected. This might happen if germs get into your belly through your catheter.

Bad infections can keep you from being able to do the PD treatments you need. To help

prevent an infection:

- Learn the right way to do your exchanges
- The staff at your dialysis center can help. Don't be afraid to ask questions.
- Keep all of your PD supplies in a clean, dry place
- Do all of your exchanges in a clean, dry place
- Always wash your hands before doing an exchange
- Wear a surgical mask when you do exchanges
- If you think you do have an infection, get treatment quickly. Tell your doctor right away if:
- You see pink or red around your catheter
- You have pain around your catheter
- Your catheter shifts or starts to come out
- Any of the clamps on your catheter break
- Your dialysate looks cloudy
- You have a fever
- You feel very sick or throw up

Prevention of fungal peritonitis

The majority of fungal peritonitis cases are preceded by courses of antibiotics ? patients with prolonged or repeated courses of antibiotics are at increased risk of fungal peritonitis.

Cost

Cost

There are several options to pay for your dialysis treatments including insurance through your employer or other private health plan, Medicare, Medicaid and through military health programs.

The Medicare program was designed to be available to anyone who was born in the US, a permanent and legal resident for 5 years, or the spouse of an individual who paid Medicare taxes for at least 10 years. People with end stage renal disease (ESRD) or those who needed a kidney transplant regardless of age (as long as they met the residency requirements) qualify for Medicare.

Some individuals are considered dual eligible and receive Medicare coverage for acute services, and Medicaid covers Medicare premiums and some additional costs. Eligibility requirements for Medicaid vary by state.

Also, if you have health insurance through an employer, you have the ability to maintain this coverage for 30 months before Medicare becomes the primary payer through the Medicare Secondary Payer (MSP) policy. This can help keep costs lower, give broader coverage and provide continuity of care.

For more information on Medicare and Medicaid visit our class [here](#) [17].

Medicare Part B will cover:

- Home dialysis training for you and your care partner
- PD equipment and basic supplies such as your PD cyclor, disinfectant, masks
- Visits to your doctor
- Visits from support staff to your home for routine and emergency issues
- Some laboratory tests and assistance from social workers or dieticians
- Medicare Part B will *not* cover:
 - Paid aides to help you with home dialysis
 - Reimbursement for your lost wages or aides lost wages
 - A place to stay while you do treatment

In 2012 the yearly deductible was \$140 dollars. After you pay your deductible you pay 20% coinsurance.⁽¹⁾

This means that once you pay your yearly deductible, you pay 20% of the costs. So, a \$100 dollar bill means you owe \$20 dollars. Medicare pays for PD at the same rates as in-center dialysis.

A major benefit to choosing PD or another form of home dialysis is the immediate coverage ability. Those that aren't eligible for Medicare before the diagnosis of ESRD have a 90 day coverage gap if they choose in-center dialysis. If you choose PD or other home therapies, Medicare can be activated immediately or retroactively to cover costs.

1. Centers for Medicare and Medicaid Services. *Medicare Coverage of Kidney Dialysis and Kidney Transplant Services*. Retrieved from <http://www.medicare.gov/Pubs/pdf/10128.pdf> [18].

Travel

One of the largest advantages of PD is the increased ability to travel. Since you are in more control of your treatments and schedule, you have increased flexibility to take a vacation. The first step to planning a trip is talking to your healthcare team. They can help you determine what supplies you need, how much you will need, connect you with resources at your destination and better understand how to help should you run into trouble.

The next step is determining if you are going to travel with your dialysate solution or have it shipped to your destination. If you choose to have it shipped to your destination you will need to give at least 2 weeks' notice to your supplier and notify your hotel to expect your packages and ensure you have a room that will hold your supplies.

Next, it is important to grab all of your necessary supplies including all of the tools needed to do an exchange including items such as masks and disinfectant. If you are flying, you are allowed to bring your supplies on the plane. It is recommended that you bring enough equipment for at least two days' worth of essentials. This will cover you in case your bags are misplaced.

If you are using a cycler to do CAPD, talk to your doctor about giving you a letter showing that it is an essential medical device. Additionally don't check this as baggage as they are expensive machines to replace. You should also connect with your doctor to write a similar note to cover any other materials that are essential to do an exchange.

Here is a resource that shares additional information on creating your own travel [toolbox](#) [19].

Last but not least, enjoy yourself and have a great vacation. The planning that you do early will make all the difference.

Additional resources

Your local ESRD Network will have resources and clicking on the map will bring you to local information.

<http://www.esrdnetworks.org/> [20]

The National Kidney and Urologic Diseases Information Clearinghouse also have a lot of great information about PD.

<http://kidney.niddk.nih.gov/kudiseases/pubs/peritoneal/> [21]

Home Dialyzers United has a buddy program that can help you connect to current PD patients.

<http://homedialyzorsunited.org/hdu-buddies/> [22]

The National Kidney Foundation has a bunch of background information.

<http://www.kidney.org/atoz/content/peritoneal.cfm> [23]

Fresenius Medical Care has information on PD and more specifically on their line of cyclers and products.

<http://www.fmcna.com/fmcna/HomeTherapies/home-therapies.html> [10]

Baxter also has good background information and a listing of their products and cyclers.

<http://www.fmcna.com/fmcna/HomeTherapies/home-therapies.html> [10]

Home Dialysis Central not only breaks down PD therapies, but also has information on other home therapies.

<http://homedialysis.org/> [24]

DaVita's site is another good place to search for basic information on PD. Their site also has a listing of videos.

<http://www.davita.com/treatment-options/home-peritoneal-dialysis> [25]

Choose Another Class

Congratulations on finishing the class! Please choose another class from the list below to continue your journey.

Peritoneal Dialysis

Another type of dialysis is called peritoneal dialysis (PD). Peritoneal dialysis uses the lining or membrane of the abdominal cavity as a filter to remove fluids and toxins from the blood. A surgeon places a special tube called a PD catheter into the abdomen. Care must be taken to prevent infection with any type of dialysis access. Peritoneal dialysis is done at home every day.

There are 2 types of PD: Continuous Ambulatory Peritoneal Dialysis (CAPD) and Continuous Cycling Peritoneal Dialysis (CCPD). Another name for CCPD is Automated Peritoneal Dialysis (APD).

In CAPD, exchanges are done using gravity. Dialysis fluid flows from prepackaged fluid bags into the peritoneal cavity through the catheter. The solution usually stays in the abdomen for 4 to 6 hours where it absorbs waste products and extra fluids and then drained. This is called an exchange. Most people do 4 to 5 exchanges per day.

In CCPD or APD, a machine called a cycler, is used to perform the exchanges, and the process is typically done at night while you sleep.

For more information on peritoneal dialysis, check out the class [here](#) [26].

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Source URL: <http://www.dpcedcenter.org/classroom/peritoneal-dialysis>

Links

- [1] <http://dpcedcenter.org/classroom/home-hemodialysis>
- [2] <http://kidney.niddk.nih.gov/kudiseases/pubs/childkidneydiseases/overview>
- [3] <http://www.kidneypatientguide.org.uk/pdanim.php>
- [4] <http://emedicine.medscape.com/article/1829737-overview#a01>
- [5] <http://www.ncbi.nlm.nih.gov/pubmed/9932658>
- [6] http://www.med.umich.edu/intmed/nephrology/docs/pd_book_11_30_02.pdf
- [7] http://nursing.uhc.edu/nursing_standards/docs/Peritoneal%20Dialysis%20-%20Acute,%20Stay%20Safe%20CAPD%20Exchange%20Procedure.pdf
- [8] <http://www.pdiconnect.com/content/31/6/614.full>
- [9] http://www.baxter.com/patients_and_caregivers/products/homechoice.html
- [10] <http://www.fmcna.com/fmcna/HomeTherapies/home-therapies.html>
- [11] <http://jama.jamanetwork.com/article.aspx?articleid=198181#qundefined>
- [12] <http://www.ncbi.nlm.nih.gov/pubmed/21091062>
- [13] <http://cjasn.asnjournals.org/content/early/2012/08/15/CJN.00440112.full>
- [14] <http://www.advancesinpd.com/adv05/Adv20053d-1.pdf>
- [15] <http://www.ncbi.nlm.nih.gov/pubmed/14763049>
- [16] <http://jasn.asnjournals.org/content/11/7/1303.full>
- [17] <http://dpcedcenter.org/classroom/medicare-and-part-d-donut-hole/medicare-101>
- [18] <http://www.medicare.gov/Pubs/pdf/10128.pdf>
- [19] <https://www.annanurse.org/download/reference/practice/pdToolbox.pdf#page=12>
- [20] <http://www.esrdnetworks.org/>
- [21] <http://kidney.niddk.nih.gov/kudiseases/pubs/peritoneal/>
- [22] <http://homedialyzorsunited.org/hdu-buddies/>
- [23] <http://www.kidney.org/atoz/content/peritoneal.cfm>
- [24] <http://homedialysis.org/>
- [25] <http://www.davita.com/treatment-options/home-peritoneal-dialysis>
- [26] <http://dpcedcenter.org/classroom/peritoneal-dialysis>