



# Peritoneal Dialysis

an introduction for patients and families

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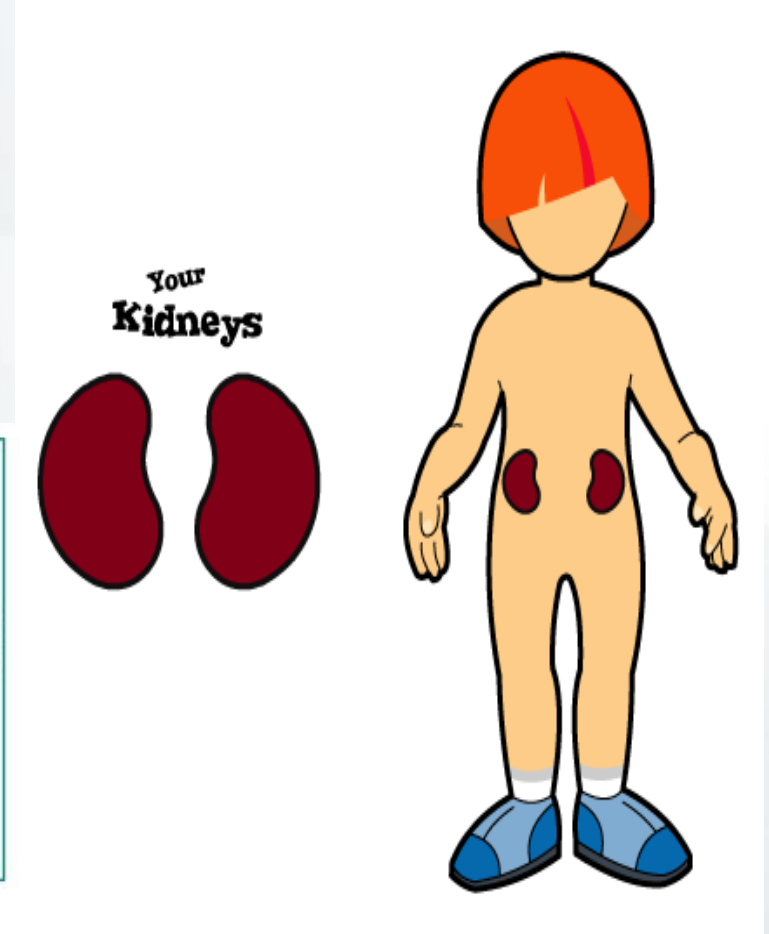
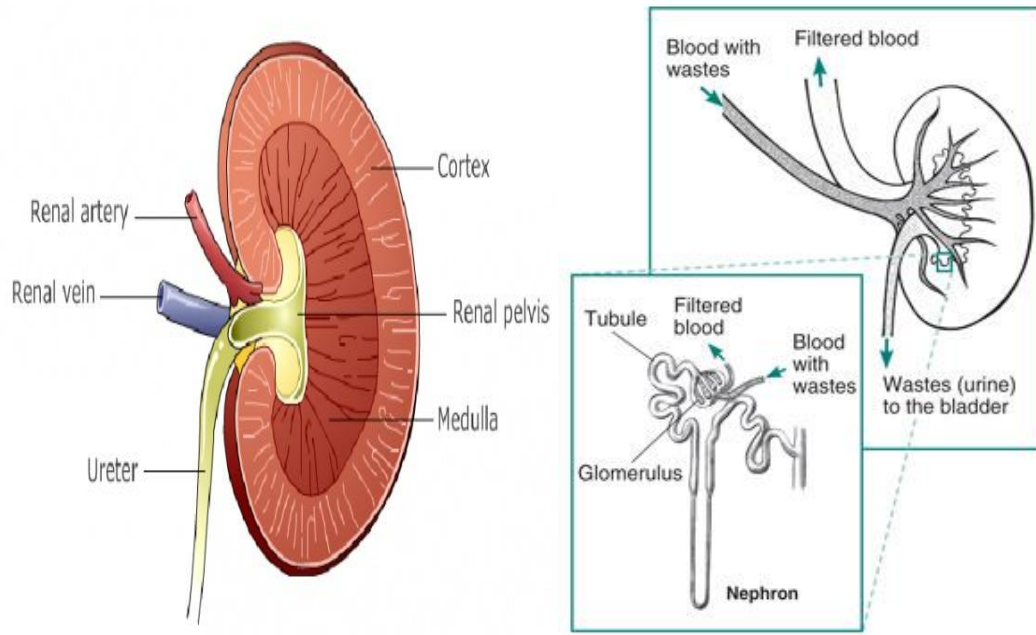
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# Kidneys

The kidneys are two of the most important organs in the body. They filter the blood and help remove waste, toxins and fluid from the body.

The kidneys are two bean-shaped organs, each about the size of a fist.

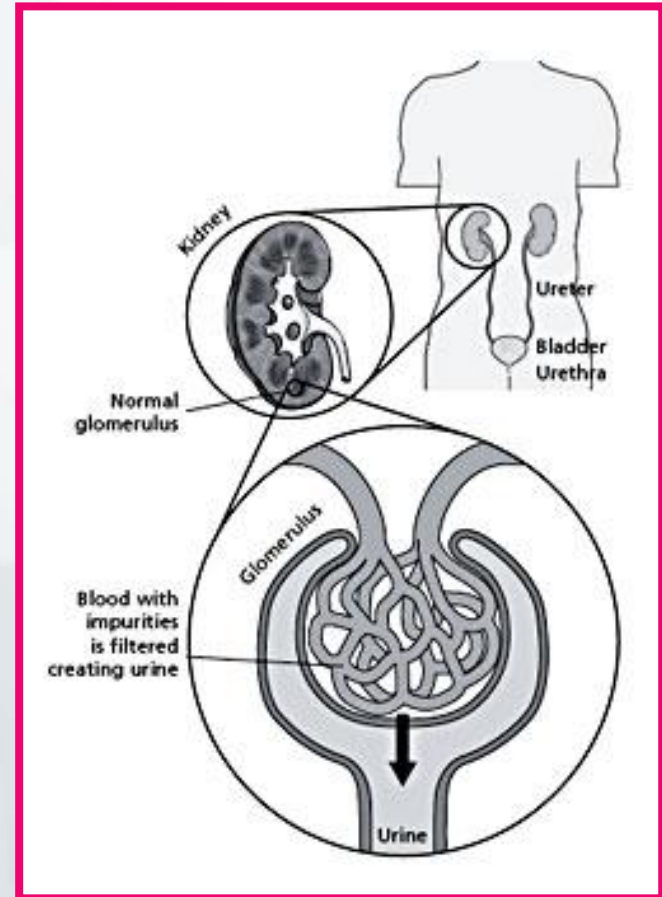
They are located just below the rib cage, one on each side of the spine



# How things work?

The urinary system consists of the kidneys, ureters, the bladder and urethra. The kidneys filter the blood to remove waste products and produce urine. The urine flows from the kidneys down through the ureters to the bladder, where it is stored until we go to the toilet. It passes through another tube called the urethra to the outside when passing urine.

The kidney is not one large filter; Each kidney is made up of about a million filtering units called nephrons. Each nephron filters a small amount of blood. The nephron includes a filter, called the glomerulus, and a tubule. The nephrons work through a two-step process. The glomerulus lets fluid and waste products pass through it; however, it prevents blood cells and large molecules, mostly proteins, from passing. The filtered fluid then passes through the tubule, which sends needed minerals back to the bloodstream and removes wastes. The final product becomes urine.



# What kidneys do?

The kidneys do several important jobs which help to keep your body working well.

## **They remove waste products carried in the blood:**

The kidneys remove waste and toxins from the body through urine. They regulate minerals, vitamins and other nutrients that you get from your diet and send off into the urine anything that is not needed.

## **They balance the volume of fluid in the body:**

Adults have around 7 to 8 litres of blood in their body (kids have a smaller amount, depending on how big they are). All of this gets filtered through the kidneys many times a day and you make urine accordingly. If you are dehydrated you would make less urine as there is not as much fluid filtered through the kidneys.

## **They can change blood pressure:**

The kidneys make hormone that can constrict and expand the arteries in the body. This causes blood pressure to rise and fall when a different pressure is needed to make sure that blood gets to where it needs to go.

## **They help in making red blood cells:**

The kidneys make a hormone that tells the body when to make more red blood cells.

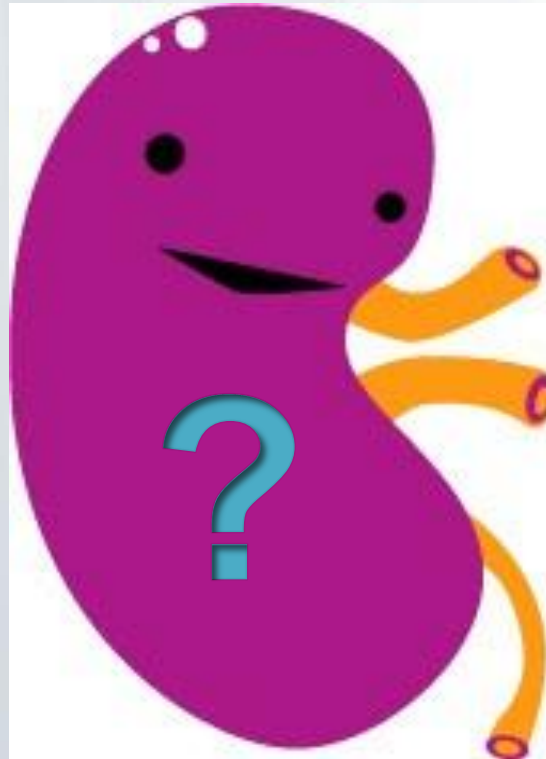
## **They produce active vitamin D:**

Vitamin D helps the body to absorb calcium from dairy products and some other foods that you eat. Calcium is needed to make strong bones and teeth.

## **Regulates Growth Hormone:**

Kidneys play a possible role in the absorption of growth hormone. The availability of growth hormone has been an important advance in the treatment of children with chronic kidney disease.

# Why don't your kidneys work?



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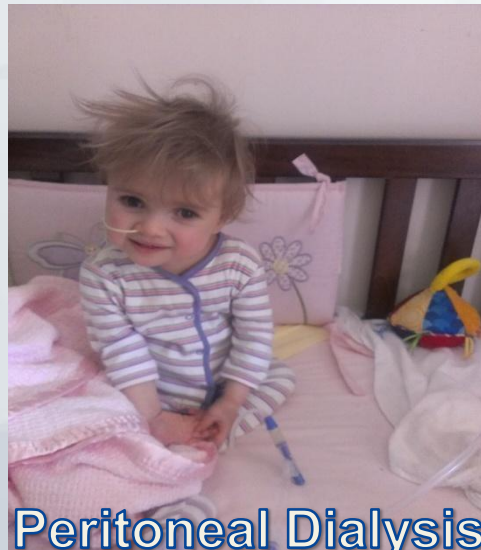


# What is dialysis?

Dialysis is needed when a child's kidneys stop working properly. This can be for several reasons. Your child's doctor will have discussed with you what has happened in your child's case. Dialysis does the job that is normally performed by the kidneys. It removes waste products from the blood and excess water from the body.

There are two methods of dialysis. One is peritoneal dialysis, where a catheter is inserted into the abdomen and fluid is filtered through the peritoneum.

The other is haemodialysis, which involves filtering out waste by passing blood through a machine via a blood line or a large vein called a fistula.



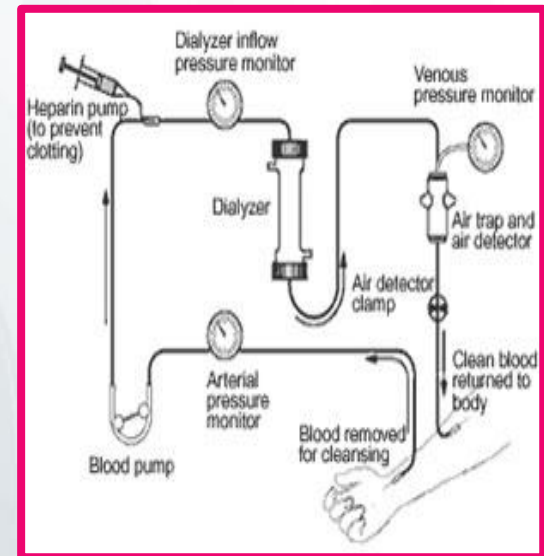
# Haemodialysis

In haemodialysis, some of your blood is taken from your body, just a little bit at a time, and it then flows through tubing and a filter. The filter is a canister that contains thousands of fibers that filter out the wastes and extra fluid. The clean blood is then returned to the body through different tubing. The machine will actually pump the blood from your body through the tubing and filter; Removing the harmful wastes and excess fluids and maintains the proper balance of electrolytes like potassium and sodium in the body.

## Adjusting to Haemodialysis

One of the biggest adjustments when starting haemodialysis treatments is following a rigid schedule. Haemodialysis is performed in the Day Medical Unit under the supervision of a nurse, and is generally required three times a week for about four hours each treatment. For example, a Monday-Wednesday-Friday schedule.

The other adjustment is that surgery must be performed to place “vascular access” so that blood can be readily removed for the procedure. There are some options for vascular access that include creating a fistula (connecting an artery and vein in the arm) or placement of a perm-a-cath (a long tube with two separate openings placed into a large vein). The catheter must be kept clean and dry, and can only be accessed by the Haemodialysis nurses.



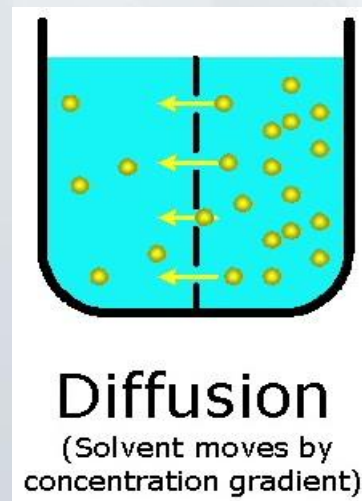
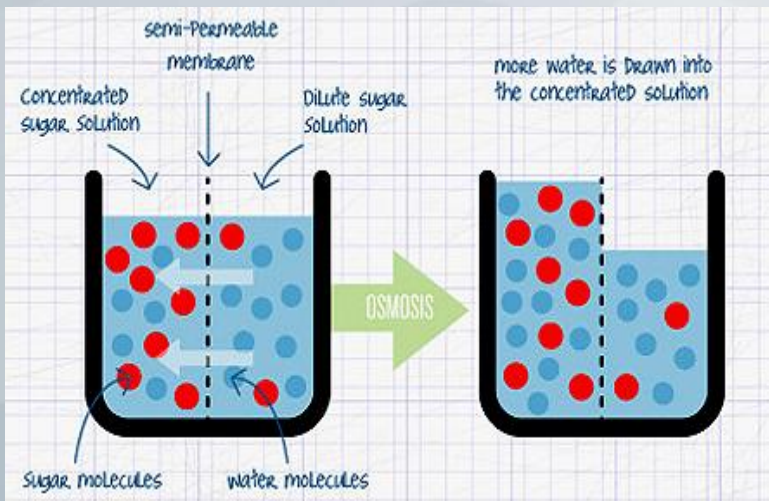
# Peritoneal Dialysis (PD)

In peritoneal dialysis, the lining of the abdominal cavity – the peritoneum – acts as the filter for cleaning the blood. The peritoneum has characteristics similar to those of the filter in haemodialysis: pores in the membrane allow certain substances through while retaining others. Higher glucose concentrations will remove more fluid. The fluid removed is referred to as the ultra-filtrate or UF.

PD is a gentle form of dialysis that is performed everyday, generally overnight while the child is sleeping. It is performed via a tube placed into the peritoneum through the stomach wall. The tube is called a Tenckhoff catheter.

To perform PD, the peritoneum is filled with fluid to allow the filtering to take place. The process of filling and draining the fluid is called a cycle or exchange.

PD uses osmosis and diffusion to regulate electrolytes and remove fluid.





# A Peritoneal Dialysis Cycle

There are three stages to a dialysis cycle (or exchange):

## FILL:

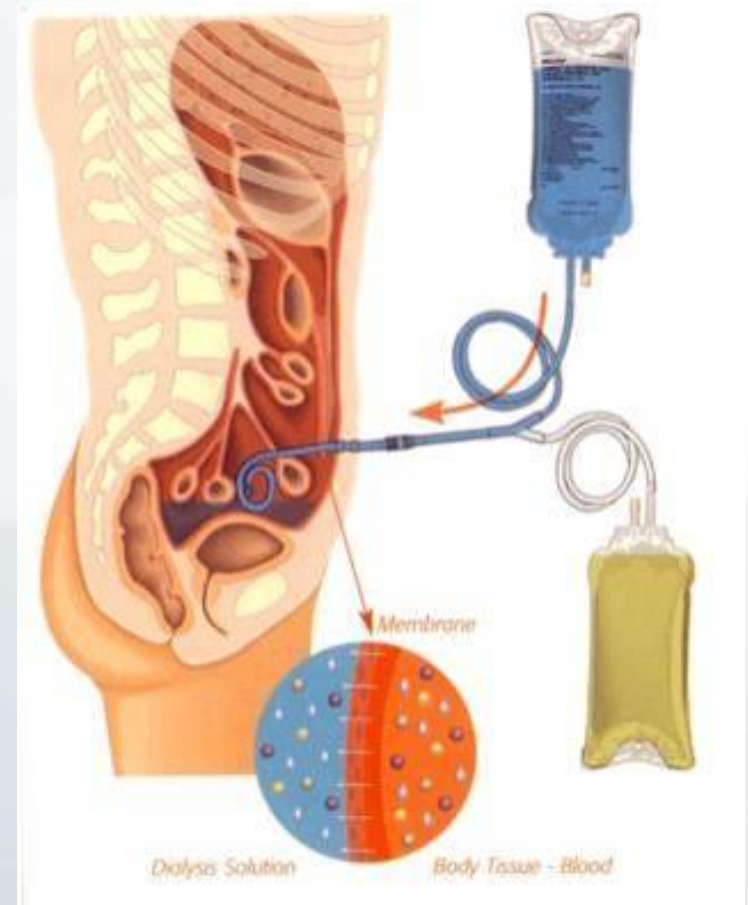
The abdomen is filled with dialysis fluid. The amount of fluid varies but is calculated according to your child's weight.

## DWELL:

The dialysis fluid stays in the abdomen for a set period of time, which varies from child to child. During this time, waste products and electrolytes filter through the peritoneum using osmosis and diffusion to remove waste and fluid from the circulating blood.

## DRAIN:

The used dialysis fluid is drained from the body and discarded and the end of the dwell.



# Automated Peritoneal Dialysis (APD)

In APD most exchanges are done during the night with the help of a machine, called a cycler.

The patient is connected to the cycler which infuses the PD solution through a tubing set for approximately 8–12 hours.

The cycler fills and drains the peritoneal cavity automatically, while the patient is sleeping.

A card will be programmed with the child's PD prescription. More than one prescription can be programmed to the card to give the family options at home.

The card also records all the treatment results and alarms so that it can be downloaded when the patient attends clinic and adjustments can be made.



# Dialysis Catheter- Tenckhoff

A Tenckhoff catheter is a soft tube that is placed into the peritoneum (in the abdomen) under general anaesthetic generally via a laparoscopic procedure.

The catheter provides permanent long term access to the peritoneal cavity. It is a thin, flexible tube. One end sits inside the peritoneum, ideally deep into the pelvis. It is then tunnelled along the abdominal wall to the outside so that it can be accessed for dialysis.

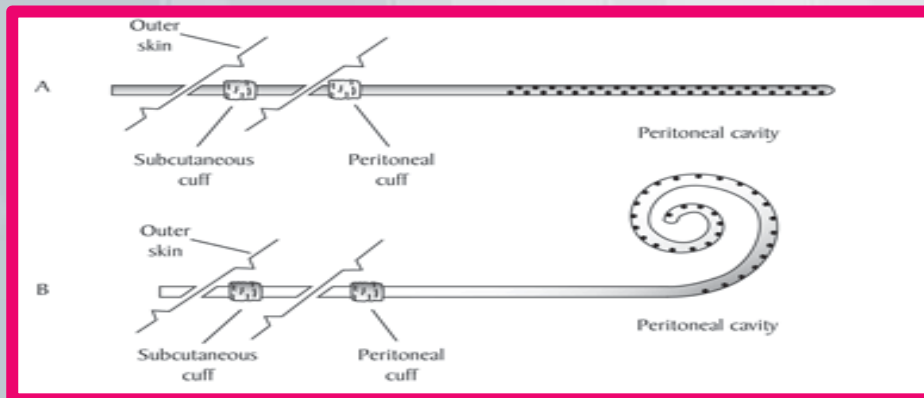
Ideally once the Tenckhoff is inserted it is rested for 14days. This allows the tunnel and exit site to heal before commencing dialysis and filling the peritoneum with fluid. This is not always possible as a patients blood levels can indicate the need to commence dialysis immediately. In this instance the Tenckhoff can be used immediately and dialysis will start at very low volumes and grade up slowly over a period of weeks.

The exit site of the Tenckhoff will be covered with a dressing post op. This dressing will need to stay in place for 7-14days. This dressing keeps the Tenckhoff clean, dry and immobile. It is very important for the exit site to be covered at all times to prevent infection.

The exit site needs to be kept clean and dry at all times. The process of the dressing change will be part of the training provided by the peritoneal dialysis coordinator.

Bathing and swimming can be undertaken once the catheter is fully healed. You have to take significant care with these activities and precautions will be discussed during the training period.

There are two types of Tenckhoff's; A straight catheter and a coiled catheter.



# What happens during training



You will work with the peritoneal dialysis nurse coordinator and ward staff so that you feel confident and have a good understanding of your child's needs.

Some of the things you will learn include:

How to monitor and record your child's weight, blood pressure and temperature.

How to set up for overnight dialysis, including connecting and disconnecting your child to and from the machine.

Gaining understanding of your child's dialysis programme.

Troubleshooting.

Recognising the signs of peritonitis.

Recognising signs of fluid overload and dehydration.

Exit site care.

Hand washing.

Fluid balance.

Training can involve inpatient and outpatient attendance at RCH. On average someone can be trained for home dialysis in 2-4 weeks. An inpatient admission to commence usually on a Monday and your child will start dialysis that night. During this time you will be expected to stay overnight so you can gain experience and become comfortable with your child on overnight dialysis.

You will also be expected to be available for teaching during the day. The importance of this is to ensure that you have the opportunity to understand and learn the practical skills that you will need to carry out peritoneal dialysis at home. The aim is that you will be attending to all your child's care, initially with support and then independently before you are discharged home.

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# Preparing for Peritoneal Dialysis

One of the dialysis nurses will come to see you at home to discuss the practical issues of home dialysis. For instance, where your child will have dialysis, where the machine will go, where you will set up the dialysis and storage of fluid and equipment. It is also a time for you and your family to ask practical questions, discuss the implications of peritoneal dialysis and get used to the idea of dialysis at home.

The home visit ideally occurs before your child is discharged from hospital. However, sometimes this will take place following discharge. The home visit is ideally performed by the peritoneal dialysis coordinator but sometimes it will be performed by a Fresenius representative or a dialysis specialist at your local hospital. The day and time of the home visit will be negotiated with the family prior to discharge.



# Once you get home



Once your child is established and stable on dialysis, plans for discharge will be made. This will only take place once you and the medical and nursing teams are confident that you are fully trained and able to care for your child's dialysis independently.

You may be required to stay in the care by parent unit prior to discharge to ensure you are ready for home.

When you are at home, you will be seen in the dialysis clinic regularly, weekly at first, then every two weeks and eventually every month. Your first appointment date will be given to you before you go home. The clinic is held every Tuesday from 2pm to 4pm at the Royal Children's Hospital, Specialist Clinic A6. Ground Floor, East Building.

Your child will have blood taken before seeing the doctors and the peritoneal dialysis nurse specialists and allied health team will be available to address any concerns or make any changes needed. Please bring your dialysis folder and treatment card with you to each clinic appointment.

We appreciate the commitment that is involved both for training and carrying out dialysis at home. Please talk to us if you have any specific concerns or worries regarding your child's dialysis. Remember that you can access 24-hour support by phoning the Nephrology department or Koala ward out of hours. If you have any questions, queries or concerns, please ring us.

The team is here to support you and help you throughout your training, transition home and ongoing management of your child on peritoneal dialysis.

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# Holidays

Yes... you can go on holidays on peritoneal dialysis.

It is very easy to organise holidays within Australia on peritoneal dialysis and just takes a quick phone call to notify your temporary delivery address.

Holidays overseas are not impossible but can be a little more difficult to organise. Not all destinations are possible.



# Medications



Most children with chronic renal failure who are on dialysis, will need to take a number of medicines. Make sure that you understand exactly how and when to give your child medicines before you leave the hospital or pharmacy. If you have any questions, please ask your doctor, nurse or pharmacist.

## **Phosphate binder:**

The dietician will give you advice to help your child's dietary phosphate intake. They will probably also need to take a phosphate binder such as calcium carbonate. They bind to the phosphate in food or drink if they are taken before a meal or with a feed.

## **Iron:**

This is available as tablets or syrup. Iron preparations should not be taken at the same time as the phosphate binder, as the absorption of the iron is reduced. Please leave an interval of about an hour.

## **Erythropoietin (EPO):**

This is a replacement for the naturally occurring hormone erythropoietin, which would have been produced by the kidneys. It stimulates the body to produce new red blood cells. EPO is given as an injection under the skin (subcutaneously) weekly or less frequent. Using either a pre-filled syringe for children or an injection pen. You will be shown how to give the injection or your family doctor or community nurse may give it to your child. Always keep EPO in the fridge.

## **Laxatives:**

Your child will also need to take a gentle laxative regularly, such as lactulose to prevent constipation. Constipation can cause complications for PD.

## **Calcitriol:**

Vitamin D, which is required for healthy bones, is usually changed by the kidney to its active form. In renal impairment, the active form of Vitamin D is given instead.

## **Vitamins:**

The dietician will decide whether your child needs additional vitamins depending on your child's dietary intake.

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# Diet/Nutrition



The team of specialised renal dieticians work closely with all families. Infants and children on peritoneal dialysis often have a decreased appetite and need to adhere to a strict fluid restriction. Your dietician will help to make sure your child has the best nutritional intake possible to maximise their growth and development. The dietician will review your child's intake, weight, height and blood results and your child's diet or feed may need to be adjusted based on this.

## Energy:

Your child's energy (calorie) intake may need to be increased. Your child will absorb glucose from the peritoneal dialysis fluid and this will be taken into account when working out your child's requirements.

## Protein:

During peritoneal dialysis, protein is lost across the peritoneum. Therefore your child may need to have extra protein from food and/or feeds or supplement drinks to make up for this.

## Phosphate:

This is not cleared well on peritoneal dialysis and your child's intake of phosphate-containing foods will need to be controlled. If you or your child is unsure how much phosphate they are allowed, check with your dietician.

## Salt:

It may be necessary to reduce your child's salt intake if your child has high blood pressure. Your dietician will advise if this is necessary.

## Vitamins:

Some vitamins are lost across the peritoneum during peritoneal dialysis. Your child may require a supplement to replace these losses. If your child is already taking a supplement drink or feed, they may be receiving enough of these vitamins. It is important for your dietician to know if your child is taking any multivitamin or supplement other than those prescribed, as these may be harmful.

# Acknowledgements

Thank-you to Alexis Cherry and her family for allowing us to use some very special photos and allow families to see that although this journey can be very challenging, there are many happy moments to be had along the way.

