

About the Khoo Teck Puat – National University Children’s Medical Institute (KTP-NUCMI)

The KTP-NUCMI is the paediatric arm of the National University Hospital and comprises the Departments of Paediatrics, Paediatric Surgery and Neonatology. We provide comprehensive and specialised medical and surgical services for newborns, children and adolescents, and are the only public hospital in Singapore that offers paediatric kidney and liver transplant programmes. Through a generous gift from the Estate of Khoo Teck Puat, we have set up an integrated outpatient facility with medical, diagnostic and rehabilitation services.

For more information about us, visit www.nuh.com.sg/nuhkids.

Contact Us

24-hour Children’s Emergency

Location: NUH Main Building, Zone F, Level 1

General Enquiry: +65 6772 2555

KTP-NUCMI

Location: NUH Main Building, Zone E, Level 2

(Accessible via Kent Ridge Wing, Zone C, Level 2, Lift Lobby C)

Operating Hours: 8.30am – 5.30pm (Mon to Fri), 8.30am – 12.30pm (Sat)

General Enquiry: +65 6772 5736

Appointment Line: +65 6772 2002

Fax: +65 6776 2102

Email: ktpnucmi_appt@nuhs.edu.sg

9a Viva-University Children’s Cancer Centre

Location: NUH Medical Centre, Zone B, Level 9

Operating Hours: 8.30am – 5.30pm (Mon to Fri)

Appointment Line: +65 6772 5030

Fax: +65 6872 4314

Email: cbccappt@nuhs.edu.sg

NUH Children’s Urgent Care Clinic @ Bukit Panjang

Location: Junction 10, 1 Woodlands Road, #01-22, Singapore 677899

Operating Hours: 9am – 11pm daily (including public holidays)

General Enquiry: +65 6219 1538

Email: childrenucc@nuhs.edu.sg

Website: www.nuh.com.sg/ucc

NUH Child Development Unit @ JMC

Location: Jurong Medical Centre, 60 Jurong West Central 3, Level 2, Singapore 648346

Operating Hours: 8.30am – 5.30pm (Mon to Fri)

Appointment Line: +65 6665 2530/2531

Fax: +65 6665 0158

Email: cdu@nuhs.edu.sg

Website: www.nuh.com.sg/cdu

NUH Child Development Unit @ Keat Hong

Location: Keat Hong Community Club, 2 Choa Chu Kang Loop, #03-01, Singapore 689687

Operating Hours: 8.30am – 5.30pm (Mon to Fri)

Appointment Line: +65 6769 4537/4637

Fax: +65 6665 0158

Email: cdu@nuhs.edu.sg

Website: www.nuh.com.sg/cdu

National University Hospital

Location: 5 Lower Kent Ridge Road, Singapore 119074

Tel: +65 6779 5555

Email: NUH_enquiries@nuhs.edu.sg

Website: www.nuh.com.sg



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NUH Campus Map

Information is correct at the time of printing (Sep 2021) and subject to revision without prior notice.

Kidney Transplant



What is a kidney transplant?

A kidney transplant is a process where you receive a new kidney, either from a deceased or living donor, in a major operation. The kidney donated should perform many of the normal kidney functions and allow you to have a better quality of life compared to staying on dialysis*.

Many symptoms of kidney disease such as hypertension, anaemia (low red cell count) and calcium and phosphate dysregulation cannot be corrected by dialysis. With a kidney transplant however, fluid and dietary restrictions can be relaxed. More importantly, particularly for children, a kidney transplant allows a child or young person to grow and learn better.

How does a transplant or dialysis help?

What the kidney does	Transplant	Dialysis
1. Removes water and salt / waste products	✓	✓
2. Regulates blood pressure	✓	
3. Maintains adequate red cells in the blood	✓	
4. Regulates calcium and phosphate in the bones and body	✓	

Kidney transplant is considered the **ideal treatment** for children and young people with kidney failure.

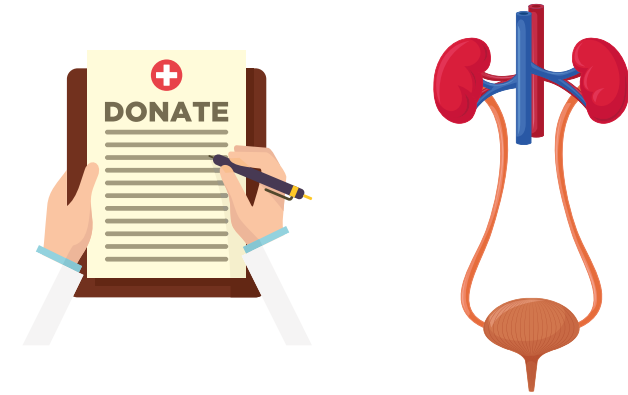
In some circumstances, we are unable to perform a kidney transplant due to medical or surgical problems that the child may have. It may also be due to a late diagnosis of kidney disease or a lack of donor kidney.

While dialysis can help prolong your life, it requires severe restrictions on fluid, food and limitation of normal activities. Not all are able to adjust to these limitations.

Other treatment options that can be considered include Haemodialysis and Peritoneal Dialysis. Speak to your doctor if you are interested to find out more about these options.

Where do donor kidneys come from?

Donor kidneys may come from two sources, namely deceased organ donors or living donors. Living donors are usually relatives of the person receiving the kidney (the recipient). Occasionally, we do receive kidney donations from people who want to do good (altruistic donors, non-directed donors).



Currently under the Human Organ Transplant Act, all Singaporean citizens or Permanent Residents will automatically be eligible to donate their kidneys, unless they choose not to and register their objection to do so. Persons who are under 21 years old or are mentally disordered are exempted. After donation, donors typically have a normal life expectancy and continue to lead a regular life with no complications.

Under the Medical (Therapy, Education and Research) Act, persons aged 18 years and above can decide to donate their organs for the purposes of education, research, therapy and transplantation after death. There are strict criteria for death certification, put in place according to the laws, to ensure that all donors receive the utmost care possible.

Are all kidneys suitable for donation?

In some cases, a transplant patient may experience an immune reaction known as rejection. This is when his/her body rejects a kidney placed into the body because the immune system recognises the donor organ as an "infection". Medications can be used to suppress the immune system so that the donor kidney can function in the recipient body for a long time.

A cross matching test will be done to see if your blood reacts to the donor's blood to form an immune reaction. If the test result is negative i.e. no immune reaction, then it is safe for you to have this kidney.

National Organ Transplant Waiting List

1. What is the National Organ Transplant Waiting List?

There are many more people who require and are able to undergo a kidney transplant than organ donors. The priority for the waiting list is set such that each person has the same chance of receiving the most suitable kidney. This ensures that the process is transparent and fair.

2. What is the process required for my name to be included in the National Organ Transplant Waiting List?

First, you will need to complete blood tests, investigations and consultations with specialists, e.g a heart doctor and surgeon, to determine if you are fit to receive a transplant. You will then be required to complete vaccinations under the National Immunisation Scheme and take additional vaccinations as prescribed. When you and your renal doctor decide that you are suitable for a transplant, we will have you registered on the waiting list. As a final step, you will be briefed about the deceased donor kidney transplant waitlist by a Transplant Coordinator.

3. How do I know if I have been listed?

You will receive a letter from the National Organ Transplant Unit and it will will state the date that you are successfully registered.

A suitable kidney may become available at any time. Hence, you should leave your home, work and any relevant and contactable phone numbers with the Transplant Coordinator and Children's Kidney Centre. It is very important that you are always contactable. Please inform the coordinators if you have a change in contact details.

"We encourage you to continue living your life to the fullest while we wait for a suitable donor to arrive!"



4. Once you are on the waiting list, we strongly recommend that you follow these suggestions to help ensure a successful transplant:

- Do not smoke; quit if you are smoking.
- Do not skip dialysis; and dialyse as prescribed by your renal doctor.
- Keep your weight as close to dry weight as possible.
- Get vaccinated as prescribed by your renal doctor.
- Follow your dialysis diet to prevent health complications.
- Exercise as much as you can.
- See your doctor regularly.
- There will be a need to ensure that you remain fit to have a transplant operation. This means taking regular blood tests and additional investigations as advised by your renal doctor. Failure to do so may mean that you will not be considered when there is a kidney available.
- If you are on intermittent catheterisation via Mitrofanoff (bladder conduit), continue management as advised by your surgeon in order to maintain a good bladder volume.

What happens during the transplant?

Before the operation

1. What do I do when I get a phone call?

- Be prepared for a few weeks' stay in the hospital. Inform and make necessary arrangements with your school or work place.
- Pack your medications and the essentials you need for the stay.
- Maintain nil by mouth from the time you are called unless advised otherwise.
- Continue to take your medications on time.
- If you are on peritoneal dialysis when you receive the phone call, please disconnect without draining your peritoneum.
- If you are still passing urine (more than once a day), do not empty your bladder before you come in so that we can collect a sample.

2. What can I expect when I arrive at NUH?

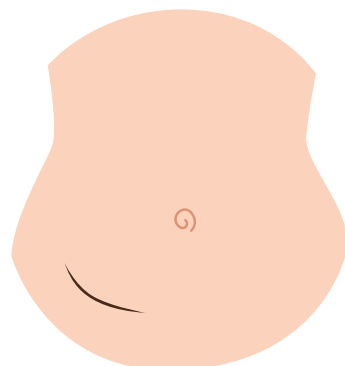
A blood test will be carried out as soon as you arrive. You will need to complete a chest X-ray, an ECG and other various investigations to ensure that you are fit to go through the operation. The blood test results, known as a cross-match, will confirm that your immune system will not reject the kidney immediately. You will be seen by the transplant team, the transplant surgeon and the anaesthetist. Consent forms will have to be signed for the operation, anaesthesia and risk acknowledgement for the kidney transplant.

3. How long will the operation take?

The operation may take about 5 hours. Additional time may be needed for preoperative procedures in the ward and in the theatre. You will be asleep during the operation and should wake up in recovery or in the Paediatric Intensive Care Unit (PICU).

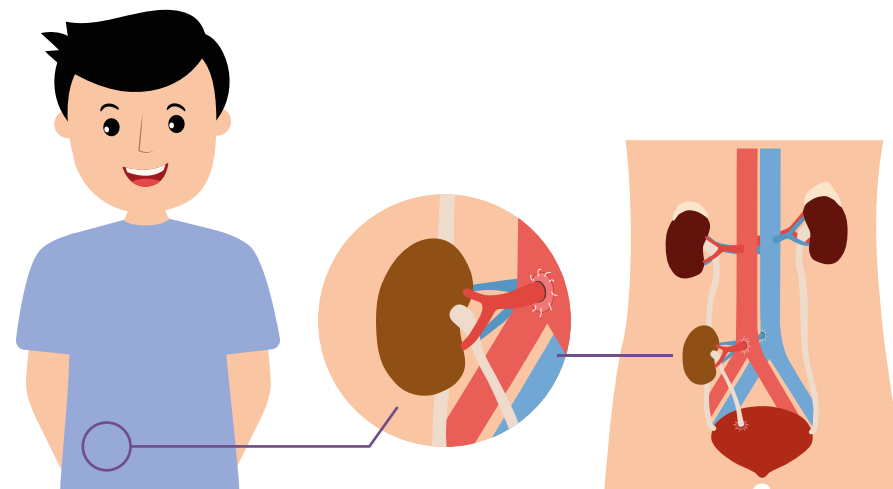
During the operation

The new kidney will go on the right or left side of your lower abdomen. After surgery, you will have a wound where the new kidney is placed.



The black line denotes the wound (incision line post-surgery).

Incision for kidney transplant surgery



The new kidney is placed on the right or left side of your lower abdomen.

What should I expect after the operation?

Monitoring

After the transplant, you will be admitted to the PICU and be closely monitored for heart rate, blood pressure, blood sugar level and the quantity of urine produced. As your new kidney recovers from the surgery, the salt levels in your blood may change quickly hence blood and urine tests will be taken frequently to monitor any salt and water imbalance.

While you were in the operating room, you would have had a line inserted into a blood vessel at your neck and a peripheral line inserted at your left wrist to allow us to take blood samples for testing, to administer medications you cannot take by mouth and to monitor your blood pressure. You will be attached to a catheter which will drain urine from your bladder for about a week and a tube in your lower abdomen to drain your wound. You will not see this, but there will also be a stent placed in your ureter into your bladder to maintain the flow of urine from your new kidney into the bladder. Patients who have had a general anaesthetic require oxygen therapy to keep oxygen levels high in their blood stream so you may wake up with an oxygen mask on your face.

While you are in the PICU, your room may be noisy and busy due to the monitors around. Our PICU staff will be there to take care of you and arrange for your family members to be with you as soon as possible.

Delayed graft function

There are occurrences where the new kidney takes some time to recover due to the lack of blood supply to the kidney before it is placed in your body. This is known as delayed graft function. This usually means that the new kidney is not producing enough urine and dialysis may be needed until it starts working.

Pain management

If you feel sore after the operation, the anaesthetist will brief you on a pain management technique called Patient Controlled Analgesia (PCA) a day before surgery. PCA is the method of choice for pain relief with this operation. We will teach you how to use the PCA, or if you are too young, this will be managed for you.

Physiotherapy

As you recover from anaesthesia, you may take shallow breaths and this may lead to fluid in the lungs, poor aeration of parts of your lungs and infection. To prevent this, we encourage you to practise deep breathing using an incentive spirometer. Do alert us if pain prevents you from taking good breaths.

Compression devices may be placed on your legs to prevent blood clots in your veins. We encourage you to sit up and move around when you do not feel much pain. Once you are moving around well, we will remove the compression devices.

PICU stay

Antibiotics will also be administered and you will be monitored closely for any signs of infection.

Typically, you will need to stay in the PICU for about 5 to 7 days. During this time, we will adjust your medications, monitor your urine output and adjust your fluid intake. This is the time when your body is at the highest risk of rejecting your new kidney so we will monitor with blood tests at least twice daily. An ultrasound scan and a nuclear medicine scan will also be done to check your new kidney function.

Before you leave the PICU, generally all your lines except the bladder catheter will be removed. You will then be transferred to the general ward and remain hospitalised for a period of 2 to 3 weeks.

In the general ward

You should start to feel much better in the ward. At this stage, you should only need oral pain relief medication and your wound should be healing well. We will continue to monitor your abdominal wound, kidney function and urine output. Blood tests will also be done less frequently, from daily to every other day. You will have your medications adjusted and you will learn how to manage your new kidney and medications.

Shortly after or before you are discharged, you will need to return to the operating room to remove the ureteric stent placed during surgery. You may feel a stinging sensation while passing urine in the 24 hours after removal of the stent. If you still have your PD or HD catheter at this time, it will also be removed.

At home

During the first few months after transplant, we will need to see you frequently in clinic (3 times a week) to review medications, urine output, weight and blood pressure. This is a crucial period as your chances of rejecting the new kidney are still high while we decrease the amount of immunosuppressant medications. You are also still at risk of infections.

After a few weeks, you should be able to return to school. You may feel tired initially and have trouble concentrating on complicated tasks. Sleep may be disrupted and you may find that you need naps during the day. It takes a while to adjust back to routines and it may take some time to learn new ones e.g. new timings to take medications.

While you are recuperating at home, please avoid crowded areas such as shopping malls, supermarkets and cinemas as you are most likely to get infections during this time. Please remember to obtain information regarding your transplant from us. This will be provided to your school, especially regarding your increased infection risk.

Long-term care

Generally when your kidney function becomes stable, we will only see you in clinic once a month for a blood test and a health check. Sometimes, you may need to be admitted to hospital for special tests and/or treatments.

There is an increased risk of having heart disease and cancer in the long term. This risk however, is much less than being on dialysis long term. It is important to remember that although there are less fluid and food restrictions after transplant, you are encouraged to eat more fresh fruit and vegetables, less fried and fatty foods and exercise regularly to keep your heart disease risk as low as possible. You may need regular echocardiograms and blood pressure monitoring to continue to monitor your heart function and risk of heart disease.

In terms of cancer risk, monitoring and vaccination are important for infection-driven cancers. Skin cancer is related to exposure to the sun, so avoid being out in the sun in the middle of the day, and use sun block when you are outside. For young girls and women, you will need to learn breast self-examination and practise it regularly.

Kidney transplants do not last forever. The first transplant is the most important, as subsequent transplants will not last as long as the first transplant. Over time, the kidney will slowly lose function due to scarring, low levels of rejection and medication side effects that cannot be avoided. When this happens, dialysis is an option and further transplantation can be discussed.

Although there may be challenges, successful pregnancy is possible. Men with kidney transplants are able to father children. Please note that one of your transplant medication and other medications that you may need to take will cause harm to your unborn baby if you conceive while on the medication.

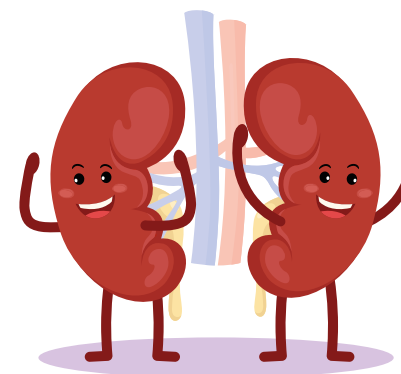
Understanding your transplant medications

Why do I need immunosuppressant medications?

Immunosuppressant medications are needed to protect your new kidney from rejection. Your immune system cannot tell the difference between 'bad' cells i.e. germs, and 'good' cells i.e. your new kidney. Your immune system is also very complex and while some medications are better than others at suppressing the immune system, we are now using a combination of medications in order to target different parts of the immune system to suppress it well and to minimise any side effects from having too much of one type of medication.

Your doctor will order immunosuppressant medications in quantities and doses that are suitable for you. You will be on higher doses of medicine right after transplant as your risk of rejection is at the highest this time. In the first year after transplant, your doctor will decrease the doses of medications you are on, until you reach the minimum safe level to prevent rejection. Following this, the dosage will not change too much except to adjust as you grow. You have to take them as long as you have the kidney transplant in your body.

Taking immunosuppressant medications correctly and on time will help sustain your life.



Please take care of me after the transplant!

- Do not skip any medications and take them as prescribed!
- Drink water often and keep me hydrated!
- Lead a healthy and active lifestyle!

Are there any side effects from taking immunosuppressant medications?

There may be side effects from taking these medications and these vary from individuals. It is important to discuss with your doctor and/or nurse if you are having symptoms that may be side effects from the transplant medications.

Potential side effects may include infection, high blood pressure and high blood sugars.

I have too many medications! What if I have difficulty taking the right transplant medications on time every day?

You may feel overwhelmed by the number of medications that you have to take and find it difficult to remember all the various timings for different medications. If you face difficulty taking your medications, please speak to your doctor to discuss possible options for you.

It is not unusual to forget taking medications once or twice. Some people do this and find that there are 'no consequences', and therefore think that they do not have to take their medications on time or even skip doses. Even if there are 'no consequences' at one time, doing this repeatedly will likely lead to reactivation of your immune system and rejection of the transplant kidney.

Some people feel that the risk of infections is worse than the risk of rejection, and decide to take less medications so they do not get sick so often. If you have strong feelings about this, please discuss your concerns with your doctor instead of changing your medications on your own. We would prefer to reduce medications with you in a safe manner to reduce the risk of infection and rejection as much as possible.

The information provided in this publication is meant purely for educational purposes and may not be used as a substitute for medical diagnosis or treatment. You should seek the advice of your doctor or a qualified healthcare provider before starting any treatment or if you have any questions related to your health, physical fitness or medical condition.