PART-I:

THE ASSESSMENT FOR LIVER TRANSPLANT

LIVER TRANSPLANTATION AT SHIFA INTERNATIONAL HOSPITAL (LIVER FOR LIFE)

INSTITUTE OF LIVER STUDIES
SHIFA INTERNATIONAL HOSPITAL
Sector: H-8/4, Islamabad - Pakistan

Introduction

Welcome to the Liver Transplant Program at Shifa International Hospital. This information pack has been put together to try and help you through the process of assessment, transplantation and recovery. Comments or suggestions about the pack are welcomed and should be sent to our transplant coordinators. Their address can be found at the conclusion of this document.

The Liver

The liver is the largest organ in the body. It is located in the upper right-hand portion of the abdomen, protected by the ribs. It lies beneath the diaphragm and on top of the stomach, right kidney, and intestines. The liver is dark, reddish-brown and weighs approximately one and a half kilograms (3 pounds).

Functions of the Liver

The liver can be considered to be “the factory or chemical laboratory” of the body. Blood flowing in from the portal vein carries all the substances absorbed by the stomach and bowel. The liver cells process this blood and breaks down the nutrients (food) and drugs into smaller building blocks, which the body can use more easily. The liver monitors and controls many of the chemicals in the blood, which are needed to live normally.

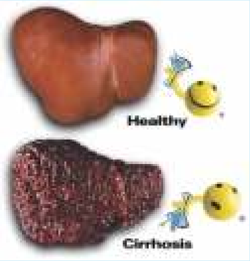
The liver is also responsible for breaking down chemicals, drugs and unwanted material. Some of the waste products generated during this process are eliminated through the bile, into the bowel and ultimately leave the body in the faeces. Other substances (bile acids) are also released into bile to help break down and absorb fat and meat in the bowel during digestion.

The liver has more than 2000 vital functions and some of these better-known ones include:

- Production of bile
- Production of cholesterol and special proteins to help carry

fat through the body
- Controls energy production (storing and breaking down sugars)
- Stores important vitamins including Vitamin A, D, E and K
- Controls the building and breaking down of protein in the body
- Breaks down haemoglobin (blood) and stores iron
- Changes ammonia (poisonous) to urea, which is excreted in the urine
- Clearing the blood of drugs and other poisonous substances (excreted into the bile or blood)
- Building proteins that help the blood to clot
- Protects against infection by producing immune factors and removing bacteria from the blood stream

Liver Disease



You are being assessed for transplant primarily because your liver is no longer functioning well. Liver failure can occur for several reasons. Occasionally, the liver stops working because of a severe, acute damage to the liver (hepatitis, drugs overdose) as is seen in patients with acute liver failure. More often, liver failure occurs due to chronic injury or insult to the liver. This is called chronic liver disease. The majority of patients undergoing liver transplant assessment at Shifa do so as a consequence of development of chronic liver disease and its complications.

Cirrhosis is the term given to scarring within the liver. Scarring occurs as a result of ongoing inflammation or liver damage. This may be related to viral infection in the form of chronic hepatitis C virus or hepatitis B virus infection or due to toxins such as alcohol. Occasionally, people develop cirrhosis through immune damage to the liver (autoimmune hepatitis, primary biliary cirrhosis, and primary sclerosing cholangitis). There are also some genetic causes (inherited) for chronic liver disease, including iron deposition in the liver (hemochromatosis), copper overload (Wilson's disease) and Alpha 1 Anti-trypsin deficiency. Sometimes, it is not possible to identify an exact cause of liver failure (cryptogenic).

Symptoms of Chronic Liver Disease

As described previously, the liver behaves as a factory performing a number of functions. When these functions fail people develop significant problems.

These problems show themselves as:

- ascites (fluid overload)
- coagulopathy (easy bleeding and bruising)
- encephalopathy or confusion
- variceal bleeding
- fatigue (tiredness)
- jaundice (yellowing of the skin)

What are the conditions when you need a Liver Transplant

- Development of above mentioned symptoms
- When you develop liver cancer
- When quality of your life become very poor in term of excessive weakness, lethargy etc

What Happens when you visit Shifa International Hospital for Your Liver disease

Patients are examined by Hepatologist and liver transplant surgeon. After initial assessment (clinical history, blood tests and ultrasound scan) if a patient is a candidate for liver transplant, short briefings are given to the patient and their family regarding the risks and benefits of the transplant operation. Patients are given time to think and plan about transplantation. They are also provided with educational material. Once the patient has made final decision about liver transplantation the detail assessment process is started. Your assessment for liver transplantation may take place either as an outpatient or as an inpatient at Shifa International Hospital.

Your pre-transplant evaluation consists of a number of medical tests designed to give a clear picture of your general health. These tests are performed because the Transplant Team wants to do everything in its power to help ensure that you have a successful transplant. To do this, your general health will be assessed in a systematic fashion. As a consequence, the transplant evaluation may reveal some conditions, which need to be corrected, before your transplant surgery. Occasionally the test may reveal a problem, which makes transplant more difficult or indeed impossible to perform. If such a situation arises, the reasons for these difficulties will be discussed with you and your doctor will attempt to create another possible treatment plan for you.

Stepwise Evaluation:

1. Radiological assessment
- Ultrasound of the abdomen
- CT scan liver dynamics and CT chest to rule out/stage HCC
- MRI and CT brain for selected cases

2. Cardiac Assessment:
- ECG
- Echocardiogram/stress echo including PA pressure
- Coronary angiogram (selected cases)
- Cardiologist comments

3. Pulmonology assessment

4. Nephrology assessment
- CXR
- Pulmonary function tests
- Pulmonologists comments
- Renal functions tests
- Routine urine analysis
- Urine culture
- 24 hour urine study
- Nephrologists comments

5. Dental assessment

6. Psychiatrist assessment

7. Mammography and Gynecological consultation in selected cases

8. Blood tests

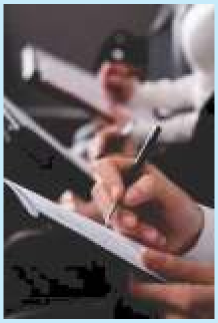
Whom will I meet during this process?
You will meet many members of the transplant team during your assessment, including hepatologists, transplant surgeons, anesthetists, dietician, cardiologist, nephrologist, pulmonologist and transplant co-coordinators. Each member of the team will be evaluating you from his or her own viewpoint. Other specialists in the hospital may be asked for an opinion.

What happens after I have had all these tests and opinions?
"Having all these tests does not necessarily mean that a liver transplant offers you the best treatment option"
The entire liver transplant team meets to discuss the suitability of individual patients for transplantation. After your case has been discussed, one of the team will talk to you about what happened at this meeting. A summary of your assessment will be sent to the doctors who normally look after you.

What should I do if I have questions?
If you have any questions, please do not hesitate to ask any member of the transplant team.

Transplant Assessment Meeting

After completing your assessment for liver transplantation all medical details and results of tests are put together and presented at our Transplant Assessment Meeting. They are attended by members of the transplant team and include: hepatologists, transplant surgeons, anaesthetists, transplant coordinators, intensive care team and nursing staff.
The assessment by the team will consider whether



transplantation is appropriate for you and the likelihood of success. If the chances of success are less than 50% (at five years after transplantation) then the current guidelines are that transplantation should not be offered. If transplantation is not considered appropriate or that the risks are too high then the medical team responsible for your care will provide a clear plan of treatment, which will be recommended to your GP (home doctor) and hospital consultant. If transplantation is considered to be appropriate for you then this will be discussed with you and you will have to make a decision as to whether you wish to go forwards and transplant date is decided

Communication and self-reporting

After you have been accepted for liver transplantation and completed the education programme, the transplant co-ordinator will tell you that you have been formally listed.

While you are on the waiting list it is essential that we are always able to contact you at short notice so that you do not miss out on the opportunity of a liver offer. We ask that you and your family are responsible for telling us about any of the following changes:

- Any change in your health
- Any admission/discharge to hospital
- Any infection/temperatures/changes to treatment
- Any changes of address, mobile or fixed telephone numbers
- Any major worries or concerns that may develop
- Any holidays or weekends away

To contact the transplant co-ordinators telephone:

Waiting Period For Liver Transplantation

During the waiting time we ask that you take good care of yourself. You should:

- Eat healthy foods (Shifa's dietician can provide you with advice and an eating plan).

- Take regular physical activity such as walking.

- Stop smoking, as this will improve your chances of avoiding serious chest infections and survival after transplantation. In the long term it will significantly reduce the risk of cancer of the mouth and lungs. If you are a heavy smoker then you may not be considered a suitable candidate for transplantation.

- Not drink alcohol, as this will cause further damage to your liver. If your transplant is being performed for alcohol-related liver disease, failure to abstain from alcohol will be considered as failing to comply with treatment and will result in you being withdrawn from the waiting list.

Follow Up During Waiting Time

After you have gone onto the liver transplant waiting list you will have a follow-up appointment with a consultant transplant surgeon at which you will be asked to sign the consent form for the operation. Your medical follow-up during the waiting time will be at here. If you have been referred from another hospital, your local consultant will continue to provide your medical care although you will be asked to come up to Shifa's occasionally.

Remember it is your responsibility to keep the transplant coordinator up to date with changes in your condition or contact details.

Vaccination Before Liver Transplantation

Please note advice regarding vaccination is continually being updated. Please ask us for the most up to date information.

- Vaccines may consist of either a live attenuated form of the virus (“live”), or an inactivated form of the virus/viral exotoxins (“killed”).
- For certain groups of patients live vaccines <u>should not</u> be given. These include:

    - Patients on immunosuppressant therapy (This will apply after your liver transplant - please see vaccination and travel advice post transplant. However some patients may be on immunosuppressants <u>before</u> their transplant)
    - Patients receiving chemotherapy/radiotherapy (or within 6 months of treatment)
    - Patients receiving high doses of prednisolone
    - Patients who are HIV positive

Please note this is <u>not</u> a full list of patients who cannot have live vaccines. We will be able to advise you on an individual basis. Your immunisation history should be checked before transplant to ensure that you have received the normal childhood immunisations and appropriate boosters.

- Where there is uncertainty, titres should be checked and boosters given where necessary. We can advise you on which boosters are necessary and how these are given as appropriate.
- In addition to your normal childhood immunisations all patients with chronic liver disease are advised to receive the vaccines detailed below.

Vaccine	When	Comments
Influenza vaccine	Annually, in autumn	This can be given by your GP
Pneumococcal vaccine	Adults: single dose (Pneumovax II). Given as an intramuscular injection or deep subcutaneous injection.	Revaccination is usually avoided due to severe reactions occurring with the second dose. If it is decided necessary (low titres) then an interval of 5-6 years should be left before re-administering the vaccine.
Hepatitis A		Booster doses may be required after 10 years

Pre Transplant Dietary Advice

During your hospital stay you may experience:

- Loss of appetite
- Reduced food intake
- Unintentional weight loss
- Increased nutritional requirements, due to your illness
- You may be asked for salt restriction

Your doctor may have advised you to follow a high protein and high calorie diet and requested review by a dietitian. Apart from the meals provided by the hospital you can request extra snacks from your nurse and/or ward hostess

PART-II:

THE TRANSPLANT
(TRANSPLANT SAVE LIVES)

LIVER TRANSPLANTATION AT SHIFA INTERNATIONAL HOSPITAL
(LIVER FOR LIFE)

LIVER TRANSPLANTATION

RISKS AND BENEFITS OF LIVER TRANSPLANTATION

What are the likely benefits of a liver transplant?

The benefits that you will notice from a successful transplant will depend on the problems that your liver is causing you. The most common problems are vomiting of blood or passing blood in your motions (melaena), abdominal swelling due to fluid accumulation (ascites) and episodes of confusion (encephalopathy). If your transplant is successful, these problems should be cured.

Other problems that you might have noticed are severe tiredness, itching and yellow skin and eyes (jaundice). These symptoms improve after a successful transplant. By treating these symptoms, we would hope that your quality of life would be better after the transplant. The main benefit of a liver transplant is that we would expect you to live longer than you would have done without it.

Are there any risks?

All operations have risks. A liver transplant, because it is such a big operation, has many risks, or complications. Some of the complications are easily treated, but others are more serious and can lead to death.

To put these risks in perspective, for every 100 patients that have transplant for chronic liver disease, 90 are alive a year after the transplant, and most of these will be enjoying a better quality of life than before their transplant. Five years after the transplant at least 70 of these 100 recipients will be alive. These figures apply to patients who are living at home at the time that they are called in for their transplant. The risks are higher for patients who are in hospital whilst waiting for transplantation.

Complications can be separated by time after transplant into three groups:

- Immediate complications, which occur within the first 48 hours after surgery
- Early complications, occurring within three months of the operation
- Late complications, occurring after three months.

Many of the late complications are caused by the medication given following the transplant to prevent the liver from being rejected. These complications are described in subsequent sections of this pack.

Anaesthesia For Liver Transplantation

An anaesthetist will have already seen you when you were being assessed for surgery. They will be kept up to date with any changes in your health since you went on the waiting list. The next time you meet them will be on the ward shortly before the operation.

Usually, you will receive a “pre med” injection (a sedative) on the ward just before going to theatre to make you feel less anxious. Your relative(s) will be invited to accompany you as far as the operating theatre, but will be taken back to the ward before you are given your anaesthetic.

When you get to theatre the anaesthetist will measure your blood pressure, oxygen levels and heart rhythm. You will be asked to breathe some oxygen before you go off to sleep, but because of the pre-medication you may not remember this

.

After you go to sleep, a special tube is placed into your wind-pipe (Figure 6). This allows us to breathe for you whilst you are asleep; this will not be removed until you are awake on the intensive care unit after your transplant.

Figure Tracheal intubation

The anaesthetists spend time inserting drips and 'lines' before your surgery starts . These are designed to allow us to give you fluids, monitor your blood pressure, monitor pressures in your heart and sometimes measure how hard your heart is working. This allows the anaesthetists to decide which fluid and drugs you may need during the operation. The amount of monitoring will depend on how severe your disease is and any other medical problems that you may have.

During your anaesthesia you will need to have:

- A tube which passes into the windpipe from the mouth -this is attached to a ventilator to assist your breathing. It remains in place until you wake up and are able to breathe on your own in the Intensive Care Unit.
- A tube that passes into the stomach via the nose - this is to prevent your stomach becoming distended or bloated during the operation. It remains in place until you are ready to drink fluid.
- Several drips are placed in the veins of the neck and forearms. These are used to give fluid and drugs and to monitor your condition. They remain in place until your condition is stable and you are able to drink fluid on your own.
- ECG electrodes, which are placed on your chest to monitor your heart rate during the operation.

A catheter (tube) inserted into your bladder, which drains urine until you are, awake enough to go to the toilet unaided.

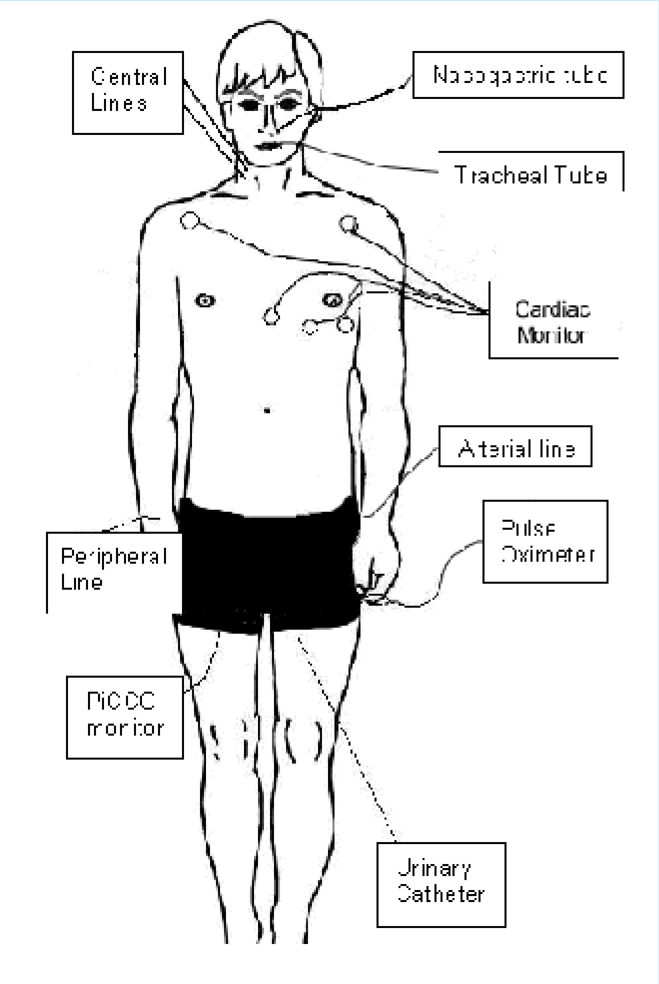


Figure . Anaesthetic preparation

While you are unconscious and unaware your anaesthetist will be in the operating theatre looking after you and will remain with you at all times. He or she monitors your condition and administers the right amount of anaesthetic drugs to maintain you in the correct level of unconsciousness during your surgery. Your anaesthetist is constantly aware of your condition and trained to respond. Your anaesthetist will be monitoring such factors as heart rate, blood pressure, heart rhythm, body temperature and breathing. He or she will also constantly watch your need for fluid or blood replacement. If you have any other medical conditions, your anaesthetist will know of these from your pre-operative assessment and be able to treat them during surgery.

Pain relief

Good pain relief is important. It prevents suffering and helps you recover more quickly. Your anaesthetist will probably discuss different pain-relief methods with you before your surgery so you can make an informed decision about which you would prefer.

- Some people need more pain relief than others. Worry increases the pain people feel.
- Pain relief can be increased, given more often, or given in different combinations.
- Occasionally, pain is a warning sign that all is not well, so please tell the nursing.
- Good pain relief helps prevent complications
- If you can breathe deeply and cough easily after your operation, you are less likely to develop a chest infection.
- If you can move around freely, you are less likely to get blood clots (deep-vein thrombosis or DVT).

It is much easier to relieve pain if it is dealt with before it gets bad. So, you should ask for help as soon as you feel pain and continue the treatment regularly.

Blood transfusion and blood products

Improvements in surgical technique and anaesthesia have resulted in large reductions in the amounts of blood loss during surgery, and the average requirement for transfusion is now four units of blood.

We will make a considerable effort to minimize the use of blood provided by our hospital blood bank; as we routinely use a 'cell-saver'; a machine, which can wash your own blood lost during the operation so that it can be given back to you. However in some circumstances, blood loss can be significant and you may require large amounts of blood and clotting products. As the diseased liver is removed, it can no longer make or release clotting products, this may require infusion of plasma from the blood bank, which contains clotting products.

The anaesthetist will be constantly checking blood results as well as how well your blood is clotting during the transplant to make sure that you get the right products to try and limit bleeding. Sometimes drugs are given in addition to try and improve clotting (Aprotinin or Tranexamic acid), these are usually only given when we expect there to be a high blood loss or where clotting is extremely abnormal before the start of the operation.

Transfer to Intensive Therapy Unit (ITU)

After your transplant operation, you will be transferred to ITU. You will be kept sedated during this period and won't remember anything. Once you arrive in the ITU, the anaesthetists will hand over care to the intensive care doctors and nurses, informing them of what has happened during the transplant as well as other important information relevant to your care. During your transplant operation, the transplant coordinators will keep your relative(s) updated on progress on a regular basis.

Safety in anaesthesia

Anaesthesia is necessary to allow surgery to be carried out safely and in comfort. The benefit of anaesthesia is that it will remove pain and sensation. This benefit needs to be weighed against the risks of the anaesthetic procedure and the drugs used. This will vary from person to person.

It is difficult to separate these risks from those of your operation or procedure and your general health.
The risk to you as an individual will depend on:

- Whether you have any other illness
- Personal factors, such as whether you smoke or are overweight
- Whether the surgery, is complicated, long or done in an emergency.
- Side effects and complications of anaesthesia

TRANSPLANT SURGERY

Living related liver transplantation

Living related liver transplantation was started in the early 1990's to overcome a shortage of livers for children. Due to scarcity of cadaveric organs in Asian countries, living donor liver transplant is the main stay of treatment for patients with end stage liver disease. In this procedure, part of a parent or relatives liver, is surgically removed and transplanted into the recipient. It has now become possible to donate the right or left lobe to an adult. The risks of this procedure are greater and the results are comparable to whole liver transplantation.

Living related liver transplantation is at present the main source of liver transplantation in Pakistan, both in children and adults.
As living donation is not risk-free, a thorough medical, psychological and social assessment of the potential donor is performed to ensure that the medical risks are as low as possible (see information leaflet on living donors).

PART-III:

THE POST TRANSPLANT CARE
(GIFT OF LIFE FOR YOU ....and....
THE LIFE GOES ON)

LIVER TRANSPLANTATION AT SHIFA INTERNATIONAL HOSPITAL (LIVER FOR LIFE)

EARLY POST-TRANSPLANT PERIOD

Intensive Care Unit Stay

All adult patients return to the Intensive Therapy Unit immediately after their liver transplant. The majority of people who receive a liver transplant will stay in the ITU for 48-72 hours.

Immediate Postoperative Phase

At the end of the operation, you will be transferred to the Intensive Care Unit (ITU). At this point you will be asleep and sedated and will be unaware of this process. In the first few hours after transplant, we will be assessing you to make sure that there is no serious bleeding and that your new liver is functioning well.

You will be attached to a breathing machine (ventilator) and we will continue to monitor your heart rate and rhythm, blood pressure, urine output and the levels of oxygen and acid in your blood. All of the drips and tubes that were inserted whilst you were in the operating theatre will still be present. Using this information we can decide which fluids and drugs that you need. During this period you will be examined by the doctors responsible for the ITU and also receive one-to-one nursing care. As soon as you return from the operating theatre, we will perform more blood tests, to check liver function and clotting, and also a chest x-ray and ECG. We will try to allow your immediate relatives to visit during this period after surgery.

What happens next?

If everything is going smoothly, and your new liver is working well, we will normally stop the sedative drugs after a few hours. This will let you wake up gradually and start breathing with just a small amount of help from the ventilator. Once the ITU team feels that the liver is working and you are awake, we will remove the breathing tube from your mouth and windpipe, and you will be able to talk. You will need to be wide-awake for this to happen. Some people find having the tube in place tolerable, but others find it a bit uncomfortable.

Please try and be patient whilst we make sure removing it is the right thing to do. After the tube is removed, you will have extra oxygen given by a facemask. It is quite common to have a sore throat or a hoarse voice for a short time. Once the breathing tube is removed it is important that you practice deep breathing exercises and cough. This is important in trying to prevent breathing problems and chest infections in the post-operative period. The nurses and physiotherapists will help you with these exercises and also encourage you to move around as soon as you are able. Pain is a concern for most people before surgery. During the transplant operation, you will be given a continuous infusion of painkillers as well as the anaesthetic. When you are transferred to the ITU, painkillers will be given on a regular basis, usually as an injection.

It is important that you ask for pain relief before the pain becomes too bad, as this will prevent you from taking deep breaths and moving around. Despite the large surgical incision, people do not seem to have a lot of pain after a liver transplant compared to other operations with the same wound. As mentioned before, when you first arrive in the Intensive Care Unit, you will have all the drips, 'lines' and tubes that you had during surgery. We try to remove them as soon as possible, but this depends on how unwell you were before and during the transplant together with how quickly your new liver starts working.

You will wake up with:

- A large drip in your neck (a central line), this is used to give fluid and drugs and can be used to give the doctors and nurses information about the pressure in your heart.
- A line in the artery in your wrist (arterial line), this tells us about your blood pressure heartbeat to heartbeat as well as allowing us to take blood samples without any more

needles. It gives us information about your oxygen, carbon dioxide and acid levels in your blood.

- A tube through your nose and into your stomach (a naso-gastric tube), this drains fluid from your stomach during surgery and (depending on the type of transplant) can be used to feed you until you are able to eat and drink. We also give you drugs down this tube.
- A tube into your bladder (a urinary catheter), this allows us to measure the amount of urine produced every hour.
- A tube coming out of your abdomen (a surgical drain), to allow us to monitor any bleeding and also to allow fluid to drain out rather than collect inside.

As you begin your recovery the intravenous lines and tubes will gradually be removed and you will be more comfortable. Everyone who has had a liver transplant will receive antibiotics, although the type of antibiotics you receive and for how long will depend on your case. Other drugs that everyone receives include immunosuppression (anti-rejection) drugs and antacids. We routinely perform blood tests early in the morning to assess your progress. We may also repeat the chest x-ray. All patients have an ultrasound scan of the liver on the first day after their transplant; we especially check the blood flow to your new liver. All of these tests are done in the ITU without you having to move.

How long will I stay on the Liver ITU?

The length of stay depends on your recovery and it is difficult to generalize. However, most people stay in the ITU for two to four days post-transplant if everything goes smoothly.

What about visitors?

You are welcome to have visitors during your stay on ITU thought we ask that this is limited to one per patient at any time. Normal visiting times are between 5pm and 7pm with two breaks during Medical and Nursing 'handover' which marks the change of staff shifts. You can imagine how complicated handing over the care of the ITU patients can be, and sometimes this does take a while. When there are special circumstances, the Nurse in Charge of the ITU can arrange visiting outside of these times. Before seeing you, we ask that all visitors remove their outdoor clothing and wash their hands. This is important in reducing the risk of infection after surgery. Daily routine in ITU

- Handover' ward rounds: These rounds allow the nurses and doctors to discuss progress and any changes in patients' conditions. They also use this time to handover from the day to night shift. The doctor's rounds start at 8am and 6pm and the nurses' rounds start at 8am and 8pm and last for one hour.
- Daily consultant ward round: This is a more detailed ward round where all the patients in ITU are seen. It takes several hours to review the previous 24 hours active problems / concerns, examine the patient and discuss the plans for the next few hours. The ITU doctors, physiotherapist, pharmacist and your nurse will discuss your progress and any changes in care. If you are awake we will include you in the discussions.
- X-ray round: 'Routine' chest x-rays will be performed early in the morning.
- Physiotherapist ward round: The physiotherapy team assess and treat every patient in the morning and may also come back in the afternoon.
- Evening Transplant Meeting: This meeting happens at 5pm, when the whole transplant team discusses the progress of all patients after their transplant. They will look at blood results and plan changes in medications or further investigations.

Liver transplantation is a major undertaking. In the vast majority of cases everything runs smoothly and you will stay in LITU for 24-48 hours and then be well enough to transfer to the ward. However, unexpected complications can occur leading to a longer ITU stay.

Early Complications of Liver Transplantation

Immediate complications

These are problems that can occur within the first 48 hours after the transplant.

- Heart problem: The operation of liver transplantation can place a big strain on your heart. This strain is at its greatest soon after blood starts flowing through the new liver. At its worst this can cause your heart to stop beating effectively. On rare occasions (less than one in 200 cases) it is not possible to restart you heart, which is fatal.

- Bleeding: During the operation there will be bleeding. Your own blood can be given back to you immediately but in addition it is highly likely that you will receive a blood transfusion. Sometimes bleeding starts again after the end of the operation and it may be necessary to perform another operation to stop this. If this happens you will need to remain in ITU for a longer period.

- The new liver doesn't work ('Primary non-function'): In about 2% of cases the new liver doesn't work at all, this is called primary non-function and becomes obvious over the first few hours after the operation. This is life threatening. In this situation you would need to have a second transplant as an emergency, but this would depend on a suitable liver donor becoming available.

- The new liver doesn't work as well as it should do (Primary dysfunction). This is called primary dysfunction and is similar to primary non-function but less severe. You would need to spend several days on ITU while your liver recovers and starts to work better.

- Blockage of the artery to your liver (Hepatic artery thrombosis): The blood vessel that brings oxygen to your liver (the hepatic artery) is a very narrow tube, often only a few millimeters wide. The join between your hepatic artery and that of the new liver is one of the most difficult parts of the whole operation. Occasionally the hepatic artery can block off soon after the operation and if this happens you may need another operation to try to unblock it, or even second transplant as an emergency. Hepatic artery thrombosis occurs in three out of every 100 transplants.

- Kidney failure (Renal failure): Your kidneys may be affected by the operation and may stop working temporarily. This is more likely to occur if you have had kidney problems before the operation. If you do develop kidney failure, you will need treatment with an artificial kidney machine until your kidneys recover, which can take anything up to six weeks. This combination of problems can often prolong your stay in ITU.

Early complications

These problems can occur within the first month after the transplant)

- Infection: Infection is the most common complication after all major surgery, especially chest infection. Transplant recipients are at higher risk than normal because of the immunosuppression medication required to protect the liver.

- Bile leak. One of the jobs of the liver is to produce bile, which passes down the bile duct into the intestines where it helps digest food. During a liver transplant the bile duct of your new liver is joined to your own bile duct. This joint can sometimes leak. If this happens you may need a special endoscopic procedure (an 'ERCP') or further operation to correct it.

- Leak from the bowel (perforation): Sometimes the bowel itself can leak. This is more likely to occur in people who have had previous surgery, which has resulted in a lot of scar tissue (adhesions) between the bowel and the liver. This problem always requires an operation to treat it.

- Acute rejection: In order to live normally our body has to fight off infections. This is done by the immune system. Just as the immune system attacks infections due to bacteria and viruses, after a transplant it also tries to attack your new liver, because it sees the liver as different to you. This process is called rejection. In order to prevent rejection you will have to take tablets that dampen down the immune system so that it does not attack your new liver. These medications are called immunosuppressants. Despite taking immunosuppressants, rejection may occur during the first few weeks after the transplant; this is usually only detected on blood tests – you may feel fine. You will be treated with immunosuppressants in higher doses for a few days and the rejection usually settles with this treatment. If it is successfully treated as described above, it will have no long-term effect on your new liver.

- Bleeding: As well as the immediate bleeding problems described above, bleeding can occur unexpectedly at any time in the first three weeks after the transplant. This may require another operation and another admission to the ITU.

Recovery in the Ward

Once your condition stabilizes you will be transferred from the ITU to our specialist transplant ward. Your length of stay in hospital will be about 18 days but it may be longer or shorter depending on your progress. You may feel quite low in mood at times during the first or second week; this is due to the fact that you have come through a period of uncertainty and serious illness. Some of the important medications you are taking can also contribute towards mood changes. Our staff and your family will provide additional support. Your relatives will be worried about you and will need reassurance that all is going well. The transplant co-ordinator will visit at regular intervals to give advice and support. If you are experiencing any difficulties, worries or concerns, that you discuss these with your designated transplant co-ordinator. You may find it helpful to write questions down as you think of them.

As your condition improves you will require less monitoring. ECG leads and finger probe for measuring oxygen levels may have already been removed in ITU. Over the following days the various tubes will be removed and you will be encouraged to move about, wash and take care of your own needs. On the ward, the nurse who is looking after you will also have other patients to care for. The nurse is part of a large team looking after you, which includes doctors, nursing staff, physiotherapists, occupational therapists, pharmacists, dieticians and transplant co-ordinators.

Pain relief

It is normal to experience some pain after your transplant; however, the doctors looking after you will have prescribed regular painkillers. If this is insufficient you can ask for more. Pain relief is important and you should not let it become too severe before asking for tablets as they may take a while to work. If you are in pain it will restrict movement and stop you from doing your breathing exercises. You may also experience back pain after your surgery, but it will improve as you become more mobile.Supporting your scar while moving or coughing will help reduce pain. The physiotherapist can advise on the correct technique if you are not sure. You may also experience a sore throat; as a result of the breathing tubing that was in place whilst on ITU.

Mobilisation

Mobilising is an important part of your recovery process. You will be encouraged to sit out of bed and walk around the day after you arrive on the ward. This may be difficult at first due to the urinary catheter and central line; however, the nurses will help. If you do have drips and a catheter, the physiotherapist may instead ask you to walk on the spot to help early mobilisation and this will also help to clear your chest. The nurses will help you put on supportive stockings (TED stockings) which can be removed when you are walking regularly. These help prevent deep vein thrombosis (DVT). Mobilising is important for several reasons:

- Reduces back pain
- Helps bowel movement
- Reduces the chance of getting a chest infection
- Reduces the risk of deep vein thrombosis
- Maintains and improves movement of joints and helps strengthen muscles.

Deep breathing

Deep breathing along with moving about helps decrease the risk of a chest infection. The physiotherapist will teach you how to do deep breathing exercises correctly. It is important that you do these regularly.

Eating and drinking

The doctors will inform you when you can start eating after your operation. This will depend on the type of operation you have had and will vary from one to five days. You would normally start by taking sips of water and gradually build up. You may experience nausea and therefore it is important to inform the nurses who will be able to give you medication to relieve this. The dietician will continue to visit and provide advice.

Further investigations

As part of your recovery process you will be closely monitored with daily blood tests, regular ultrasound scans and a liver biopsy (if rejection is suspected).

Sleep

This may be made worse by the different medications that you are taking and the stress of surgery. This may cause you to have vivid dreams and/or nightmares. These dreams may also happen during the day and are called hallucinations. These can be disturbing, however, the doctors and nurses are aware that they can happen, and will make sure that you are safe..

Preparation for Discharge Home

As soon as you return to the ward from ITU the transplant team will work with you to prepare for your discharge home.The prospect of going home at this early stage post transplant may make some people feel anxious, but careful planning of discharge will provide you and your family/carer with the information necessary to manage.

To help prevent rejection of your new liver, you will have been started on immunosuppression medications. Part of your post-operative education is aimed at learning about medication and their potential side effects. Our aim is that you should feel confident about taking your medication before returning home.

SELF- MEDICATION PROGRAM

What is self-medication?

Self-medication is a scheme that allows you to get used to taking your medicines whilst in hospital. It is designed to improve your knowledge about your medicines so that you are able to take them independently and safely when you get home. We aim to ensure that all patients are self-medicating for at least 48 hours before being discharged home.

Why should I self-medicate whilst I am in hospital?

Self-medication allows you to take your medicines as you would at home. This provides you with the opportunity to discuss any changes and raise any problems you may have while managing your medication. Your hospital stay can seem long, particularly when you are not mobile following major surgery such as a transplant. Self-medication allows you to take charge of your life and be responsible for your own medicines.

What do I need to learn before going home?

You are encouraged to:

- o Identify your medicines
- o Know when and how to take them
- o Gain an understanding of what they are for

How does it work?

- o Step 1: Assessment

  A transplant co-coordinator will visit you during your recovery. He/she will talk about the self-medication program and give you reading material. You will then be asked to sign a consent form to be involved.
- o Step 2: Supply

  Once the consent form is signed, your medicines and medication record card will be ready within 24 hours from Pharmacy. The medication record card records your name, tablet strength, dose (how many to take), and time to take your medicines and what are they for.
- o Step 3: Medication Counselling

  You will have post-transplant education sessions with the transplant co-ordinator who will talk you through your medicines. You should then be ready to start self-medicating. The pharmacist will also come and further discuss your medicines.
- o Step 4: Self-medication

  At medication rounds the nurse will give you a bag containing your medicines. You should use the medication record card to identify the medicines to be taken at that time and put them in the small paper cup provided.

  Ask the nurse to check if you have selected the correct medicines for that time of day before you take them. The whole self-medication process will be supported by the nurses who will monitor your progress and assist you when you have difficulty taking your medicines.

What happens if the dose changes?

Doses are still being adjusted while you are in the hospital. If the doses of your medicines change the nurse should update your card for you. For anti-rejection medicines, the dose will be printed on the label. You should take your medicines according to the instruction on the card.

What happens when I go home?

The liver pharmacist/nurse will provide medication counselling before your discharge. With your permission, medicines that have been stopped will be discarded. You will be given at least two weeks' supply of all medicines for going home. You will also be provided with an up-to-date list of your medicines.

Remember that not taking your medication at the right time and in the correct amount is one reason for transplant failure. You are responsible for making sure you do not run out of your medications.

What if I am still worried?

If you have any doubts ask the nurse, the liver pharmacist or transplant co-ordinator. The liver pharmacist visits the ward daily. This is the time for you to raise any questions so that any difficulties with your medicines can be resolved before you go home. You can contact the Transplant Unit for advice in an emergency.

Medications after Liver Transplantation

General Information about taking your medicines

This information is designed to give you some general background knowledge about your medicines. It does not contain fully comprehensive information so it may not list all known side effects. Always read the package insert with your medicine. If you have any concerns or questions about any medicines you are given please ask your doctor or pharmacist.

- Your liver is responsible for the metabolism (“break down”) of medication in your body.
- When your liver is not working properly, drugs may not be broken down as efficiently.
- This means that you may need smaller doses of drugs. It may also mean that you may be more susceptible to certain side- effects (for example: drowsiness)
- Let your doctor know if you experience any unwanted effects from your medicines (even if they are not mentioned in the leaflet), particularly if they persist.
- Check with your doctor/pharmacist before starting any new medicines, including herbal and over the counter medicines.
- Whilst taking immunosuppressants you must never receive live vaccines.
- Whilst taking immunosuppressants women of child bearing age should use contraceptives. Please speak to your doctor for advice
- If you have to come into hospital, always remember to bring in your medicines.
- Always bring in an up-to-date list of your medicines when you come to the outpatient clinic. Medicine record cards are available.
- When you are discharged from hospital you will receive at least two weeks supply of your medicines.

“Remember you must not run out of your medicines”.

Medications commonly used in liver transplantation

These are some of the medicines frequently used before or after liver transplantation. They are listed in alphabetical order. This information should be used in addition to the medicine package insert. If you have any queries about your medicines contact the transplant team

Tacrolimus

Tacrolimus is one of a group of medicines called immunosuppressants (anti-rejection agents).

What is Tacrolimus used for?

Tacrolimus is used to prevent your body rejecting the new liver.

How should I take Tacrolimus?

Tacrolimus should be taken twice a day, approximately12 hours apart. It should be taken on an empty stomach or at least one hour before, or two to three hours after food. They should be swallowed whole with water. Do not drink grapefruit juice; pomelos or Seville oranges (usually found in marmalade) while taking Tacrolimus.

The exact amount of Tacrolimus you need has been carefully worked out just for you. Taking too much may increase the chance of side effects, while taking too little may lead to rejection of your new liver. The dose you take depends on a number of factors. These include: the level of Tacrolimus in the blood; your kidney and liver function; and your general response to your medicines. Initially higher levels of Tacrolimus will be aimed for and then they are gradually reduced over the weeks and months following your transplant. You must follow your doctor's instruction on how many capsules to take.

Stopping Tacrolimus may increase the chance of rejection. Do not stop taking Tacrolimus unless your doctor tells you to. Remember you must not take your Tacrolimus on the morning of your clinic visit. Bring the dose with you to take immediately after your blood test.

What are the side effects?

As with any medicine, Tacrolimus can cause unwanted effects. These can include:

- Trembling and numbness of hands and feet.
- Muscle cramps.
- Headache.
- Visual disturbances, for example double vision.
- High blood glucose levels (which may lead to diabetes)
- High blood pressure, which may require treatment.
- Tacrolimus may affect your kidney function. This will be regularly monitored in clinic.
- Increased risk of developing infections. Report any signs of infection e.g. sore throat to your doctor.
- Increased risk of developing cancer, particularly of the skin.

You should wear protective clothing and use a sunscreen with a high protection factor when taking Tacrolimus to limit your exposure to sunlight and UV light.

You must not receive live vaccines while on Tacrolimus. Effective contraception must be used during therapy, and for four weeks after stopping Tacrolimus. Please consult your doctor or pharmacist for the choice of contraception.

What if I take too many tablets?

Contact your doctor immediately.

What if I forget to take a dose?

If you forget to take a dose, take it as soon as you remember and then continue as normal. If it is less than six hours before the next dose, skip the missed dose and continue as normal. Do not take extra tablets to catch up.

Mycophenolate Mofetil

Mycophenolate Mofetil is one of a group of medicines called immunosuppressants (anti-rejection agents).

What is Mycophenolate used for?

Mycophenolate is used with other immuno-suppressants to prevent your body rejecting the new liver. If you develop problems with your kidneys as a result of Tacrolimus, Mycophenolate may be added to reduce the amount of Tacrolimus you need.

How should I take Mycophenolate?

As with any medicine, Mycophenolate capsules or tablets should be swallowed whole, preferably on an empty stomach. You should take it twice a day; approximately 12 hours apart. Stopping Mycophenolate may increase the chance of rejection. Do not stop taking Mycophenolate unless your doctor tells you to.

What are the side effects?

As with any medicine, Mycophenolate can cause unwanted effects. These can include:

- Indigestion, diarrhoea, nausea and vomiting. If you experience severe stomach pains contact your doctor.
- Bruising or bleeding. If you experience either of these contact your doctor.
- Increased risk of developing infections. Report any signs of infection, for example a sore throat to your doctor.
- Increased risk of developing cancer, particularly of the skin.

  While taking Mycophenolate you must wear protective clothing and use a sunscreen with a high protection factor to limit your exposure to sunlight and UV light.

  You must not receive live vaccines while on Mycophenolate. Effective contraception must be used during therapy, and for six weeks after stopping Mycophenolate. Please consult your doctor or pharmacist for the choice of contraception.

What if I take too many tablets/capsules?

Contact your doctor immediately.

What if I forget to take a dose?

If you forget to take a dose, take it as soon as you remember and then continue as normal. If it is less than six hours before the next dose, skip the missed dose and continue as normal. Do not take extra tablets to catch up.

Prednisolone

Prednisolone is one of a group of medicines called steroids (naturally occurring hormones).

What is Prednisolone used for?

Prednisolone is used to treat many different conditions. Prednisolone is used with other immunosuppressants (anti-rejection agents) to help stop your body rejecting the new liver.

How should I take Prednisolone?

Prednisolone is taken once a day in the morning. Taking Prednisolone with or after meals will help to prevent it irritating your stomach. We recommend the coated Prednisolone tablets to help protect your stomach. They come in 5m strengths and the tablets should be swallowed whole. The dose of Prednisolone is usually decreased gradually over the weeks and months following transplant. You should follow your doctor's instruction on how many tablets to take. Do not stop taking Prednisolone unless your doctor tells you to.

What are the side effects?

As with any medicine, prednisolone can cause unwanted effects. These include:

- Stomach irritation, indigestion or stomach ulcers. You will be given omeprazole to help prevent these unwanted effects.
- Salt and fluid retention, which can lead to increased blood pressure.
- High blood glucose levels (which may lead to diabetes).
- Mood swings, for example your emotions may swing from very happy to depressed.
- Skin changes, for example skin thinning, bruising, delay healing and acne.
- Osteoporosis (softening of bones) with long-term use of prednisolone.
- Increased appetite, which can lead to weight gain.
- Increased risk of developing infections. Report any signs of infection to your doctor e.g. sore throat.

You must avoid close contact with people who have chicken pox, shingles or any other infectious disease. If you do come into contact with any of these (even if it is up to three months after stopping treatment) contact your doctor immediately.

You will be given a blue 'steroid card' from either your doctor or pharmacist when you are given your medicine. It is in your best interest to carry the card with you at all times because it contains useful information if you were to fall ill or be involved in an accident.

What if I take too many tablets?

Contact your doctor immediately.

What if I forget to take a dose?

If you forget to take a dose, take it as soon as you remember and then continue as normal. If you do not remember until the next day, skip the missed dose and continue as normal. Do not take extra tablets to catch up.

Aspirin

What is Aspirin used for?

Aspirin is used to prevent blood clots from forming in the vessels supplying blood to your new liver. It is also used to reduce blood clots in the arteries to prevent angina and clotting in coronary artery grafts and valves, which have been replaced or repaired.

DO NOT take other medicines containing Aspirin. Some painkillers like Ibuprofen (Brufen) may interfere with the way your blood clots and increase the risk of bleeding. If you need a painkiller, use Paracetamol instead. If you are in any doubt, ask your doctor or pharmacist.

How should I take Aspirin?

Aspirin is dispensed as 'dispersible' tablets. It should be dissolved in water before taking once a day, with or after food/milk.

What are the side effects?

Aspirin can cause some irritation of the stomach wall. This is reduced if the dispersible tablets are dissolved in water before swallowing with or after food. If you develop stomach pain please consult your doctor. Other side effects include indigestion, nausea and vomiting, breathing difficulty (particularly if you have asthma), gut ulceration and bleeding.

What if I take too many tablets?

Contact your doctor immediately.

What if I forget to take a dose?

If you forget to take a dose, take it as soon as you remember and then continue as normal. If you do not remember until the next day, skip the missed dose and continue as normal. Do not take extra tablets to catch up.

Fluconazole

This is one of a group of medicines called anti-fungal agents.

What is Fluconazole used for?

Fluconazole is used to stop you from getting a fungal infection whilst you are taking immunosuppressants. It is also used to treat fungal infections. Sometimes Fluconazole can be used to increase the Tacrolimus levels in your blood.

How to take Fluconazole?

Fluconazole should be taken once a day swallowed whole with water usually in the morning.

What are the side effects?

Most people do not experience any problems when taking Fluconazole. However sometimes it can cause some unwanted effects. These can include: nausea, stomach discomfort, diarrhoea, rash and headache.

What if you take too many capsules?

Contact your doctor immediately.

What if you forget to take a dose?

If you forget to take a dose, take it as soon as you remember and then continue as normal. If you do not remember until the next day, skip the missed dose and continue as normal. Do not take extra tablets to catch up.

Amlodipine

This is one of a group of medicines called calcium channel blockers.

What is Amlodipine used for?

Amlodipine can be used to treat high blood pressure. It works by relaxing blood vessels so that blood passes through them more easily.

How should I take Amlodipine?

It should be taken once a day, usually in the morning.

What are the side effects?

Most people do not experience any problems when taking Amlodipine. However, sometimes it can cause some unwanted effects. These can include: headache, flushing, rash, nausea, ankle swelling, tiredness and a rapid heart rate.

What if I take too many tablets?

Contact your doctor immediately.

What if I forget to take a dose?

If you forget to take a dose, take it as soon as you remember and then continue as normal. If you do not remember until the next day, skip the missed dose and continue as normal. Do not take extra tablets to catch up.

Beta-blockers (Propranolol, Atenolol, Metoprolol)

This is a group of medicines called beta-blockers.

What are the Beta-blockers used for?

Beta-blockers can be used to treat high blood pressure. There are a number of beta-blockers available - your doctor will have chosen the beta-blocker, which is best for you and your symptoms.

How should I take Beta-blockers?

If you take your beta-blocker once a day, take it at the same time each day. Most people find it easier to remember to take their tablets in the morning. If you are taking more than one dose each day you must space the doses out evenly throughout the day.

What are the side effects?

Most people do not experience any problems when taking beta-blockers. However, sometimes they can cause some unwanted effects. These can include: dizziness / light-headedness, tiredness / fatigue, a slow pulse, cold hands / feet, breathlessness, sleeplessness, impotence and nightmares.

What if I take too many tablets?

Contact your doctor immediately.

What if I forget to take a dose?

If you forget to take a dose, take it as soon as you remember and then continue as normal. If you do not remember until the next day, skip the missed dose and continue as normal. Do not take extra tablets to catch up.

Magnesium Carbonate

What is Magnesium Carbonate used for?

Magnesium Carbonate is used to treat low magnesium levels. Low magnesium levels can cause trembling hands and feet, and muscle cramps. You can have low magnesium levels for a number of reasons. These can include: diarrhoea, fluid loss from stomas or fistulas.

How should I take Magnesium Carbonate?

The capsules can be swallowed whole; or opened and the contents dispersed in water before taking immediately.

What are the side effects?

Most people do not experience any problems when taking Magnesium Carbonate. However sometimes it can cause diarrhoea. If the diarrhoea becomes troublesome contact your doctor.

What if I take too many capsules?

Contact your doctor immediately.

What if I forget to take a dose?

If you forget to take a dose, leave out that dose completely. Take your next dose at the right time.

Magnesium Glycerophosphate

What is Magnesium Glycerophosphate used for?

Magnesium Glycerophosphate is used to treat low magnesium levels, which can cause trembling hands and feet, and muscle cramps. You can have low magnesium levels for a number of reasons including: diarrhoea, fluid loss from stomas or fistulas, and as a result of taking some medicines, such as Tacrolimus.

How should I take Magnesium Glycerophosphate?

The tablets can be swallowed whole or chewed; or crushed and dispersed in water before taking immediately.

What are the side effects?

Most people do not experience any problems when taking Magnesium Glycerophosphate. However sometimes it can cause diarrhoea. If the diarrhoea becomes troublesome contact your doctor.

What if I take too many tablets?

Contact your doctor immediately.

What if I forget to take a dose?

If you forget to take a dose, leave out that dose completely. Take your next dose at the right time.

Omeprazole

This is one of a group of medicines called proton pump inhibitors.

What is Omeprazole used for?

Omeprazole is used to treat and prevent stomach irritation, indigestion and stomach ulcers. These may be caused or worsened by some immunosuppressants, such as Prednisolone and Mycophenolate. Omeprazole works by reducing the amount of acid that your stomach makes.

How should I take Omeprazole?

The capsules should be swallowed whole with water. If you are taking Omeprazole once a day, try to take it at the same time each day.

What are the side effects?

Most people do not experience any problems when taking Omeprazole. However sometimes it can cause some unwanted effects. These can include: headache, dizziness, skin rashes, diarrhoea or constipation, nausea (feeling sick), flatulence (wind), dry mouth, feeling faint and difficulty sleeping.

What if I take too many capsules?

Contact your doctor immediately.

What if I forget to take a dose?

If you forget to take a dose, leave out that dose completely. Take your next dose at the right time.

Statins: Simvastatin, Pravastatin, Atorvastatin

This is a group of medicines called statins.

What are statins used for?

These drugs stop the production of cholesterol by the liver and reduce the amount of lipid in your blood.

What are lipids / cholesterol?

Lipids are fatty substances found in the blood and in many of the foods we eat. These substances are essential to the body. Cholesterol, triglycerides and lipoproteins are all types of lipid.

Why worry about lipids?

High levels of lipids can cause narrowing (or even blocking) of the vessels, which supply the heart muscle with blood. This can lead to angina and heart attacks. There is an increased risk of high lipids in some family groups, but for people the reason for high lipid levels is an excessive fat intake from food and large amounts being made by the liver.

How should I take statins?

Cholesterol production occurs mainly at night and therefore the best time to take these drugs is in the evening or at night. You should avoid taking grapefruit juice if you are taking statins.

What are the side effects?

As with any medicine, statins can cause unwanted effects. These can include: headache, nausea and vomiting, tiredness and rashes. Sometimes this drug can cause muscular problems, so if you experience any unusual muscle pain, weakness or cramps please tell your doctor.

How can lipid levels be reduced?

The first stage in treatment is to change the food that you eat. The aim is to reduce your weight (if you are overweight), reduce the total intake of fat, and reduce the proportional intake of saturated fats. We highly recommend you speak to a dietician at Shifa regarding your diet and how to change it effectively. In many cases drug therapy will also be used, but this will not be successful if you have not changed your diet.

What if I take too many tablets?

Contact your doctor immediately.

What if I forget to take a dose?

If you forget to take a dose, leave out that dose completely. Take your next dose at the right time.

Valganciclovir

Valganciclovir is one of a group of medicines called anti-viral agents.

What is Valganciclovir used for?

Valganciclovir is used to prevent and treat cytomegalovirus (CMV) infection. Some patients are at increased risk of getting CMV infection while on immunosuppressants.

How should I take Valganciclovir?

Valganciclovir is taken once a day, usually in the morning. The tablets should be swallowed whole, with or after food.

What are the side effects?

As with any medicine, Valganciclovir can cause unwanted effects. These can include: low white blood cells and platelets, stomach upsets (for example: nausea, vomiting, diarrhoea and stomach pain), confusion and drowsiness. Valganciclovir may affect your kidney function. This will be regularly monitored in clinic.

Effective contraception (barrier and oral) is required during treatment. Male patients should practice barrier contraception during, and for at least 90 days following treatment with Valganciclovir, unless it is certain that the female partner is not at risk of pregnancy.

What if I take too many tablets/capsules?
Contact your doctor immediately.
What if I forget to take a dose?
If you forget to take a dose, take it as soon as you remember and then continue as normal. If you do not remember until the next day, skip the missed dose and continue as normal. Do not take extra tablets to catch up.

Complementary Medicines

It is recommended that you should avoid using complementary medicines if you are:

- Receiving immunosuppression therapy following transplant
- Receiving chemotherapy
- Epileptic
- Pregnant or breast feeding

There is little known about many complementary medicines and how they may interact with conventional medicines or what adverse effects they may have on you. A plant contains several active chemicals in varying amounts, which can be different between batches or different brands of complementary medicines and therefore a variable dose of the chemicals administered with them. Combinations of complementary medicines are often used and this further complicates the picture, as interactions are possible between them as well as between conventional and complementary medicines. Evidence to support the possible benefits of complementary medicines is often poor or unreliable.

The risk of suffering severe consequences following a drug interaction or adverse effect outweighs the potential benefits. You are therefore strongly recommended to avoid using complementary medicines.

Life After Liver Transplantation

Going Home

As soon as you feel well enough and the medical team is happy with progress, your discharge date will be planned. Your transplant co-ordinator will arrange an education session with you and your family beforehand and this will be an opportunity to discuss any worries or concerns regarding life at home, follow-up appointments and medications.

Preparation for discharge -Before you go home:

- You will know and self-administer your medication.
- You will be eating and drinking
- You will be mobilizing independently and should be able to climb stairs
- If you have a T-tube the nurses or transplant coordinator will ensure you are able to change the dressing and observe the condition of your wound.
- You will have an appointment to attend the outpatient clinic, usually within one week.

Life at home

When you arrive home, you may feel stressed, confused and even frightened. This is normal and your designated transplant coordinator is available to help. They will contact you at home after the first few days to see how you are getting on. This is a good opportunity to confirm the times of your outpatient appointments and that everything is going well with your medications.

Contacting your transplant team

If you have any worries or concerns it is important for you to discuss these with your transplant co-ordinator, who is available Monday to Saturday. A transplant co-ordinator is on call 24 hours a day for emergency situations. Please use this service only if there is a genuine emergency or if you are confused about your medications. Remember the on call transplant co-ordinator may be busy arranging liver transplants or dealing with another emergency and may not be able to answer your call immediately.

You should contact transplant co-ordinator if you have any of the following:

- Fever above 38°C (keep a thermometer at home)
- Flu-like symptoms
- Vomiting and /or diarrhoea
- Jaundice, pale stools or dark urine
- Itching
- Swollen ankles or abdomen
- Redness, localised pain, warmth, swelling or smelly drainage from the wound or T-tube site (some tenderness is to be expected)
- A sudden change to your state of health

If you experience severe pain, have difficulty breathing, feel dizzy and faint or experience chest pain, you may require emergency care.

Transplant Clinic Follow Up

During the first few months, your visits to the hospital may be frequent. You will be expected to attend your first clinic appointment, usually within a week of discharge. As you get better, your appointments will be extended to fortnightly, monthly, three-monthly and six-monthly visits. Your follow-up appointments are extremely important for the success of your liver transplant. The doctors and liver transplant coordinators will be present and available for you to ask questions. If you are not able to attend your clinic appointment, you must cancel with the clinic and they will rearrange a new appointment for you.

During clinic visits you will have blood taken to monitor your liver and kidney function. You will also be weighed and have your blood pressure checked. You will then see the doctor who will check your progress. Please remember to bring your medication card with you to the clinic, as you will need to show this to your doctor during the consultation. Remember you must not take your immunosuppressant medication in the morning before you are due to have your blood taken (except for prednisolone). Bring your inmmunosuppressant to the clinic and take it after your blood sample has been taken.

You will continue to attend follow-up appointments with the transplant team for the rest of your life and so you should never be without a future appointment. Eventually your visits will become much less frequent.

Exercise and sporting activities

For the first few days after discharge you may feel very tired and find it easier not to have any visitors at home. It is normal to require a short nap in the afternoon. After a while you may feel that this extra rest is not needed. To help your recovery it is essential to take plenty of rest and regular exercise. During the initial stages of recovery walking is an excellent form of exercise that gives a sense of personal achievement and is a good form of social activity. It encourages deep breathing, improves your blood circulation and strengthens your muscles. Daily gentle walks around your local neighbourhood or garden are a good starting point and taking a friend or family member with you will provide the support to help build up confidence.

Over a period of weeks you should gradually increase the distance you walk, but always remember that if you experience any discomfort and/or shortness of breath – stop and rest. If the symptoms persist make an appointment to see your doctor.

You must not play any contact sports (such as football and rugby), for at least six months, but other forms of exercise you may wish to consider once you regain your strength and your wound has healed include swimming, cycling, running, badminton and tennis. We recommend that you avoid attending your local swimming pool for a period of six months, as you will be at a greater risk on contracting fungal and viral infections due to the effect of the immunosuppression therapy.

You can, however, swim in the sea, off clean and uncrowded beaches once your wound has healed – weather permitting of course!

Driving

As your abdominal muscles will take some time to heal and you are likely to experience general tiredness and poor concentration, we recommend that you wait two months after your transplant before starting to drive again. Start by taking small trips with a friend or family member until you have regained your confidence.

Holidays / foreign travel

You must discuss any travel plans with the doctor at your clinic appointments before booking a holiday. Generally, you can take holidays within Pakistan at any time (once you have recovered from your operation) so long as you don't miss any clinic appointments.
You should not book any holidays abroad until at least six months after your transplant. It is a good idea to get a letter from your clinic doctor to say that you are fit to travel abroad and have good liver function, as most insurance companies will require a certificate of health.

You must also ensure you have enough supplies of all your medication for the whole holiday before you go as it will be difficult to get supplies whilst away. Take your medication in their original packing. Carry at least one-week worth in your hand luggage and a further supply in your main luggage in case your bags get lost.

Plan ahead, discuss about vaccinations required for travelling with your clinic doctor as to which you can have and also other medications that might be required.

Skin care

Your medications can increase the harmful effects of the sun on your skin so you must limit your exposure to the sun by:

- Covering up with a hat
- Avoiding the midday sun (10am – 3pm)
- Applying high factor sunscreen and lip-balm.

It is the ultraviolet (UV) rays of the sun that are responsible for causing skin cancers. These UV rays are present even on cloudy days and in the shade.

Your risk of developing skin cancers increases with time after transplant. These cancers are 10 times more common in transplant patients than in the general population! Therefore it is essential that you monitor yourself regularly for signs of skin cancer.
Warning signs include:

- Sores that bleed
- Growths that do not go away in a few weeks
- Moles that bleed or change in size and appearance.

If you find anything that concerns you it is important that you see your GP without delay.

Cancer screening

The type of screening you will require can vary according to your underlying liver disease. You should check with your doctor or transplant doctor regarding appropriate screening for you. It is recommended that women have cervical smears every two years and check for breast lumps every month and have breast screening over 50 years. It is recommended that men check for testicular lumps once a month after a warm bath or shower. As previously discussed there are some rare conditions that cause the lymph nodes to become enlarged. Should you notice any persistent swelling or enlargement of your lymph glands please seek medical advice.

Sexual health and pregnancy

Following your transplant, we expect over 80 percent of women to have a normal menstrual cycle within eight months. Indeed, normal menstrual bleeding may occur as early as two months following transplant. High dose prednisolone may stop the menstrual flow, but ovulation (the time when you are fertile) will continue. Therefore, you may become pregnant even though you are not yet having normal menstrual periods.

Sexual activities can be resumed as soon as you feel ready. Some male patients may experience some sexual dysfunction following surgery. This should resolve over two - three months. If you are concerned please seek advice from your doctor or transplant doctor. For the majority of woman, pregnancy will be safe. However, it is recommended that you wait until your medical condition has stabilized after transplant and should allow at least 12 months before planning a family. It is essential that you discuss your intention to become pregnant with the transplant team before you conceive, especially if you have been prone to rejection and/or infection. There is a slightly increased risk of miscarriage in the first trimester (weeks 0 – 13) and we may need to adjust the doses of your medication during the pregnancy. In addition, we will want to make contact at an early point with your local obstetrician.

If you have had a successful transplant and deliver a healthy baby, we recommend you do not breast feed, as some of your immunosuppressants will be transferable in breast milk. If you do become pregnant, please tell us as soon as possible and we will endeavour to support you through it.

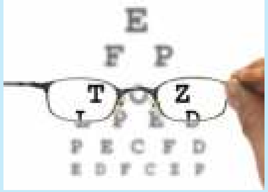
Smoking

The risks to your health from smoking continue after your transplant and may be increased by your medications. Smoking increases your risk of heart disease as well as mouth, tongue, throat, lung, pancreas and bladder cancer.

Dental care

It is essential that you continue to have regular dental checkups (every 6 – 12 months) as it is important for you to keep your teeth and gums in good health. Please inform your dentist of your liver transplant and immunosuppressive therapy, as you will need to take protective antibiotics if you undergo any dental treatment. If dental treatment is needed within the first three months of transplantation contact the transplant coordinator for advice.

Opticians



It is normal to experience a mild degree of blurred vision in the first three months after transplant. This can be due directly to the medication or as a result of raised blood sugar especially while taking prednisolone. Visual disturbances normally resolve within two – three months, however, if they persist, you should have a full eye examination with a qualified optician to exclude any other causes such as glaucoma.

Gardening

It is safe to continue gardening however, please remember your sun protection, wear gardening gloves and cover any exposed cuts. Your tetanus immunisation should be updated every 10 years.

Pets

It is considered safe to continue to keep a household pet. However some types of animals have been found to carry diseases that can be spread to humans. You should therefore avoid keeping reptiles, parrots, wild and exotic animals.

It is important to remember strict hand hygiene when dealing with animals, and to ensure that your pet receives annual vaccinations and checkups. You should take extra care to avoid contact with your pets' body fluids such as vomit, feces, urine, and saliva. If your pet uses indoor toileting, please ensure that you wear gloves and wash your hands afterwards.

Going back to work

Many people return to work at three months post-transplant. This depends on how soon you recover and the type of work that you do.

Protection against malaria

Prevention with antimalarial

It is not possible to advise on the recommended anti-malarial prevention for specific destinations since this information is constantly being updated due to seasonal changes and changing resistance patterns to malaria. Some anti-malaria medications have the potential to interact with your immunosuppressant medication, for example: Tacrolimus (Prograf®) and Cyclosporin (Neoral®). We would therefore try to use an alternative anti-malaria medication that would be effective in the area of your travel but less likely to interact. We will advise you to start this medication earlier than is normally recommended so that we can measure your blood level to check that there is no interaction (it has not raised or lowered your immunosuppressant level)

Protection against bites

Anti-malaria medications do not provide 100% protection and you should also take the following practical measures to protect against being bitten by mosquitoes:

- Sleep in screened rooms
- Use fly-killer spray to kill any mosquitoes that may have entered the room during the day
- Depending on your accommodation, use mosquito nets around the bed at night.

- Wear long sleeves and trousers after sunset. Light-coloured clothes are less attractive to mosquitoes.

Apply insect repellents; containing 30-50% DEET to exposed areas. The protective effect only lasts for a few hours but you should not exceed the manufacturer's recommended dose.

Return from malarial region

Typical symptoms of malaria can be confused with flu; usually bouts of high fever lasting a few hours, starting dramatically with shaking chills and sweating. If you develop any illness within a year and especially within 3 months of return you should see the doctor immediately and mention your exposure to malaria.

If you have had your spleen removed (Asplenia)

If you have had your spleen removed (splenectomy), or if you suffer from severe splenic dysfunction, you are at greater risk of severe malaria. Travel to malarial regions is therefore not recommended. Please speak to your doctor if the travel is unavoidable.

Common Post-transplant Problems

Weakness / tiredness

During recovery it is common to feel weak and tired. This is expected because of the effect of liver disease, including poor nutrition and the stress of surgery on the body and problems with lack of sleep.

Pain

It is uncommon not to feel any pain after a liver transplant. This is due to the operation itself and to the wound. Back pain can be a problem because of the retraction on the ribs, which is necessary during surgery. Pain control is usually achieved with drugs. Pain can sometimes develop during an infection of the wound or inside the abdomen.

Oedema / ascites / pleural effusion

During your early recovery fluid can collect in your arms, legs, abdomen and chest. This is more common in people who had ascites and poor kidney function before transplantation. If fluid accumulates in the chest it can cause shortness of breath. The fluid overload usually resolves within a few weeks but may need treating with diuretics (water tablets) for a short time.

Jaundice

Jaundice normally resolves after transplant. People who are not jaundiced before transplantation may develop jaundice in the first few weeks. This may take some time to resolve, especially in case of poor initial function of the new liver, rejection and/or infection.

Rejection

Acute rejection occurs in about half of all patients after liver transplantation but usually responds to an increase in immunosuppression. It happens more frequently after the first week and within three months of transplantation. It can happen later but is usually associated with low levels of immunosuppression. Rejection does not cause specific symptoms and is detected by abnormal liver blood tests. The diagnosis is usually confirmed with a liver biopsy. You may experience fever and jaundice as part of the rejection process.

Acute rejection is treated in hospital with high doses of steroids for three days and by increasing the doses of other anti-rejection drugs. Acute rejection after discharge from hospital is usually due to your body not reacting well with your medications. This is more difficult to treat and can occasionally lead to loss of the liver.

Anti-rejection medication

The goal of anti-rejection medicines (immunosuppressants), is to adequately suppress the immune response to prevent rejection of the transplanted organ without interfering with the ability to fight infection. Many of the medications used to achieve immunosuppression have side effects. That's why you are given a combination of medications that work in different phases of the immune response to minimize side effects and produce effective immunosuppression.

You will return to the transplant clinic to have your medication levels checked regularly. You can experience rejection without knowing it. Based on your follow-up test results, your medication dosages may be adjusted and over a period of time the amount of drugs you have to take will be gradually reduced.

Infections

Anyone who has received a transplant is more vulnerable to infection because of the anti-rejection medication, which protects your liver, but weakens the ability to fight bacterial and viral infections. All patients are given a short course of antibiotics at the start of surgery to try to avoid infections from bacteria.

The main symptom to look out for is fever and the most common infections are in the chest, urinary tract and wound. Smoking before your transplantation and during the recovery period is not good, as it will increase the likelihood of a chest infection. Respiratory exercises, good hygiene and early mobilisation help in reducing infections. Food safety is also important in preventing food poisoning after transplantation. You should be given antibiotic drugs before any invasive dental work, for example tooth extraction.

Infections can be due to Bacteria, Viruses or Fungi.

Bacterial Infections

- *Wound infection*

  Bacterial wound infections occur at and around the incision made during your operation. If you have a fever or notice redness, swelling, tenderness, or discharge of the wound, you must notify the transplant team. After a wound culture (a test for bacteria) is taken, you will be prescribed antibiotics if infection is present.

- *Other Infections*
  Pneumocystis carinii is a germ similar to a fungus, and is normally found in the lung. In people whose immune systems are suppressed, it may cause a type of pneumonia (PCP). Early in the illness, a mild, dry cough and a fever may occur. If you suspect that a cold or flu-like illness is developing, contact your doctor.

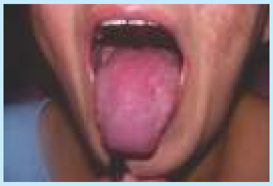
Viral Infections

- *Cytomegalovirus (CMV)*
  CMV is one of the viral infections that occur most commonly in transplant patients. The risk of CMV is highest in the first year after transplantation and may affect the liver, gut, chest and sometimes eyes. Early signs of this disease are similar to those of flu and include fatigue, high temperature, aching joints, headaches, visual disturbances, and pneumonia. To prevent you getting this infection you may be given Valganciclovir tablets within the second week after your transplant. If you are at high risk you will continue on this medication for three months and must complete the course of treatment.

- *Herpes-simplex virus type I and II*
  These viruses most often infect the skin but can also occur in other areas such as the eyes and lungs. Type I typically causes cold sores and blisters around the mouth, and type II causes genital sores. Most herpes-simplex infections are mild, but occasionally they can be severe. Although there is no cure for herpes, it can be treated. Depending on the severity of the infection, the treatment is either topical, oral, or intravenous (IV). Symptoms of herpes include feeling weak and having painful fluid-filled sores in the mouth or genital area. Women should also be aware of any unusual vaginal discharge.

- *Herpes zoster (shingles)*
  Shingles appear as a rash or small water blisters, usually on the chest, back or hips. The rash may or may not be painful. You should contact the transplant team if you think you have shingles.

Fungal Infections



- *Candida (yeast)*
  Candida is a yeast fungus that can cause a variety of infections in transplant patients. It usually appears in the mouth and throat but may occur in the wound, eyes, and respiratory and urinary tracts. Candida is most severe if it enters the bloodstream. If infection occurs in the mouth or throat, it is called thrush. Thrush produces white, patchy lesions (raw areas), pain or tenderness, a white film on the tongue, and difficulty swallowing. Candida can also infect the oesophagus (the tube from your mouth to your stomach) or, in women, the vagina. Vaginal infections usually produce an abnormal discharge that may be yellow or white.

Vascular Complications

These complications include narrowing and blockage of the blood vessels going into or out of the liver. These are life-threatening complications, which need to be treated as soon as possible. If a clot blocks the artery to the liver early after surgery, re-transplantation may be needed.

If you experience narrowing of the artery, portal vein or the hepatic veins it can be treated by our radiologists without the need for open surgery. Heparin or warfarin will then usually be given to thin the blood and lower the risk of further clotting of vessels. However, this carries an increased risk of bleeding.

Biliary Complications

These complications affect the tube that carries bile into the intestine.

Bile leak

A bile leak occurs when bile leaks outside the bile ducts. A patient who has a leak may experience pain over the liver, nausea, and/or fever. An endoscopy (ERCP) to pass a stent across the join will be necessary.

Biliary stenosis (narrowing of the bile duct)

Occasionally, the bile duct narrows and eventually may become blocked. If this occurs, endoscopy may be necessary to correct it. Between 5% and 10% of patients may eventually require surgery to fix the narrowing.

Hypertension

Hypertension (high blood pressure) is common early after transplant. Certain anti-rejection medications, as well as the original disease, can contribute to hypertension. Your blood pressure should be monitored regularly during all follow-up visits at Shifa. Treatment of hypertension may include one or more drugs, and often, as anti-rejection medicines are tapered to a low maintenance dose, hypertension may decrease.

Renal Impairment

Long-term kidney damage is a growing concern because patients survive much longer. This damage occurs because the main anti-rejection drugs are toxic for the kidneys. Newer drugs are now available which can be used in combination or on their own providing immunosuppression without harming the kidneys.

Diabetes

Some anti-rejection medicines are known to cause raised sugar levels in blood. Although it is usually a temporary condition after transplantation, it is more common in patients who are overweight or have a family history of diabetes. Reducing the dose of anti-rejection medicines can help but sometimes it requires long-term medication.

High Cholesterol

Many immunosuppressant drugs cause high cholesterol levels in the blood and this affects many transplant recipients. Between 15% and 40% of recipients have high blood cholesterol and 40% have high blood triglycerides. When a person develops high cholesterol, the blood vessels (including the ones attached to the transplanted organ) can become damaged. This slowing of blood flow can affect the success of your transplant and may lead to heart disease. It is therefore important to reduce other risk factors for heart disease, such as changing your diet, losing weight and taking regular exercise. These actions, together with taking medicine called statins, will help to control your cholesterol.

Obesity

50% of people who have had a liver transplant become significantly overweight.

Excessive weight gain often occurs as a result of:

- Changes to eating habits after transplantation
- Steroid medication stimulating the appetite,
- A feeling of freedom from previous dietary restrictions
- An increased sense of well-being

Excessive weight gain can be harmful to your health because it increases the risk of heart and blood vessel disease, diabetes and osteoporosis.

Osteoporosis

Osteoporosis refers to the loss of bone matter, which makes bones fragile and increases the chance of bone fractures. Chronic back pain is the most common sign and can be due to undetected fractures of the spine. Factors that increase the risk

of osteoporosis include calcium and vitamin D deficiency, immobility, treatment with steroids, hormone imbalance, poor nutrition, alcohol abuse, smoking, menopause and immunosuppressive medications. The most rapid bone loss occurs in the first three - six months after transplantation. Bone recovery continues up to years after transplantation. Oral medication will be given to improve bone density.

Malignancy

People who have had a liver transplant are in the long-term at greater risk for the development of malignant (cancerous) tumours when compared to the general population.

The most common tumours are lymphomas and skin cancer. Cancer of mouth throat and lungs are more frequent in people who smoke and particularly for those transplanted for alcohol-related liver disease. Bowel cancer is more common in those people who had a transplant for primary sclerosing cholangitis. You should regularly check your skin for moles and note any changes in their shape and size. You should also look for glands in the neck, armpits and groin. If your liver transplant was due to sclerosing cholangitis you should have a colonoscopy every year.

Gout

Gout is a painful and potentially disabling form of arthritis, which can affect post transplant patients. Diagnosing gout can be difficult and treatment plans vary based on existing medical problems and medications.

Disease Recurrence and Management

Liver transplantation is recognized as the only effective treatment for end stage liver disease and has become very successful. The problems of liver transplantation include the need for long-term immunosuppression and recurrence of the original liver disease. This problem is becoming increasingly well recognised because of the large number of recipients surviving more than 20 years after their liver transplant. Our views about disease recurrence are constantly changing and being updated by new published information. The most common reasons for liver transplants in adults are Hepatitis C, alcohol-related chronic liver disease, and hepatocellular carcinoma, and these diseases have the highest rates of recurrence.

Hepatitis C

This is one of the most common reasons for transplantation. The Hepatitis C virus re-infects the new liver in all patients. In the early weeks after transplantation all the liver tests settle in the normal manner. Many people with Hepatitis C will experience a slight rise in their liver function tests three - four months after transplantation. For the majority (six out of ten recipients) these abnormal blood tests will settle without the need for treatment. A small number of recipients will experience continuing liver dysfunction and a biopsy will be performed to confirm that this is due to the Hepatitis C virus and treatment will then be started (Pegylated interferon and Ribavirin).

A routine biopsy of the liver is performed one year after the transplant to try to identify whether the virus is active. You will also continue to have follow-up appointments as liver damage from the virus tend to appear by seven – ten years after transplant. The risk factors for recurrence depend on the type of Hepatitis C virus, the immunosuppression required and other immune factors that are not clearly understood. You may be asked to join a research trial of new medication to try to reduce the risk of recurrence of Hepatitis C. If liver disease recurs and progresses to liver failure, then re-transplantation will be offered.

Alcohol related disease

Alcohol alone or in conjunction with other liver diseases such as Hepatitis C is a major reason for liver transplantation.

Lifelong abstinence of alcohol is strongly recommended. It is considered that the transplanted liver is more susceptible to injury by alcohol. Potential candidates for transplantation are only accepted onto the list with a minimum of six months abstinence to demonstrate a commitment to well-being.

This period of abstinence also allows for potential improvement in liver function and may even remove the need for a liver transplant. We strongly recommend that all people due to receive a liver transplant because of alcohol-related liver disease attend an official alcohol support group such as Alcoholics Anonymous. Support is also provided through a clinical nurse specialist. Failure to remain abstinent while on the waiting list results in removal from the list. If there is disease recurrence from alcohol after the transplant which leads to liver failure it is the Unit policy not to offer re-transplantation.

Hepatocellular carcinoma (Cancer of the liver)

About 10% of our recipients receive their transplant because they have liver cancer. These tumours occur in association with cirrhosis from any cause. There are well-recognised criteria for inclusion or exclusion on the basis of the risk of tumour recurrence. We currently use University of California, San Francisco extended criteria for transplantation. The risk of recurrence of the cancer depends on the size of the tumour, the number of tumours and their behaviour. Survival five years after liver transplant is approximately 65%. The common sites for tumour recurrence are the new liver, the lungs and bone. If the tumour does recur then further treatment with surgery or chemotherapy maybe possible. Follow-up will include CT scans and blood tests.

Hepatitis B

Hepatitis B can recur after liver transplantation, but there is now effective treatment to prevent this. The blood tests you have before transplantation will show if the virus is active and whether treatment is necessary to inactivate it. Your transplant may be delayed until treatment has been effective at inactivating the virus. After the transplant Hepatitis B immunoglobulin is given by intravenous or intramuscular injection and this will continue long term with a need for monthly injections. Entecavir, an effective anti-viral agent, is given in conjunction with the immunoglobulin and provides excellent protection against disease recurrence. Your vigilance in maintaining drug and immunoglobulin levels is key to preventing disease recurrence.

Primary biliary cirrhosis

This disease can recur in patients after liver transplantation but is rare, possibly because the drugs given to prevent rejection of the transplanted liver also treat primary biliary cirrhosis. Loss of the transplanted liver is very rare but if it occurs then re-transplantation is offered. If you have primary biliary cirrhosis then prednisolone at a dose of 5mg will be included in your long-term immunosuppressive treatment as there is evidence that this protects against the disease recurring.

Autoimmune hepatitis

This is an uncommon reason for transplantation and can recur. As with primary biliary cirrhosis, the immunosuppressive drugs used to prevent rejection also control autoimmune liver disease. Long-term medication will include prednisolone and possibly mycophenolate mofetil or azathioprine to reduce the likelihood of the disease recurring.

Primary sclerosing cholangitis

Recurrence is thought to be rare and seldom to cause long-term problems. However, a small number of patients do develop problems of bile duct strictures or cholangitis and may be treated with increased levels of prednisolone and ursodeoxycholic acid. Transplantation is offered if disease recurrence results in liver failure.

Budd-Chiari syndrome

This is a rare condition caused by abnormal clotting of the blood, which results in blockage of the veins draining the liver. The abnormal clotting may persist after liver transplantation and warfarin (an anti-clotting treatment) will be given to prevent complications. Failure to thin the blood in this way may lead to blockage of blood vessels going to the liver and loss of the graft. Re-transplantation is offered in cases of graft failure.