Nursing Presentation
Possible Liver Solutions

In 2009, 1,470 patients died in the United States while waiting for a liver transplant. Another 1,001 patients became too ill to receive their transplant. As of September 2010 there were 16,051 people awaiting a liver transplant from a deceased donor in the United States. Unfortunately, in 2009 only 6,320 liver transplants were performed in the United States, of which 6,101 were from deceased donors and 219 were from living donors. Because of the severe national organ shortage, alternative solutions to using deceased donors have been sought.

Advances in liver transplantation have provided new techniques that increase the number of livers available for transplantation. Some of those advances are explained here.

• Deceased Donors
  • Whole Liver: The majority of livers become available through deceased donors. Most donated livers are allocated to one recipient.
  • Split Liver: In some clinical situations it is possible to split a donated liver into two segments; allowing transplants for two recipients.

High-Risk Donors

Some donors have been determined by the Centers for Disease Control (CDC) to have an increased risk to transmit some viral infections, including HIV, Hepatitis C, and Hepatitis B because of certain donor behaviors such as IV drug abuse, being in jail, or certain sexual behavior (e.g., prostitution). These donors are referred to as, “CDC high-risk donors.” All donors, whether they are high-risk, or not, are tested for a number of transmissible diseases including hepatitis C, hepatitis B, and HIV infection. These tests can detect a donor infection that may have been acquired as recently as one to two weeks prior to donation. The results of these tests are usually back before the organs are donated. High-risk donors who test negative for transmissible diseases carry a very low risk of transmission of infection and are therefore used as liver donors. The true risk of transmission is not known but is probably much less than 1 percent. Because the risk of dying on the waiting list before receiving a liver transplant is between 10–20 percent, it is reasonable to consider receiving a liver transplant from a CDC high-risk donor under certain circumstances.
In addition, some donors have been previously exposed to the hepatitis B virus and have positive antibody tests. In many instances, these donor organs are fully functional and work as well as donor organs from individuals not previously exposed to hepatitis B. Your doctor may recommend that you consider receiving an organ from a donor who previously had a hepatitis B infection. If you receive an organ from a donor who was previously exposed to hepatitis B you will be given an additional medication following the transplant to prevent reactivation of the virus. Your doctor and the transplant surgeon on call will explain this to you in more detail should you have questions. In general, we recommend liver candidates on the waiting list keep all of their options open. The on-call transplant surgeon will always discuss with you if the donor organ carries a risk of transmitting a hepatitis B or C infection and will obtain your permission and willingness to receive such an organ before using it.

**Donation After Cardiac Death (DCD)**

DCD occurs after a person has experienced a devastating medical event from which recovery is not possible. With the family’s approval, the patient is withdrawn from life support and cardiac death will occur prior to donation. If cardiac death does not occur within a designated time frame following the withdrawal from life support, the organ recovery will not occur.

- **Living Donors**

  Living liver donation is one of the solutions to the severe national organ shortage that has proven successful.

  In some clinical situations a recipient is identified as a potential candidate for a “segmental” or “partial” liver. A living donor liver transplant is considered when: a) the recipient is a candidate for a living donor, b) the recipient has an individual willing to donate, and c) the potential donor is healthy enough and deemed to be a suitable donor for that recipient.

  In this process the donor donates a portion of their liver to the recipient. Because of the liver’s amazing capacity to regenerate, the liver is restored to its original size in the donor, and grows to a comparable size in the recipient in approximately four weeks. Although it is relatively safe, the operation does involve certain risks, including death. Living liver
donation will be discussed in detail, including the risks and social issues, with patients who may be a suitable candidate or donor for this program. Potential donors are very carefully screened prior to acceptance as a suitable donor.

**Living Liver Coordinator/Donation**

Potential living donors will work with a nurse who will coordinate their care through the evaluation process.

**Who Can Donate?**

It is important for living liver donors to have a substantial emotional relationship with the person they are donating to. Parents, children, siblings, other relatives as well as in-laws and close friends can be considered. A potential donor must have no chronic illnesses, such as diabetes, heart disease or high blood pressure. A living liver donor must have personal health insurance, be between the ages of 18 and 59, and have a body mass index (BMI) of less than 35. The donor and recipient must have compatible blood types. Smokers must be willing to quit prior to donation.

**Prescreening**

If your blood type is compatible, you will be asked a series of questions regarding your health. If these screening questions don’t turn up a medical reason why you should not donate, an appointment will be made for you to come to the transplant clinic to meet with the transplant team. The members of the team include a hepatologist, a surgeon, a social worker, a medical doctor as your donor advocate, a financial counselor and a nurse.
Evaluation

At your evaluation appointment you will learn more about the donor surgery, potential complications, post operative recovery and expectations for returning to work. To determine whether you would be an appropriate candidate to donate a portion of your liver you will need to have some medical tests. The tests include an EKG, chest X-ray, a variety of lab tests, a CT scan, and an MRA, MRV or MRCP. You will also need to attend a Patient Education Class.

History and Physical

All living donors must have an appointment for a history and physical just prior to surgery. Since it is imperative you be healthy at the time of the surgery, your surgery may have to be rescheduled if you are not in good health at the time of your appointment.

Operation

A living donor liver transplant actually involves two overlapping operations between you, the healthy donor and the recipient. The right lobe of your liver is removed with its blood supply intact in one operating room. While this is happening, the patient’s diseased liver is being completely removed in another operating room. The healthy portion of your liver is then taken into the adjacent operating room where it is then sewn into place in the recipient. The donor operation usually takes between four and eight hours.

The right lobe of the liver is about 60% of the liver, thus leaving 40% of a normal liver in the donor. Because of its amazing capacity to regenerate, your liver is restored to its original size and grows to a comparable size in the patient in approximately four weeks.

You can expect to stay in the hospital from five to ten days and be out of work for six to eight weeks after surgery.
Post Operative Follow-Up Care

Your post operative care relationship with the Transplant Center will be at least two years following your operation. You will have an appointment in the Transplant Clinic one week after discharge. You will have an on-going schedule for lab work to monitor your blood levels. Initially you will have lab work done at UMHS at seven to 14 days after donation and then 30 days.

Appointments and blood work done at six months, one year, two years can be done locally with your internist or family physician, although the results need to be made available to the Liver Transplant Coordinator.

Arrival for Transplant/Once in the Room

Nurse Presenter’s Name ____________________________________________________

After you have checked in at the nursing desk, you will be placed in a room and will begin to prepare for surgery.

• **History and Physical:** A resident will ask about your history, perform a physical exam, will order chest X-rays and an EKG. These are done prior to surgery to verify that there are no significant changes in the patient’s heart or lungs.
• **Blood Draw**: Blood will be drawn for a variety of lab tests prior to surgery.

• **Shower**: You will be asked to take a shower with an antimicrobial soap prior to surgery.

• **IV Started**: An IV will be started in your arm.

• **Transplant Research Team**: A representative from the Clinical Research Team will meet with you to review the various clinical research studies available.

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**Potential Cancellations or Delays**

After the offer call comes and you have arrived at the hospital, there are still several factors that can either cancel or delay the transplant. The surgery may be delayed for many hours after you arrive at the hospital for reasons such as coordinating processes between hospitals and surgical teams. The team will proceed as quickly as possible.

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**Your Health Condition**

You must be healthy before an operation. The transplant cannot proceed if you have any heart or lung problems or any infections in your body. Since you will be taking medications that suppress the immune system, your body will not be able to actively fight an infection at the time of transplant.
Changes in the Condition of the Donor

The medical condition of the donor can impact the availability of the donated liver. If the donor becomes unstable, the liver may not be retrievable. Another situation that can occur is that the surgeon may determine that the donated organ is not suitable for transplant. When the organ isn’t suitable for transplant the reason is often some anatomical detail that isn’t apparent until the organ is visible to the surgeon.

Sometimes patients come to the hospital ready for their transplant, only to be sent back home for reasons beyond their control and when it does it can be disappointing and frustrating. It may help to remember the reasons for canceling a transplant are in your best interest – by either avoiding a potential health risk or waiting until a suitable organ becomes available.

Family Responsibilities

You are taken to the operating room approximately two hours before the start of the operation. Family members are allowed to walk with you to the operating room.

- **Waiting**
  After you are taken to the operating room, your family will be asked to check in at the reception desk in the surgery family waiting room.

- **Be Available**
  Families are asked to tell the receptionist in the surgery family waiting room where they will be if they choose to wait somewhere other than the waiting room. Following surgery, the surgeon will go to the surgery waiting room to speak with your family. If they are not present and cannot be located, they may miss the opportunity to speak with the surgeon immediately following your surgery.

- **Rest**
  Families are encouraged to use the waiting time to rest. Some families use the time to get something to eat or to arrange for lodging. Whatever activity the family engages in during this time, the surgery waiting room must be aware of how to find the family.
Liver Transplant Surgery

- **Length of the Operation**
  The length of time you spend in the operating room varies, but generally it is between four and 12 hours.

- **Communicating with the Surgeon – During and After the Operation**
  Families should not expect updates from the operating room while the operation is taking place. Following the surgery, the surgeon will look for the family in the waiting room.

During the evening, weekends and holidays when a receptionist may not be available to assist with communications, it is important to have a family representative available in the surgery waiting room to speak with the surgeon following the operation.

Central Lines

Just prior to or during surgery, the physician will place many tubes and equipment to assist in your monitoring. Since many of these lines will be in place the first time your family visits you, it is helpful if they are aware and expect to see the equipment.

- Central lines are inserted into the internal jugular vein in the side of the neck or the subclavian vein in the upper chest.
- A special catheter (called a Swan-Ganz) is inserted into a large blood vessel. It’s a special monitoring IV used to measure circulatory pressure and fluid volume.
• A catheter is placed in an artery at your wrist, elbow or groin area to measure constant blood pressure, and to act as a source for future blood draws.

• A ventilator or respirator is used to help you breathe. The ventilation tube is inserted through the mouth into the lungs and is attached to a machine. This allows for optimal anesthesia, relaxation and sedation.

• A nasogastric tube (NGT) is placed through your nasal cavity into the stomach and is used to keep the stomach empty.

• A foley catheter is placed into your bladder to monitor urine output.

• A biliary drainage tube may be placed during the surgery into the common bile duct or the cystic duct. It is used to monitor the bile output and protect the connections made during surgery. The tube stays in place for six weeks or longer, depending upon when the problem is resolved.

**After Surgery**

Following a liver transplant you will be admitted directly to the Surgical Intensive Care Unit (SICU) on 5D, without going to the Recovery Room. Family members won’t be able to visit you for one to two hours after you arrive at the SICU.

While you are in the SICU, you will remain connected to many lines, tubes and monitoring devices. Many patients retain fluids, gain fluid weight and appear swollen following surgery. It may take days to weeks before the fluid retention is resolved.

**SICU Visiting Hours**

Visitation for patients in the SICU is somewhat more restrictive than the general care floor to allow the patients the rest necessary to recover.
Visitation is:
- Arranged through the charge nurse by calling the desk from the waiting room
- Available from 9 a.m. to 10 p.m., without specified time periods
- Limited to one or two visitors at a time
- Not recommended for individuals who are ill. Sick individuals should not have direct contact with any patient.
- To be coordinated between your family and your nurse for children.

Patients usually stay in the SICU for one to three days following liver transplantation and then are moved to the transplant general care floor, 5C.

Length of Stay

The overall average length of stay for a liver transplant patient is between eight and 15 days. The following chart reflects the most usual course of stay for our patients.

<table>
<thead>
<tr>
<th>Location</th>
<th>Low Average</th>
<th>High Average</th>
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<tbody>
<tr>
<td>Surgical Intensive Care Unit (SICU), taken there immediately following the operation.</td>
<td>1 day</td>
<td>3 days</td>
</tr>
<tr>
<td>General care transplant floor (5C), taken there when the equipment is removed and the patient is mobile.</td>
<td>7 days</td>
<td>12 days</td>
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Respirator

Patients generally wake up one to two hours after arriving in the SICU and usually awaken with the respirator (commonly known as a ventilator) still in place. Because the ventilator tube goes through the vocal cords, the patient will not be able to talk while the ventilator is in place. Until the ventilator tube is removed, usually within 24 hours, you will have to communicate by writing or non-verbal communications. The time spent on a ventilator varies by patient, but a patient who smokes is usually on a ventilator somewhat longer than a non-smoking patient.

Since patients still have anesthesia and pain medication in their system from the operation, they often do not recall much from the first several days following surgery – even though they appear awake.

Sometimes restraints are needed to remind the patient they have tubes and lines in place. The patient’s wrists may be tied down to prevent them from trying to pull the tubes and lines out.

Preventing Pneumonia

As you improve, equipment is removed and you are encouraged to become more active. Coughing and deep breathing are exercises to help prevent pneumonia by keeping the air sacks open.

You will be encouraged to take deep breaths and use your incentive spirometer 10 times each hour while you are awake. You will work to breathe deeply as the incision is close to the diaphragm and you may experience some discomfort.

You will be provided a pillow to “splint” your incision area to reduce discomfort.
Mobility

Increasing mobility is very important for you to prevent pneumonia, reduce the potential for blood clots, and to increase strength and conditioning.

The day after surgery, you will be out of bed and sitting up in a chair. While the removal of lines and tubes is a factor, you will be encouraged to increase your mobility each day. When you move from the ICU to the general care floor, you will be encouraged to progressively increase your walking.

Some patients may need the assistance of physical therapy or rehab, either while they are in the hospital or when they return home.

Diet and Nutrition

You will have a nasogastric tube in place until the function of your intestines resumes. The nasogastric tube may make your throat sore. While the tube is in place you may have ice chips for your throat. Once the tube has been removed, you can begin with a clear liquid diet as tolerated. You will proceed to an advanced diet which could be a heart healthy diet, as you are able to tolerate it. You may be on a diet, restricting salt, protein and fluids. Some patients who cannot eat may require a feeding tube (Dobhoff). This is uncommon, but it could occur.
Abdominal Incision

There are several types of abdominal incisions for a liver transplant; the Mercedes-Benz or the “humped” incision. The type of incision is dependent on the surface area the surgeon needs to remove the old liver and transplant the new liver.

The incisions are made and closed in the layers of tissue. The outer layer of the abdomen will be closed using staples or sutures. The abdominal incision may look similar to a railroad track. The staples remain in place for approximately three weeks and will be removed during an office visit. You may shower using a mild soap while the staples are in place. Absorbable sutures may be used to close the skin layer and do not need to be removed.

Patients may experience fluid drainage from their incision due to ascites. Drainage due to ascites can take several months to resolve.

Types of Incisions

The humped incision includes one long incision across the upper abdomen which is higher in the midsection than the sides.

The Mercedes-Benz incision includes the humped incision in addition to a vertical midline incision at the top of the hump. The Mercedes-Benz incision is used most often.

Both incisions are very extensive, usually from one side to the other. The incision is close to the diaphragm, which is under the rib cage.

A modified Mercedes-Benz incision is often used on the living liver donor and some recipients.
Photos of Mercedes-Benz Incision and Right Subcostal Incision with Midline Extension (Hockey Stick)

The photo on the left shows the Mercedes-Benz incision across the upper abdomen with a midline vertical incision at the top of the hump. This incision is used for the liver transplant.

The patient pictured also had a kidney transplant. The lower incision is a result of the kidney transplant.

The tube shown in the lower left is a bile tube placed during surgery and used to monitor the bile output.

The other photo is the right subcostal incision with midline extension. Similar to the Mercedes-Benz incision, it is closed in layers. However, final closure is with a suture called Quill that is under the skin and absorbs over time.

Post-Operative Pain

Our goal is to keep our patients comfortable following a liver transplant, but we cannot eliminate all pain. Pain tolerance differs significantly from person to person. Some patients experience back or rib pain. Some patients experience some numbness following surgery which is helpful with pain in the area of their incision. Pain related to pre-transplant conditions may not go away.
Post-Operative Pain Medication

You will receive pain medications through an IV while you are in the ICU. Some patients have a PCA (Patient Controlled Analgesia) pump that allows them to self-administer pain medications within prescribed limits. Pain medications cannot eliminate all pain. You will be given oral medications for pain prior to being discharged from the hospital. Some patients may need to be referred to the pain clinic for chronic pain management.

Possible Symptoms – Pre- and/or Post-Transplant Surgery

Following liver transplant surgery you may experience encephalopathy or ascites similar to symptoms experienced before surgery.

- **Encephalopathy** is a condition of the brain that is demonstrated as confusion and can be experienced by any patient following transplant. Confusion is caused by toxins not being filtered out of the blood by the liver and may be related to the impaired liver function, sleep deprivation, pain medications or prednisone. Patients may need to be restrained during periods of confusion.

Confusion also can be caused by either sleep deprivation or the use of pain medications, or it can be aggravated by the use of steroids. Confusion from these causes is usually relieved by treatment of the cause. For instance, allowing more time for sleep, and decreasing pain medications or steroids at the direction of your physician. Usually the confusion after surgery is caused by a combination of these factors.
• **Ascites** is an accumulation of fluid in the abdominal cavity and may occur following liver transplant surgery. Ascites is generally managed with medication, usually Lasix or Aldactone. Patients who experience difficulty breathing due to ascites, may need to have an abdominal tap (Paracentesis).

**Biliary Drainage Tubes**

External biliary drainage tubes (also called biliary stents) are occasionally placed during the transplant operation to protect the bile duct where it was sutured and to monitor bile output. The tubes are left open to a bag while you are in the hospital, but by the time you are discharged the tube is usually capped off. These tubes are usually removed during an outpatient visit six to 10 weeks following surgery.

An internal biliary stent is placed during the transplant operation from the bile duct to the small bowel. It usually passes on its own through the digestive tract. If you do not pass the stent in four to six weeks an X-ray is taken to confirm the placement. If the stent is still present, an EGD is performed to remove it.

An internal/external biliary stent (PTC) is used when the problem is high in the liver. A JP drain is used in the abdominal cavity when there is a need for drainage from that area.
Bile Duct and Vascular Complications

Serious complications can result from the delayed diagnosis of a problem in the bile duct anatomy. Labs are the first step in diagnosis and early intervention of a bile duct problem. All procedures should be performed at the University of Michigan during the early follow-up period. Abnormal laboratory tests, and presenting signs and symptoms will determine the management of a problem.

The liver has a dual blood supply from the portal vein and the hepatic artery. If the hepatic artery develops thrombosis (clot), it may progress to liver failure rapidly. If the portal vein develops thrombosis (clot), the patient may develop variceal bleeding, abdominal pain and ascites.

Vena cava obstruction can cause the liver to enlarge leading to ascites and lower extremity edema (swelling). A procedure to open the obstruction may include dilation or stent placement.

Bile drains from the liver through the bile ducts. Bile duct obstruction or leaks can make you very sick. Obstructions and leaks are treated with a temporary stent like a T-Tube, ERCP or PTC stent. The stents are changed every four to six weeks until the obstruction or leak is resolved. Sometimes the obstructions can be treated with dilation until the issue is resolved.

The gall bladder is removed from the recipient and from the donor during transplant.

Discharge Criteria

Before you can be discharged from the hospital following a liver transplant there are specific criteria you must meet. You must be able to eat and drink. Your lab values must show increasingly stable liver

Discharge Criteria

- Able to take anti-rejection medications properly (with the help of a caregiver)
- Able to walk to and from the bathroom safely
- Able to do basic self-care tasks (with help)
- Able to eat and drink
- Stable liver functions
- Knowledge of signs and symptoms of infection and rejection
- Involvement of family/support system
functions. You must be able to walk to and from the bathroom safely. You must be able to perform basic self care tasks, with some help. You must demonstrate your knowledge of the signs and symptoms of infection and rejection. You must be able to take your anti-rejection medications properly, with the help of your caregiver. You must have your caregiver and support system in place, and it is important to have a secondary support system.

Prior to discharge you will need to take and pass a written test to demonstrate your knowledge in these areas.

**Follow-Up Care For Life!**

Each liver transplant patient will have an individualized care plan for on-going follow-up care.

Weekly clinic visits are necessary for the first four weeks after transplant, followed by bi-weekly clinic visits. Patients, depending upon the services they need, are sometimes seen in the Transplant Ambulatory Care Unit. Eventually you will become sufficiently stable to allow visits once or twice a year.

Lab work is necessary to check your blood for anti-rejection drug levels. Lab work will be needed every week for the first few months following transplant, and then may decrease in frequency. It is important to understand that the need for lab work will never go away. Lab work will be needed forever.

**Transplant Ambulatory Care Unit (TACU)**

The TACU is an outpatient unit within the hospital that specializes in the handling of transplant–related issues. Patients are frequently seen in this unit for outpatient infusions, treatment of rejection, administering antibiotics, medication and lab monitoring, and evaluation of an acute problem.
Since the TACU is an outpatient unit, patients are not provided accommodations such as meals. For this reason, you would need to have someone stay with you while you are in the TACU. If your treatment there spans a period of time, they may need to stay in the Med Inn or at a local hotel during your treatment period.

**Transplant Specialty Pharmacy Services**

The University of Michigan has a Transplant Specialty Pharmacy whose only focus is to serve patients, ensuring they have ongoing and timely access to their medications. The specialty pharmacy makes available financial counseling and support services to assist transplant patients in navigating through the complexities of insurance coverage and allows patients to obtain answers to questions regarding their medication regimen and medication side effects. A representative from the Transplant Specialty Pharmacy will meet with you while you are in the hospital to review the program and discuss your pharmacy options. If you have questions about the UMHS Transplant Specialty Pharmacy, please call (866) 946-7695.

**Anti-Rejection Medications**

Anti-rejection medications are a fact of life for patients following a liver transplant. Immunosuppressive drugs reduce the strength of the body’s immune system, but it does not eliminate the immune system. Immediately following transplant, you will take many medications in high dosages. Different combinations of medications and smaller dosages are used to develop a balance between providing enough immunosuppression to avoid rejection and as little as necessary to minimize side effects. While you will always be on some immunosuppressive medication, the dosages may be reduced over time.

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**Anti-Rejection Medications**

- Anti-rejection Medications - called Immunosuppression
  - Will be on some medication forever
  - Different combinations of medications work in different areas of the immune system
  - Use the smallest doses of meds to minimize side effects
  - Immune system is “knocked down” but not completely “knocked out”
  - Start with high dose, taper to lower doses
Side Effects of Anti-Rejection Drugs

The immunosuppressive medications necessary following a transplant have side effects that you may find troublesome. Over time the Transplant Team will work with you to find the right balance of medications and dosages to prevent rejection and minimize side effects. The most common side effects for the three major drug types following transplant are shown here.

Post-Transplant Complications

The most common complications you may experience after a liver transplant are infections, bile duct problems, rejection or blood flow problems.

Infections that occur at the wound site are generally treated by opening the wound to allow it to drain and by keeping clean dressings on the wound. An abscess is a “pocket” of infection that may require a drainage tube in your side. A viral infection, such as cytomegalovirus (CMV), may require medications for a period of one to three months.

An acute rejection episode would generally occur early on following transplant and would be treated by increasing immunosuppressive drugs – usually administered through an IV. Chronic rejection usually occurs a period of time after the transplant and reoccurs on multiple occasions. Vanishing Bile Duct Syndrome or long-term chronic rejection could result in needing a second transplant.
The bile duct system is similar to a tree. The bile ducts are a common problem for liver transplant patients. Bile duct problems, such as leaking or a stricture, generally occur at the location of the stitching. Often a stent can be inserted through an EGD to treat a bile duct problem. After a period of time, prolonged damage can affect the new liver.

The liver is dependent on blood for survival. The hepatic artery is the main artery that feeds the liver. If the hepatic artery is damaged you could suffer liver damage with eventual liver failure. The portal vein carries blood away from the liver. If there are problems with the portal vein the patient usually suffers ascites and fluid accumulation in their lower extremities. Blood flow problems in the hepatic artery or the portal vein are generally apparent soon after surgery and, if severe, need to be corrected surgically.

**Potential Medical Complications**

Following liver transplant some medical complications may appear or re-appear.

- **Diabetes:** Acute illness and a lengthy pre-clinical stage can put a patient at risk for developing diabetes. When multiple factors are present (obesity, hyper-lipidemia and age) the risk increases for the patient to need long-term management.

  After surgery while on high dose steroid and anti-rejection medication, the patient’s blood glucose would become unstable requiring insulin intervention. Sometimes a lowering of the medication helps but often it does not. If the patient becomes a diabetic, they must commit to a diabetic regimen that includes self care, development of a treatment plan with their physician and honest communication with a medical team.

  It is important to note that being a diabetic is a lifestyle change that requires intervention and education for life.
• **Renal Failure:** Kidney disease is common in patients with liver disease. While the body is under stress a significant number of patients will undergo a temporary insufficiency related to the surgery. The kidneys usually recover as the patient recovers but sometimes they do not. If the patient’s kidneys do not recover they may have to go on hemodialysis temporarily, or for life. Renal failure is associated with poorer transplant and patient outcomes.

Anti-rejection medications can cause a decline in kidney function over time with a significant number of liver transplant recipients developing chronic kidney disease. Chronic kidney disease is associated with increased mortality and an increase in cardiovascular risk.

Treatment plans for renal failure are hemodialysis which is usually scheduled three times a week and/or a kidney transplant from a living donor or cadaver donor.

It is important to note that hemodialysis is a major lifestyle change.

• **Skin Cancer:** Skin cancer is a greater risk due to the immunosuppressive medications. Patients are encouraged to use safety precautions in the sun. Limiting sun exposure and the use of a hat and sun block are encouraged. In addition, routine skin observation for foreign moles, spots and lesions is advised.

• **Hypertension and Increased Cholesterol/Lipids:** Hypertension and increased cholesterol/lipid levels may occur. The hypertension is treated with medication, diet and lifestyle changes. While these increases may be temporary, some patients require on-going medications to maintain healthy levels. Your primary care physician will monitor your blood pressure and lipid levels following the transplant admission.

**Recurrence of Disease**

Transplant may not cure the underlying disease process that damaged your liver. However, since many of these diseases take years to result in damage to a liver it is hopeful you will not experience liver failure a second time as a result of recurring disease.

**Recurrence of Disease**

- Hepatitis B
- Hepatitis C
- Autoimmune hepatitis
- Primary sclerosing cholangitis
- Primary biliary cirrhosis
- Hepatocellular cancer (HCC)/Cholangiocarcinoma
- Return to substance abuse
Hepatitis B affects 1.2 million Americans and can reoccur following transplant. We follow a protocol to treat and monitor patients following liver transplant.

Hepatitis C affects four million Americans. Patients may require anti-viral medications to treat a recurrence of hepatitis C.

Autoimmune hepatitis usually affects young women and the cause is unknown. With autoimmune hepatitis your body attacks your own liver.

Primary biliary cirrhosis (PBC) is a chronic cholestatic liver disease characterized by immune destruction of interlobular and septal bile ducts. PBC occurs most often in women.

Primary sclerosing cholangitis (PSC) is a chronic cholestatic syndrome characterized by immune diffuse fibrosing inflammation of the intra and extra hepatic bile ducts. PSC occurs most often in men. There is a close association with inflammatory bowel disease, especially ulcerative colitis.

Substance abuse is an issue the patient must control. If the patient avoids using drugs or alcohol, they will not experience a recurrence of liver disease as a result of substance abuse.

**Cholangiocarcinoma and Hepatocellular Carcinoma**

Cholangiocarcinoma is a cancer that starts in the bile ducts. When it is at the branch points of the right and left bile ducts, it is called hilar cholangiocarcinoma. In some patients, hilar cholangiocarcinoma may be cured by combining chemotherapy and radiation followed by liver transplantation. Hepatocellular Carcinoma is a cancer that starts in the liver cells and is often associated with cirrhosis. A liver transplant may cure this cancer in some patients by removing all of the cancer along with all of the old liver and replacing the old liver with a new one.

**Lifetime Commitment**

It is important to recognize that a liver transplant is more than a single surgical event. Liver transplant is not a cure for liver disease; it is a treatment. A successful liver

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#### Lifetime Commitment

- Procedures and follow-up are on-going for your entire life
- All are absolutely essential and necessary to maintaining a good liver function and good health
- Family support
- Number of medications and frequency of procedures could be difficult, especially in the initial post-transplant period
- You must have a primary care physician to manage non-transplant health issues
transplant is a group effort that requires a lifetime commitment by the patient to adhere to a healthy lifestyle and receive on-going medical care. The following areas are examples that require an on-going commitment.

**Medications** to suppress the immune system will be required for life. The types of medications and the dosages may change over time, but some level of medication will always be needed. Generally, the number of medications and the dosages are highest immediately following the transplant.

**Lab work** will be required on a regular and on-going basis. Lab tests are required to monitor the level of medications and the functions of the liver.

**Medical procedures** will be needed on an on-going basis – generally they are most frequent following the transplant surgery or during a rejection episode.

The members of the group needed for a successful liver transplant include the transplant professionals, the patient, the patient’s family or caregiver, and the patient’s primary care physician.

Liver transplant patients must establish a relationship with a primary care physician who will manage their non-transplant health issues.

The support you receive from your family and caregiver team is crucial to your success. The support will be needed on an on-going basis.