

# **Transplantation Rotation**

**Length:** 1-2 Months, PGY-4 year

**Location:** University of California at San Francisco, Department of Surgery

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## **GOALS**

Upon completion of the transplant rotation, Residents will understand the basic principles of organ transplantation and immunology.

## **OBJECTIVES**

### **Liver Transplantation Objectives**

#### **MEDICAL KNOWLEDGE**

1. Be able to obtain a focused history and physical examination in preparation for liver transplantation
  - a. Be able to state what physical findings would constitute a contraindication to going forward with a liver transplant
  - b. Specifically assess chest, abdomen, lymph nodes, peripheral pulses, lower extremities, neuro exam in preparation for kidney transplant
2. Assess risk factors for liver transplantation, including:
  - a. Cardiac risk factors
  - b. Infectious risk factors
  - c. Risk of rejection
  - d. Risk of recurrence of disease, HCC, HBV, HCV
3. Understand and be able to state/describe:
  - a. Indications and contraindication for liver transplant
  - b. Describe treatment options for hepatocellular carcinoma
  - c. Anatomy of liver, segmental anatomy.
  - d. Describe normal and aberrant blood supply of liver
  - e. Describe anatomy of biliary tract.
  - f. Describe anatomy of IVC, hepatic veins

- g. Describe right hepatectomy, left hepatectomy, left lateral segmentectomy
  - h. The steps involved in performing a liver transplant.
  - i. Immunosuppressive medications
    - i. Classes
    - ii. Mechanism of action
    - iii. Toxicities
  - j. Immunology of rejection
    - i. T cells, B cell involvement
    - ii. Assessment of risk
    - iii. Diagnosis of rejection
    - iv. Treatment of rejection
  - k. Complications of transplant
    - i. Work up of increased liver enzymes, hyperbilirubinemia post liver transplant
  - l. management of fulminant hepatic failure and complications
    - i. need for CVVHD
    - ii. cerebral edema
    - iii. hypoglycemia
    - iv. profound coagulopathy
  - m. management of patients with end stage liver disease and complications
    - i. Gi hemorrhage
    - ii. Spontaneous bacterial peritonitis
    - iii. Encephalopathy
    - iv. Intractable ascites
    - v. Hepatocellular cancer
  - n. Describe the Child-Pugh score
  - o. Describe the MELD system and its usefulness
4. Be able to describe
- a. management of refractory ascites
  - b. interventional, endoscopic and surgical management of variceal hemorrhage
    - describe TIPS, indications, complication, contraindications
    - describe shunt procedures, e.g. porta-caval, meso-caval, Rex shunt
  - c. the technical conduct of a liver transplant
    - piggy back vs. conventional liver transplant
    - methods to deal with inadequate arterial/venous inflow
  - d. differential diagnosis of elevated liver enzymes at various times post liver transplant.
5. Be able to assess and manage in the immediate postoperative period for liver transplant recipients:
- a. Decreased urine output
  - b. Decreased blood pressure
  - c. Fever

- d. Hemorrhagic shock
  - e. Respiratory failure
  - f. Renal failure
6. Be able to state signs, symptoms, prophylaxis and treatment of common opportunistic infections in transplant recipients.
  7. Be able to write postoperative orders on a liver transplant recipient.

### **PATIENT CARE/TECHINICAL**

1. Perform at least 6 complete history and physicals in patients with end stage liver disease
2. Present patients in a succinct fashion to attendings on attending rounds.
3. Scrub in on at least four liver transplants, performing closure of fascia, subcutaneous and subcuticular sutures.
4. Scrub in on at least 4 general non transplant hepatic cases, including RFA, resection
5. Perform four open cholecystectomies (during liver transplant)
6. Perform at least two paracenteses.
7. Scrub in on at least eight multiorgan procurements
  - a. Perform at least four median sternotomies (during procurement)
    - AND on procurements:
    - Mobilize right colon
    - Mobilize left colon
    - Perform full Kocher maneuver
    - Expose aorta, IVC
    - Cannulate aorta and vena cava and inferior mesenteric vein
    - Mobilize spleen and pancreas to complete left medial visceral rotation
    - First assist excision of organs, blood vessels
8. Demonstrate proficiency in one- and two-handed knots
9. Take primary responsibility for the care of at least six liver transplant patients on the floor
10. Take primary responsibility for at least four critically ill liver patients in the intensive care unit.
11. Help PGY-1s manage critically ill liver transplant patients
12. Go on at least one deceased donor procurement

### **PRACTICE BASED LEARNING**

1. Attend all weekly Transplant M&M/teaching conference, participate on analysis of treatment outcomes by review of cases at morbidity and mortality conference.
2. Present a septic review of a complication and literature review of a particular complication in one teaching conference. Critically analyze available literature.
3. Maintain a personal patient log

4. Be able to describe the most common technical complications in the immediate post op period for liver transplant recipients, e.g. post op hemorrhage, biliary leak, stricture, hepatic artery thrombosis, and be able to answer:

How do they present?

What is their incidence in the post op period?

How are they diagnosed?

How can they be prevented?

What is the treatment?

## **INTERPERSONAL AND COMMUNICATION SKILLS**

1. Communication
  - a. Communicate appropriately and effectively with all those involved in the patient's care
  - b. Help coordinate and supervise 4 PGY1's (two medicine, two surgical)
  - c. Counsel and educate patients and families – assist with education of transplant recipients before discharge.
  - d. Document the patient's care with timely completion of admission history and physical examination, entry of progress notes, and discharge summaries
2. Interpersonal skills
  - a. Interact on a daily basis with ICU and floor nurses, pharmacists, nurse coordinators
  - b. Mentor the third and fourth year medical students and PGY-1s on the service
  - c. Respect the chain of command regarding senior residents, fellows and attendings
  - d. Obtain informed consent of patients
  - e. Request post mortem exams of patients

## **PROFESSIONALISM**

### **Ethics of transplantation**

1. Be able to:
  - a. Discuss the ethics of organ donation, brain death, withdrawal of support, the separation of the transplant team and the team caring for an injured patient or patient with brain injury
  - b. Discuss the ethics of patient selection.
  - c. Discuss the ethics of living donation.

- d. Discuss the ethics of compensation of donor families or living donors.
  - e. Discuss the ethics of various organ allocation schemes, emphasizing utility, efficiency, justice.
  - f. Discuss the conflicting interests of individual transplant patients vs. the waiting list as a whole
2. Attend at least two liver transplant selection conferences.
  3. Be punctual
  4. Complete medical records, dictations, discharge summaries in a timely fashion
  5. Maintain attendance at Grand Rounds and Basic Science conference

### **SYSTEM BASED PRACTICE**

1. Be able to answer the following:
2. How are deceased donor livers allocated in the U.S.?
3. What are the costs of a liver transplant?
4. What are the annual costs of immunosuppressive medications for a liver transplant recipient?

## **Kidney Transplantation Objectives**

### **MEDICAL KNOWLEDGE**

1. Be able to obtain a focused history and physical examination in preparation for kidney transplantation
  - a. Be able to state what physical findings would constitute a contraindication to going forward with a kidney transplant
  - b. Specifically assess chest, abdomen, lymph nodes, peripheral pulses, lower extremities, GU exam, Neuro exam in preparation for kidney transplant
2. Describe how we determine candidacy for a renal transplant
3. Identify important pertinent positives and negatives in history of potential transplant candidates
4. Assess risk factors for kidney transplantation, including:
  - a. Cardiac risk factors
  - b. Infectious risk factors
  - c. Risk of rejection
5. Understand and be able to state/describe:
  - a. Indications and contraindication for kidney transplant
  - b. Anatomy of kidneys, renal vessels, irater, bladder, iliac vessels
  - c. The steps involved in performing a kidney transplant, donor nephrectomy and transplant nephrectomy
  - d. Describe the anatomy of the pancreas and its blood supply
  - e. Indication for a pancreas transplant
  - f. Immunosuppressive medications
    - i. Classes
    - ii. Mechanism of action
    - iii. Toxicities
  - g. Immunology of rejection
    - i. T cells, Bcell involvement
    - ii. HLA testing, role of PRA
    - iii. Assessment of risk
    - iv. Crossmatching
    - v. Diagnosis of rejection
    - vi. Treatment of rejection
  - h. Complications of transplant
    - i. Work up of decreased urine output, increased creatinine post renal transplant
  - i. Dialysis
    - i. Indications for acute dialysis
    - ii. Access for dialysis
    - iii. Complications of dialysis

6. Describe the appropriate preoperative workup of a renal transplant recipient
  - a. cardiac workup
    - i. indications for p/ thall/echo/ who needs cardiac catheterization
  - b. pulmonary w/u – abg/PFTS
  - c. hypercoag w/u – who needs one, what does it consist of
  - d. rheum w/u – e.g. lupus w/u incl C3,C4, CH50
  - e. ID w/u
    - ii. What to do with a positive PPD pretxp?
    - iii. CXR with findings?
  - f. hx of malignancy – how to w/u
    - iv. wait time for a transplant
7. Be able to assess and manage in the immediate postoperative period for kidney transplant recipients:
  - a. Decreased urine output
  - b. Decreased blood pressure
  - c. Hypertension
  - d. Chest pain
  - e. Shortness of breath
  - f. Pulmonary edema/fluid overload
  - g. Hyperkalemia in a patient with renal insufficiency
  - h. Fever
  - i. Hyperglycemia
8. Be able to state signs, symptoms, prophylaxis and treatment of common opportunistic infections in transplant recipients.
9. Be able to write postoperative orders on a kidney transplant recipient.
10. Describe candidacy for a pancreas transplant
11. Describe back-table vascular reconstruction for a pancreatic allograft
12. Describe techniques for exposure of iliac vessels, exposure of native ureter, venous anastomoses, arterial and anastomoses, ureteroneocystostomy and-uretero ureterostomy in kidney transplant
13. Describe the risk of recurrence of primary disease post transplant, e.g. lupus, IgA nephropathy, diabetic glomerulosclerosis, FSGS, MPGN
14. Describe the steps in a pancreas transplant.
15. Describe options for venous drainage
16. Describe options for exocrine drainage
17. Describe w/u for hyperamylasemia/hyperlipasemia post pancreas transplant.
18. Describe w/u for hyperglycemia post pancreas transplant.
19. How is pancreas transplant rejection diagnosed?
20. How is humoral rejection of a kidney transplant diagnosed?
21. Describe special consideration of management of general and vascular surgical problems in patients with renal failure and/or renal transplants, diabetics/patients with a pancreas transplant.

## **PATIENT CARE/TECHINICAL**

1. Perform at least 6 complete history and physicals in patients being called in for a deceased donor transplant.
2. Present patients in a succinct fashion to attendings on attending rounds.
3. Scrub in on at least eight kidney transplants (deceased donor and living donor), performing closure of fascia, subcutaneous and subcuticular sutures.
4. Perform at least four procedures for dialysis access – peritoneal dialysis, AV fistula, AV graft
  - a. Demonstrate demonstrate proficiency in one and two handed ties, using 3-0,4-0,5-0 and 6-0 sutures
5. Demonstrate proficiency in one- and two-handed knots
6. Demonstrate proficiency in vascular anastomosis, both arterial and venous (renal artery and renal vein)
7. Demonstrate proficiency in performing a ureter to bladder anastomosis
8. Take PGY-1 through wound closure (teaching assistant)
9. Scrub on at least one peritoneal dialysis catheter placement and at least one hemodialysis catheter placement.
10. Scrub in on at least one pancreas transplant
11. Go on at least one donor procurement
  - a. Perform median sternotomy
  - b. Mobilize right colon
  - c. Mobilize left colon
  - d. Perform Kocher maneuver
  - e. Expose aorta, IVC
  - f. Cannulate aorta and vena cava and inferior mesenteric vein
  - g. First assist excision of organs, blood vessels
12. Take primary responsibility for the care of at least six immediate post-transplant patients.
13. Participate in the care of transplant patients in the intensive care unit

## **PRACTICE BASED LEARNING**

1. Present cases at weekly M&M conferences, describe the complication, why it occurred, and what can be done to prevent the complication the next time around
2. Present a septic review of a complication and literature review of a particular complication in one teaching conference. Critically analyze available literature.
3. Be able to describe the most common technical complications in the immediate post op period for kidney transplant recipients, and be able to answer:
  - How do they present?
  - What is their incidence in the post op period?
  - How are they diagnosed?

How can they be prevented?  
What is the treatment?

4. Maintain a personal patient log

## **INTERPERSONAL AND COMMUNICATION SKILLS**

### 1. Communication

- a. Communicate effectively up and down the chain of command; communicate appropriately and effectively with all those involved in the patient's care
- b. Inform fellows and attending of all changes in patient status in a timely manner
- c. Counsel and educate patients and families – assist with education of transplant recipients before discharge.
- d. Document the patient's care with timely completion of admission history and physical examination, entry of progress notes, and discharge summaries
- e. Assist PGY-1 with H&Ps, discharge summaries, orders, ordering diagnostic tests
- f. Supervise PGY-1 with central venous access, removal of central lines, removal of drains, thoracentesis, wound closures.

### 2. Interpersonal skills

- a. Interact on a daily basis with ICU and floor nurses, pharmacists, nurse coordinators
- b. Mentor the third and fourth year medical students on the service
- c. Respect the chain of command regarding senior residents, fellows and attendings
- d. Establish good rapport with fellow, junior residents, students and attendings
- e. Obtain informed consent of patients
- f. Request post mortem exams of patients

## **PROFESSIONALISM**

### **Ethics of transplantation**

#### 1. Be able to:

- a. Describe the ethics of organ donation, brain death, withdrawal of support, the separation of the transplant team and the team caring for an injured patient or patient with brain injury
- b. Describe the ethics of patient selection.
- c. Describe the ethics of living donation.
- d. Discuss the ethics of compensation of donor families or living donors.

- e. Discuss the ethics of various organ allocation schemes, emphasizing utility, efficiency, justice.
- f. Discuss the conflicting interests of individual transplant patients vs. the waiting list as a whole
2. Demonstrate mentoring and positive role modeling skills for the interns and medical students
3. Attend at least one kidney transplant selection conference.
4. Be punctual
5. Complete medical records, dictations, discharge summaries in a timely fashion
6. Maintain attendance at Grand Rounds and Basic Science conference

### **SYSTEM BASED PRACTICE**

1. Be able to answer the following:
  - a) Describe the overall health care costs of dialysis. Compare them to the costs of renal transplantation.
  - b) How is the cost of dialysis covered? What does Medicare cover?
  - c) How is the cost of renal transplantation covered in the U.S.?
  - d) Describe the barriers to renal transplantation faced by various populations.
  - e) Describe the organ allocation system for organ allocation.
  - f) Describe matching criteria for a kidney transplant.
  - g) Describe a global package contract for services.