

KIDNEY TRANSPLANT CONSULTATION SERVICE

The Transplant Consult Service works closely with the Transplant Surgery Service to monitor and care for over 230 patients receiving renal allografts each year at the University of Michigan Hospital. Extensive supervised experience in renal allograft biopsy and interpretation are included in this activity. Fellows on this service also provide hospital consultation for other solid organ transplant patients with renal complications. In order to provide continuity of care experience, fellows on this service attend a weekly ambulatory clinic dedicated to patients recently discharged with new renal allografts; this clinic is staffed with both surgical and medical transplant specialists who provide supervision. Fellows follow new renal allograft recipients from the time of transplantation into the ambulatory clinic. During this rotation, fellows also attend weekly Transplant Evaluation Committee meetings where the entire group of care providers (transplant nephrologists, transplant surgeons, coordinators, nurses, social workers, and dieticians) charged with evaluating and listing prospective recipients reach their decisions.

Educational Goals:

1. The transplant service builds the foundations for a broad knowledge base in transplant nephrology, by providing fellows exposure and opportunities to manage tertiary and quaternary referral patients, as well as managed primary care patients.
2. The fellow is expected to develop competency in providing compassionate and thorough care to a medically and socially diverse group of hospitalized patients.
3. Fellows serve as team leaders on these services and have opportunities to develop teaching, leadership, and management skills with residents and students.
4. The purpose of this rotation is to provide the first year fellow with the education and experience necessary to become proficient in caring for inpatient renal transplant patients.

Objectives:

Patient Care

Each fellow will rate as valuable the importance of being a transplant nephrologist to a medically and socially diverse group of patients

Each fellow will be able to obtain and document a complete history and physical, formulate a thorough assessment and plan, and communicate this assessment to the transplant surgery or medical primary care team

Each fellow will demonstrate the ability to make daily assessments of their patients and convey that information to the team through a variety of methods, including daily written progress notes

Specific educational goals are to provide clinical expertise and opportunities to gain experience in:

1. Immediate post operative management of transplant recipients, including administration of immunosuppressive medications and transplant induction protocols;
2. Diagnosis and management of delayed graft function.
 - 2.1. Clinical diagnosis of all forms of delayed graft function including laboratory, histopathologic, and imaging techniques;

- 2.2. Post-transplant dialytic management;
- 2.3. Medical management of rejection, including use of immunosuppressive medications (pharmacology and risks) and other modalities (i.e. plasmapheresis);
3. Recognition and medical management of the surgical and non-surgical complications of transplantation including the differential diagnosis of acute and chronic graft dysfunction;
4. Diagnosis and management of acute and long-term infectious complications of solid organ transplantation.
5. Management of long-term non-infectious complications (hematologic, cardiovascular, metabolic) of kidney/kidney-pancreas transplant recipients in the inpatient setting.
6. Evaluation and selection of transplant candidates.
7. Preoperative evaluation and preparation of transplant recipients and donors.

Medical Knowledge

The fellow will demonstrate a knowledge and understanding of the pathophysiology, diagnostic evaluation, and therapeutic management of a core group of transplant problems described above.

By the end of the transplant month, each fellow will have attended and participated in the educational activities listed in the teaching methods section.

By the end of the transplant month, each fellow is encouraged to complete some of the recommended readings (below)

Communication Skills

Each fellow will demonstrate effective communication skills with the attending physician by discussing each consultation or admission in a timely fashion

Each fellow will discuss the ongoing care of each patient with the appropriate attending daily

Each fellow will demonstrate effective teaching and feedback skills with interns, residents, and medical students.

Each fellow will model effective interpersonal communication skills with patients, families, and allied health professionals

Professionalism

Each fellow will demonstrate compassion and understanding to a group of socially, economically and racially diverse group of patients

Each fellow will rate as comfortable his/her ability to assume the leadership role on the healthcare team

Each fellow will model appropriate team function by including allied health professionals in management discussions

Practice-Based Learning and Improvement

The fellow will incorporate basic knowledge of evidence-based medicine in evaluation and management of patient medical problems

Each fellow will continue the process of acquiring skills and documenting the procedures required by the ABIM, as listed in the procedure summary

Each fellow will model practice based learning and effective information seeking in the daily care of patients

Systems-Based Practice

The fellow will demonstrate competence in the integration of inpatient and outpatient care, and a systems approach to care, by demonstrating appropriate follow-up/discharge plans for all patients he/she has admitted

The resident will demonstrate an awareness of issues cost-effective medicine in patient care, by discussing the cost implications of a case/month with the attending physician

Each fellow will rate as valuable the contributions of other members of the health care team into management plans for patients

Each fellow will routinely evaluate the socioeconomic needs of his/her patients, including health insurance, access to care and co-payments necessary to provide care

By the end of consultation month, each fellow will have assumed care for patients of colleagues on the team and effectively transferred care of his/her own patients when not in the hospital

Teaching Methods:

Teaching methods include rounds with the nephrology transplant faculty member, attendance at the Renal Transplant Evaluation Committee meetings, and review of transplant biopsies with renal pathology faculty members. Nephrology teaching faculty members will provide fellow education for evaluation of prospective renal transplant donor and recipients who fellows see in recipient and donor evaluation clinics, and follow up of renal transplant recipients. The teaching faculty member may provide literature on various topics. In addition, all radiological studies obtained are reviewed and if needed direct consultation is obtained from radiology faculty members. There are didactic sessions pertaining to the specific educational goals in the Nephrology Core Curriculum Seminar Series, Nephrology Clinical Conference, Nephrology Clinical Journal Club, Clinical Research Conference, and Basic Science Conference. Fellows attend Multi-Disciplinary Educational Transplant Conference while on this rotation. Suggested readings for various aspects of transplant nephrology include The Handbook of Kidney Transplantation, 3rd Ed. by Danovitch and the Basal Primer published by The American Society of Transplantation. Other suggested readings may include papers distributed by the Nephrology attending. There is access to PUBMED and Up-to-Date, as well as other elective medical literature databases available in the fellows' office and all public workstations. Kidney Transplantation, 4th Ed. by Morris is available in the Fellow's office.

Patients' Characteristics:

Patients followed include immediate postoperative kidney and kidney-pancreas transplant recipients, patients with acute and chronic graft dysfunction after discharge from the perioperative period and, patients admitted who have complications from the transplantation procedure or immunosuppressive medications (e.g., opportunistic infections, post transplant diabetes mellitus), ambulatory renal transplant recipients, and potential renal transplant donors and recipients. The daily census is usually between 15-25 patients on the Nephrology Transplant Service. (Patients who are discharged while the fellow is on the renal transplant service may be followed longitudinally by the Nephrology fellow in the outpatient clinic.) The renal fellow performs renal transplant biopsies and reviews these biopsies with the supervision and guidance of the Nephrology transplant attending and renal pathologist. It is expected that during the 3 months on this rotation the Nephrology fellow will have access to ≥ 20 new renal transplant patients and share responsibility with a Nephrology attending of ≥ 20 patients in longitudinal follow up and for inpatient hospitalizations in the transplant combined clinic. Experience in longitudinal care will be supplemented during 2nd fellowship year with a 3 month, half day per week rotation in the transplant combined clinic.

Procedures:

Procedures include performance of urinalyses, renal transplant biopsies, placement of temporary vascular access for hemodialysis, continuous renal replacement therapy as well as peritoneal dialysis, hemodialysis, and continuous renal replacement therapy treatments.

Services:

Fellows on this rotation will be asked to take care of patients by providing an outstanding standard of care as stated by the six core clinical competencies. Fellows are expected to interact with the transplant surgery service and with support staff (transplant nurses, coordinators, physician's assistants, social workers, and dieticians) during this rotation. Recipient and donor coordinators arrange studies required for full evaluation as requested by the fellow and attending.

Reading List:

General References:

1. Basal Primer (Fellows are encouraged to obtain and review topics as they arise during rotations)
2. Danovitch G, Handbook of Kidney Transplantation (Third Edition) Lippincott Williams and Wilkins 2001

References by Topic:

Management Guidelines:

1. The Evaluation of Renal Transplant Candidates: Clinical Practice Guidelines American Journal of Transplantation 1 (Suppl 2) 2001.
2. Danovitch GM et al. Management of the Waiting List for Cadaveric Kidney Transplants: A report of a survey and recommendations by the Clinical Practice Guidelines

Committee of the American Society of Transplantation. J Am Soc Nephrol 13: 528 – 535, 2002.

3. Kasiske BL, The evaluation and selection of living kidney donors. Am J Kidney Dis 26: 387, 1995.
4. Recommendations for the Outpatient Surveillance of Renal Transplant Recipients (Clinical Practice Guidelines of the American Society of Transplantation) J Am Soc Nephrol 11 (Suppl 15) Oct 2000.
5. Zand M et al, Care of the Well Transplant Patient Graft 4:230 – 320, 2001.

Immunosuppressive Therapy - Principles:

1. Denton MD, Magee CC, Sayegh MH. Immunosuppressive strategies in transplantation. Lancet 1999; 353: 1083 - 91.
2. Immunosuppression, edited by W Land. Current Opinion in Organ Transplantation Sept 2000; 5: 243 - 276.
3. Harlan DM, Kirk AD. The future of organ and tissue transplantation: Can t-cell costimulatory pathway modifiers revolutionize the prevention of graft rejection? JAMA 1999; 282: 1076 - 82.
4. Pratschke J, Tullius SG, Neuhaus P. Immunosuppression in solid organ transplantation; a review. Graft 6:338-343; 2002.

Rejection: Definition and Classification:

1. Mauiyyedi S, Pelle PD, Saidman S et al. Chronic Humoral Rejection: Identification of antibody-mediated chronic renal allograft rejection by C4d deposits in peritubular capillaries J Am Soc Nephrol 12: 574 –582, 2001.

Immunosuppressive Therapy –Trials:

1. A randomized clinical trial of cyclosporine in cadaveric renal transplantation: The Canadian Multicentre Study Group. N. Engl. J Med 1983; 309: 809 – 15.
2. The Canadian Multicentre Study Group. A randomized clinical trial of cyclosporine in cadaveric renal transplantation: Analysis at three years. N. Engl. J Med 1986; 314: 1219 – 25.
3. Ponticelli C, Civati G, Tarantino A, di Palo FQ, Corbetta G, Minetti L, Vegeto A, Belli L. Randomized study with cyclosporine in kidney transplantation: 10-year follow-up. J Am Soc Nephrol 1996; 7: 792 – 7.
4. Pirsch JD, Miller J, Deierhoi MH, Flavo V, Filo RS. A comparison of tacrolimus (FK506) and cyclosporine for immunosuppression after cadaveric renal transplantation. Transplantation 1997; 63: 977 – 83.
5. Mayer DA, Dmitrewski J, Squifflet JP, Besse T, Grabensee B, et al. Multicenter randomized trial comparing tacrolimus(FK506) and cyclosporine in the prevention of renal allograft rejection: A report of the European Tacrolimus Multicenter Renal Study Group. Transplantation 1997; 64: 436 – 43.
6. Knoll GA, Bell RC. Tacrolimus versus cyclosporin for immunosuppression in renal transplantation: meta-analysis of randomised trials. BMJ 1999; 318: 1104 – 7.
7. European Mycophenolate Mofetil Cooperative Study Group. Placebo-controlled study of mycophenolate mofetil with cyclosporin and corticosteroids for prevention of acute rejection. Lancet 1995; 345: 1321 -5.

8. Sollinger HW for the U.S. Renal Transplant Mycophenolate Mofetil Study Group. Mycophenolate Mofetil for the prevention of acute rejection in primary cadaveric renal allograft recipients. *Transplantation* 1995; 60: 225 - 32.
9. The Tricontinental Mycophenolate Mofetil Renal Transplantation Study Group. A blinded, randomized clinical trial of mycophenolate mofetil for the prevention of acute rejection in cadaveric renal transplantation. *Transplantation* 1996; 61: 1029 - 37.
10. Mathew TH for the Tricontinental Mycophenolate Mofetil Renal Transplantation Study Group. A blinded, long-term, randomized multicenter study of mycophenolate mofetil in cadaveric renal transplantation: results at three years. *Transplantation* 1998; 65: 1450 - 4.
11. Mathew TH for the Rapamune Global Study Group. The safety and efficacy of sirolimus/cyclosporine for the prevention of acute rejection in primary renal allograft recipients (abstract). *Transplantation* 2000; 69: S360.
12. MacDonald A, Scarola J, Burke JT, Zimmerman JJ. Clinical pharmacokinetics and therapeutic drug monitoring of sirolimus. *Clin Ther* 2000; 22 (Suppl B): B101 - B121.
13. Nashan B, Moore R, Amlot P, Schmidt AG, Abeywickrama K, Souillou JP, for the CHIB 201 International Study Group. Randomised trial of basiliximab versus placebo for control of acute cellular rejection in renal allograft recipients. *Lancet* 1997; 350: 1193 - 8.
14. Vincenti F, Kirkman R, Light S, Bumgardner G, Pescovitz M, et al for the Daclizumab Triple Therapy Study Group. *N Engl J Med* 1998; 338: 161 - 5.
15. Nashan B, Light S, Hardie IR, Lin A, Johnson JR, Daclizumab Double Study Group. Reduction of acute renal allograft rejection by daclizumab. *Transplantation* 1999; 67: 110 - 5.
16. Kahan BD, Rajagopalan PR, Hall M, United States Simulect Renal Study Group. *Transplantation* 1999; 67: 276 - 84.
17. Groth CG, Backman L, Morales JM, Calne R, Kreis H, et al. Sirolimus (rapamycin)-based therapy in human renal transplantation: Similar efficacy and different toxicity compared with cyclosporine: Sirolimus European Study Group. *Transplantation* 1999; 67: 1036 - 42.
18. Kreis H, Cisterne JM, Land W, Wramner L, Squifflet JP et al. Sirolimus in association with mycophenolate mofetil induction for the prevention of acute graft rejection in renal allograft recipients. *Transplantation* 2000; 69: 1252 - 60.
19. Vanrenterghem Y, Lebranchu Y, Hene R, Oppenheimer F, Ekberg H for the Steroid Dosing Study Group. Double-blind comparison of two corticosteroid regimens plus mycophenolate mofetil and cyclosporine for prevention of acute renal allograft rejection. *Transplantation* 2000; 70: 1352 - 9.

Outcome Studies:

1. Hariharan S, Johnson CP, Bresnahan BA, Taranto SE, McIntosh MJ, Stablein, D. Improved graft survival after renal transplantation in the United States, 1988 to 1996. *N. Engl. J Med* 2000; 342: 605 – 12.
2. Meier-Kriesche HU, Ojo AO, Hanson JA, Cibrik DM, Pugh JD, Leichtman AB, Kaplan B. Increased impact of acute rejection on chronic allograft failure in recent era. *Transplantation* 2000; 70: 1098 - 1100.

Diagnostic Procedures:

1. O'Neill WC, Baumgarten DA. Ultrasonography in renal transplantation *Am J Kidney Dis* 39: 663 – 578, 2002.

Chronic Allograft Nephropathy:

1. Womer KL, Vello JP, Sayegh M. Chronic allograft dysfunction: mechanisms and new approaches to therapy. *Semin Nephrol* 2000; 20: 126 - 47.
2. Redefining expectations in transplantation: nephrotoxicity, edited by AP Monaco. *Transplantation (Supplement)* June 27, 2000; 69: SS5 - SS36.
3. Boom H, Mallat MJK, de Fijter JW, Zwinderman AH, Paul LC. Delayed graft function influences renal function, but not survival. *Kidney Int* 2000; 58: 859 - 66.
4. Rush D, Nickerson P, Gough J, McKenna R, Grimm P, Cheang M, Trpkov K, Solez K. Beneficial effects of treatment of early subclinical rejection: a randomized study. *J Am Soc Nephrol* 1998; 9: 2129 - 34.

Infectious Disease:

1. Fishman JA, Rubin RH : Infections in organ transplant recipients. *N Engl J Med* 1998; 338:1741
2. Jassal SV, Roscoe JM, Zalzman JS: Clinical practice guidelines: prevention of CMV disease after transplantation: *J Am Soc Nephrol* 1998; 9: 1696.
3. Daniel C. Brennan: Cytomegalovirus in renal transplantation: *J Am Soc Nephrol* 12: 848-855, 2001.
4. Uwe Heemann, Rene R. Wenzel: CMV prophylaxis: what is valid in 2002? *Nephrol Dial Transplant (2002)* 17: 556-559
5. Pizzo PA: Fever in immunocompromised patients. *N Engl J Med* 1999; 341 : 893
6. Gane, E and Pilmore H. Management of chronic viral hepatitis before and after renal transplantation. *Transplantation* 74: 427-437; 2002.

Malignancy:

1. Penn I. De novo cancers in organ allograft recipients. *Curr Opin Org Transplant* 1998; 3: 188-196.

Pregnancy:

1. Ghandour FZ, Knauss TC, Hricik DE: Immunosuppressive drugs in pregnancy. *Adv Ren Tep Ther* 1998; 5: 31

Metabolic Disorders:

1. Massari PU. Disorders of bone and mineral metabolism after renal transplantation. *Kidney Int* 1997; 52: 1412
2. Weber TJ, Quarles D. Preventing bone loss after transplantation with bisphosphonates: We can ...but should we? *Kidnet Int* 2000; 57: 735
3. Maria A Rodino, Elizabeth Shane: Osteoporosis after organ transplantation: *Am J Med* 1998; 104: 459-469.
4. Miles AM, Sumrani N, Horowitz R. Diabetes mellitus after renal transplantation. *Transplantation* 1998; 65: 380
5. Massy ZA, Kasiske BL. Post transplant hyperlipidemia : mechanisms and management. *J Am Soc Nephrol* 1996; 7: 971.

Pathologic material:

Fellows review transplant renal biopsies as well as other pathologic material from patients with attending renal pathology faculty members and nephrology teaching faculty members.

Method of Evaluation:

The fellow is evaluated using the ABIM form for Evaluation of Clinical Competence, Categories evaluated include the core competencies of Patient Care, Medical Knowledge, Practice Based Learning , Interpersonal and Communication Skills, Professionalism, Systems Based Learning, evaluation of procedures above, and Moral and Ethical Behavior, and Overall Clinical Competence as a Specialist In Nephrology. The American Board of Medical Specialties Generic Form for Global Ratings of Resident Performance is also used which evaluate the 6 core competencies. Please see general Curriculum for details of the evaluation. These evaluations are filled out every rotation by the supervising Nephrology attending. The fellow evaluates the teaching of the nephrology teaching faculty member simultaneously.

Responsibilities/Supervision

The nephrology fellows on the Nephrology Transplant rotation is responsible for the initial evaluation of new kidney/kidney-pancreas patients, as well as follow up of existing patients on this rotation. The Nephrology fellow communicates any concerns to the transplant nephrology faculty member that might mandate review of the patient prior to rounds scheduled later in the day. The nephrology fellow contacts the nephrology teaching faculty member prior to the start of any form of renal replacement therapy or treatment of rejection, and writes initial orders in consultation with the faculty member. The nephrology faculty member discusses patients and reviews the medical notes presented by the fellow on a daily basis. The faculty member confirms the history, physical findings, assessment and plans after interviewing and examining the patient. The nephrology faculty member discusses with the fellow any modifications of the above. The nephrology faculty member supervises procedures, such as placement of vascular access for hemodialysis or continuous renal replacement therapy, as well as hemodialysis, peritoneal dialysis or renal replacement therapy treatments unless the faculty member is not on the premises at the time of the procedure. The faculty member supervises all renal transplant biopsies.

The nephrology fellow relays to the housestaff recommendations that are agreed upon after review with the nephrology faculty member. The faculty member may personally communicate with certain physicians. The fellow and faculty member jointly decide which patients no longer need to be actively followed during the Nephrology Transplant rotation.

The nephrology fellow is responsible for seeing recent renal transplant recipients weekly with transplant faculty members in the ambulatory care setting (Transplant Combined Clinic). The fellow presents the patient's history, physical examination, and assessment and plans to one of the nephrology teaching faculty preceptors for donor or recipient evaluation clinic. The nephrology faculty preceptor discusses the patient with the fellow at the time of visit and confirms the history, physical findings, assessment and plans after interviewing and examining the patient. The fellow is responsible for dictating the clinic note within two weeks of the visit. The faculty member who supervised the fellow for the particular patient is responsible for electronically signing the outpatient note within two weeks of the transcription. The fellow

communicates other tests required for evaluation to the patients transplant coordinator at the time of the visit.