McMaster University Nephrology
Trainee Manual

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Revised 2009

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Manual is available on our website: http://www.fhs.mcmaster.ca/nephrores/

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DESCRIPTION OF THE NEPHROLOGY DIVISION

The Division of Nephrology currently has 15 faculty members, 13 nephrologists, 2 full-time basic scientists, 4 nephrology trainees, and 1 clinical fellow. All of the faculty are located at St. Joseph's Health Care at the Charlton Campus. The Division has a strong tradition in clinical nephrology and renal transplantation - there are currently over 70 hemodialysis stations at St. Joseph's Health Care with 2 affiliated satellite units in Brantford and Stoney Creek. There are approximately 70 peritoneal dialysis patients and between 70-90 renal transplantations each year. The transplantation program currently follows over 850 successfully transplanted patients in the outpatient clinic.

The vast majority of patients with acute and chronic renal disease are seen at St. Joseph's Health Care. The Division also provides a consultative service to the 3 other acute care hospitals in Hamilton where in-hospital hemodialysis is provided.

Division of Nephrology Members:

Dr. Dianne Arlen
Dr. Scott Brimble (Medical Director, Peritoneal Dialysis)
Dr. Euan Carlisle (Medical Director, Hemodialysis**;** Head of Service)
Dr. Catherine Clase
Dr. Azim Gangji
Dr. Alistair Ingram
Dr. Joan Krepinsky
Dr. David Ludwin (Medical Director, Bayshore Dialysis Unit)
Dr. Peter Margetts
Dr. Christian Rabbat (Medical Director, Kidney Function Program)
Dr. David Russell (Divisional Director, Medical Director, Renal Transplant Program)
Dr. Darin Treleaven
Dr. Robert Yang

Dr. Damu Tang (PhD, research)
Dr. Rick Austin (PhD, research)

GOALS AND OBJECTIVES

The goals and objectives of the McMaster University Nephrology training program are those identified by the Royal College of Physicians and Surgeons of Canada (RCPSC) [see website below].

http://rcpsc.medical.org/information/index.php?specialty=460&submit=Select

(Please see also the "Policies and Procedures" booklet.)

DEFINITION

Nephrology is that branch of medicine concerned with the care of patients with kidney disease and disorders of fluid and electrolyte metabolism.

GOALS

Upon completion of training, a resident is expected to be a competent specialist in Nephrology capable of assuming a consultant's role in the specialty. The resident must acquire a working knowledge of the theoretical basis of the specialty, including its foundations in the basic medical sciences and research.

Only candidates certificated by the Royal College of Physicians and Surgeons of Canada in Internal Medicine or Pediatrics may be eligible for the Certificate of Special Competence in Nephrology.

Residents must demonstrate the requisite knowledge, skills, and attitudes for effective patient-centered care and service to a diverse population. In all aspects of specialist practice, the graduate must be able to address issues of gender, age, culture, ethnicity and ethics in a professional manner.

COMPETENCIES IN NEPHROLOGY:

At the completion of training, the resident will have acquired the following competencies and will function effectively as a:

Medical Expert

Definition:

As *Medical Experts*, physicians integrate all of the CanMEDS Roles, applying medical knowledge, clinical skills, and professional attitudes in their provision of patient-centered care. *Medical Expert* is the central physician Role in the CanMEDS framework.

Key and Enabling Competencies: Nephrologists are able to…

Function effectively as consultants, integrating all of the CanMEDS Roles to provide optimal, ethical and patient-centered medical care

Effectively perform a consultation, including the presentation of well-documented assessments and recommendations in written and/or verbal form in response to a request from another health care professional

Demonstrate effective use of all CanMEDS competencies relevant to Nephrology

Identify and appropriately respond to relevant ethical issues arising in patient care

Effectively and appropriately prioritize professional duties when faced with multiple patients and problems

Demonstrate compassionate and patient-centered care

Recognize and respond to the ethical dimensions in medical decision-making

Demonstrate medical expertise in situations other than patient care

Establish and maintain clinical knowledge, skills and attitudes appropriate to Nephrology

Apply knowledge of the clinical, socio-behavioral, and fundamental biomedical sciences relevant to Nephrology, including:

The anatomy and histology of the kidney and its micro structures including the structure and function of the glomerular filtration barrier

The physiology and pathophysiology of

- Renal blood flow and glomerular filtration
- Regulation of acid base, electrolyte and water homeostasis
- Mineral metabolism and its alteration in renal disease, metabolic bone disease and nephrolithiasis
- Hypertension
- Clinical pharmacology as it pertains to drug prescribing in renal disease and transplantation (especially with regards to immunosuppression) and the use of dialysis therapies for poisonings.
- Immunology as it pertains to mechanisms of renal injury (such as in glomerulonephritis, vasculitis, tubulointerstitial disease and renal transplant rejection) and diagnostic testing relevant to renal disease
- Microbiology as it pertains to infections of the renal system and infectious complications of renal transplantation
- Embryology, growth and development of the kidney in the normal and disordered state (i.e vesico-ureteral reflux, cystic diseases of the kidney, renal changes with ageing)
- Mechanisms of fluid delivery, machine mechanics and membrane physiology as they relate to all dialysis modalities.

Pathology of disease in the native and transplanted kidney such as glomerulonephritis, vasculitis, systemic disease (e.g. diabetes, hypertension) etc.

Epidemiology of acute renal failure and chronic kidney disease including those diseases commonly causing end stage kidney disease such as diabetes and hypertension

Principles of genetics as they relate to the inheritance and transmission of diseases that affect the kidney

Psychology of chronic illness such as chronic kidney disease

The effects of systemic diseases on the kidney as well the effect of disordered kidney function on systemic health

Apply the lifelong learning skills associated with the Scholar Role to implement a personal program to remain up-to-date, and enhance areas of professional competence

Contribute to the enhancement of quality care and patient safety in Nephrology, integrating currently available best evidence and best practices

Perform a complete and appropriate assessment of a patient

Effectively identify and explore issues to be addressed in a patient encounter, including the patient's context and preferences

For the purposes of prevention and health promotion, diagnosis and or management, elicit a history that is relevant, concise and accurate to context and preferences

For the purposes of prevention and health promotion, diagnosis and/or management, perform a focused physical examination that is relevant and accurate

Select medically appropriate investigative methods in a resource-effective and ethical manner

Interpret the results of the following investigations in the context of the patient

- Measures of renal function
- Serology
- Urine microscopy
- Other urine tests (e.g. electrolytes)
- Blood pressure data (e.g. ambulatory monitoring, home, office, manual and automated)
- Renal imaging
- Renal histology

Demonstrate effective clinical problem solving and judgment to address patient problems, including interpreting available data and integrating information to generate

differential diagnoses and management plans of the following presentations and their associated complications as appropriate in Adult or Pediatric Nephrology

- Acute renal failure
- Chronic kidney disease of all stages including transplantation
- Proteinuria
- Hematuria
- Nephrolithiasis
- Hypertension
- Genetic renal disorders (cystic, metabolic, tubular, nephritis)
- Pyuria
- Disorders of fluids, electrolyte and acid-base

Comment: See original definition on page 1 of what a nephrologists 'is', need to remain congruent here.

Use preventive and therapeutic interventions effectively

Implement an effective management plan in collaboration with a patient and their family

Demonstrate effective, appropriate, and timely application of preventive and therapeutic interventions relevant to Nephrology

- Strategies for renal protection (e.g. control of blood pressure, minimization of proteinuria, prevention of contrast nephrotoxicity)
- Immunosuppression in patients with renal disease and management of its' complications
- Plasmapheresis in patients with renal disease
- Hemodialysis
- Peritoneal dialysis
- Renal transplantation
- Strategies for management of complications of kidney disease (e.g. bone disease, anemia, growth delay, malnutrition)

Ensure appropriate informed consent is obtained for therapies

Ensure patients receive appropriate end-of-life care

Demonstrate proficient and appropriate use of procedural skills, both diagnostic and therapeutic

Demonstrate appropriate performance of urine microscopy

Demonstrate effective, appropriate, and timely performance of therapeutic procedures relevant to Nephrology

- Insertion of central venous access (Adult Nephrology only)

Prescription, monitoring and adjustment of dialysis for renal replacement as well as in the treatment of poisonings and metabolic disorders

Ensure appropriate informed consent is obtained for procedures

For the procedures not necessarily performed by Nephrologists, describe the risks and benefits and appropriately recommend

5.4.1 Renal biopsy

5.4.2 Obtaining and maintaining access for dialysis (central venous catheter, arterial venous fistula, arterial venous grafts and peritoneal dialysis catheter)

5.4.3 Plasmapheresis

5.4.4 Renal artery revascularization

5.4.5 Renal transplantation surgery

5.4.6 Living kidney donation (Adult Nephrology only)

5.4.7 Renal replacement therapy in critically ill patients

5.1 Appropriately document and disseminate information related to procedures performed and their outcomes

5.1 Ensure adequate follow-up is arranged for procedures performed

Recognizing the scope of their expertise, Nephrologists seek appropriate consultation from other healthcare professionals and;

Demonstrate insight into their own limitations of expertise via self-assessment

Demonstrate effective, appropriate, and timely consultation of another health professional as needed for optimal patient care

Arrange appropriate follow-up care services for a patient and their family

Communicator

Definition:

As *Communicators*, physicians effectively facilitate the doctor-patient relationship and the dynamic exchanges that occur before, during, and after the medical encounter.

Key and Enabling Competencies: Nephrologists are able to…

Develop rapport, trust, and ethical therapeutic relationships with patients, families and caregivers

Recognize that being a good communicator is a core clinical skill for physicians, and that effective physician-patient communication can foster patient satisfaction, physician satisfaction, adherence and improved clinical outcomes

Establish positive therapeutic relationships with patients and their families and caregivers that are characterized by understanding, trust, respect, honesty and empathy

Respect patient confidentiality, privacy and autonomy

Listen effectively

Be aware and responsive to nonverbal cues

Effectively facilitate a structured clinical encounter

Accurately elicit and synthesize relevant information and perspectives of patients and families, caregivers, colleagues, and other professionals

Gather information about a disease, but also about a patient's beliefs, concerns, expectations and illness experience

Seek out and synthesize relevant information from other sources, such as a patient's family, caregivers and other professionals

Accurately convey relevant information and explanations to patients and families, caregivers, colleagues and other professionals

Deliver information to a patient and family, caregivers, colleagues and other professionals in a compassionate manner and in such a way that it is understandable, encourages discussion and participation in decision-making

Develop a common understanding on issues, problems and plans with patients, families, caregivers and other professionals to develop a shared plan of care

Effectively identify and explore problems to be addressed from a patient encounter, including the patient's context, responses, concerns, and preferences

Respect diversity and difference, including but not limited to the impact of age, level of functioning, gender, religion and cultural beliefs on decision-making

Encourage discussion, questions, and interaction in the encounter

Engage patients, families, and relevant health professionals in shared decision-making to develop a plan of care

Effectively address challenging communication issues such as

Obtaining informed consent

Delivering bad news

Addressing anger, confusion and misunderstanding

Initiating and withdrawing of dialysis

Appropriateness and choice of renal replacement modality

Convey effective oral and written information about a medical encounter

Maintain clear, accurate, and appropriate records (e.g., written or electronic) of clinical encounters and plans

Provide clear, accurate and appropriate consultation reports

Effectively present verbal reports of clinical encounters and plans

When appropriate, effectively present medical information to the public or media about a medical issue

Collaborator

Definition:

As *Collaborators*, physicians effectively work within a healthcare team to achieve optimal patient care. The management of patients with chronic kidney disease relies extensively on the skills provided by all members of the health care team.

Key and Enabling Competencies: Nephrologists are able to…

Participate effectively and appropriately in an interprofessional healthcare team

Clearly describe their roles and responsibilities to other professionals

Describe the roles and responsibilities of other professionals within the health care team. Members of this team may include nursing, clinical nutrition, social work, pharmacy, physiotherapy, occupational therapy, teacher, child life specialist, psychologist, hospital management, biomedical technicians, and other physicians as well as the Nephrologist.

Recognize and respect the diversity of roles, responsibilities and competences of other professionals in relation to their own

Work with others to assess, plan, provide and integrate care for individual patients (or groups of patients) in particular those with progressive kidney disease, on dialysis and with a renal transplant

Where appropriate, work with others to assess, plan, provide and review other tasks, such as research problems, educational work, program review or administrative responsibilities

Participate effectively in interprofessional team meetings

Enter into interdependent relationships with other professions for the provision of quality care

Describe the principles of team dynamics

Respect team ethics, including confidentiality, resource allocation and professionalism

Where appropriate, demonstrate leadership in a healthcare team

Effectively work with other health professionals to prevent, negotiate, and resolve interprofessional conflict

Demonstrate a respectful attitude towards other colleagues and members of an interprofessional team

Work with other professionals to prevent conflicts

Employ collaborative negotiation to resolve conflicts

Respect differences, misunderstandings and limitations in other professionals

Recognize one's own differences, misunderstanding and limitations that may contribute to interprofessional tension

Manager

Definition:

As *Managers*, physicians are integral participants in healthcare organizations, organizing sustainable practices, making decisions about allocating resources, and contributing to the effectiveness of the healthcare system. Nephrologists direct the clinical aspects of predialysis, dialysis and transplant programs including the planning, budgeting and evaluation of these patient care programs.

Key and Enabling Competencies: Nephrologists are able to…

Participate in activities that contribute to the effectiveness of their healthcare organizations and systems

Work collaboratively with others in their organizations

Participate in systemic quality process evaluation and improvement, such as patient safety initiatives or quality assurance processes in the dialysis unit

Describe the structure and function of the healthcare system as it relates to Nephrology, including the roles of physicians at the local, regional and national level in the provision of predialysis care, dialysis therapies and living and deceased kidney transplantation.

Describe principles of healthcare financing, including physician remuneration, budgeting and organizational funding

Manage their practice and career effectively

Set priorities and manage time to balance patient care, practice requirements, outside activities and personal life

Manage a practice including finances and human resources

Implement processes to ensure personal practice improvement

Employ information technology appropriately for patient care

Allocate finite healthcare resources appropriately

Recognize the importance of just allocation of healthcare resources, balancing effectiveness, efficiency and access with optimal patient care in particular with high cost therapies or scarce societal resources such as dialysis and deceased donor organs

Apply evidence and management processes for cost-appropriate care for individual patients with kidney disease as well as at a systems level

Serve in administration and leadership roles, as appropriate

Chair or participate effectively in committees and meetings

Lead or implement a change in health care

Plan relevant elements of health care delivery (e.g., work schedules**)**

Health Advocate

Definition:

As *Health Advocates,* physicians responsibly use their expertise and influence to advance the health and well-being of individual patients, communities, and populations.

Key and Enabling Competencies: Nephrologists are able to…

Respond to individual patient health needs and issues as part of patient care

Identify the health needs of an individual patient including their ability to access services in the healthcare and social services system

Identify opportunities for advocacy, health promotion and disease prevention with individuals to whom they provide care

Respond to the health needs of the communities that they serve

Describe the practice communities that they serve

Identify opportunities for advocacy, health promotion and disease prevention in the communities that they serve, and respond appropriately (e.g. access to dialysis therapies, promotion of organ donation, identification and treatment of hypertension)

Comment: Identification and treatment of diabetes, hypertension etc.

Appreciate the possibility of competing interests between the communities served and other populations

Identify the determinants of health for the populations that they serve

Identify the determinants of health, including barriers to access to care and resources, in patients with disease in their native kidneys, on dialysis therapies and with a renal transplant

Identify vulnerable or marginalized populations within those served and respond appropriately

Promote the health of individual patients, communities, and populations

Describe an approach to implementing a change in a determinant of health of the populations they serve (e.g. organ donation initiatives, early diagnosis of chronic kidney disease with eGFR (estimated Glomerular Filtration Rate) reporting, advocacy for dietary salt restriction)

Describe how public policy impacts on the health of the patients with renal disease

Identify points of influence in the healthcare system and its structure

Describe the role of advocacy groups, public education bodies and private organizations, such as the Kidney Foundation of Canada and the Canadian Society of Nephrology, in promoting the health needs of patients with renal disease

Describe the ethical and professional issues inherent in health advocacy, including altruism, social justice, autonomy, integrity and idealism

Appreciate the possibility of conflict inherent in their role as a health advocate for a patient or community with that of manager or gatekeeper

Describe the role of the medical profession in advocating collectively for health and patient safety

Scholar

Definition:

As *Scholars*, physicians demonstrate a lifelong commitment to reflective learning, as well as the creation, dissemination, application and translation of medical knowledge.

Key and Enabling Competencies: Nephrologists are able to…

Maintain and enhance professional activities through ongoing learning.

- Describe the principles of maintenance of competence
- Describe the principles and strategies for implementing a personal knowledge management system
- Recognize and reflect on learning issues in practice
- Conduct a personal practice audit
- Pose an appropriate learning question
- Access and interpret the relevant evidence
- Integrate new learning into practice
- Evaluate the impact of any change in practice
- Document the learning process

Critically evaluate medical information and its sources, and apply this appropriately to practice decisions

- Describe the principles of critical appraisal
- Critically appraise retrieved evidence in order to address a clinical question
- Integrate critical appraisal conclusions into clinical care

Facilitate the learning of patients, families, students, residents, other health professionals, the public and others, as appropriate

- Describe principles of learning relevant to medical education
- Recognize potential barriers to learning such as illness, literacy and language skills
- Collaboratively identify the learning needs and desired learning outcomes of others
- Select effective teaching strategies and content to facilitate others' learning
- Demonstrate an effective lecture or presentation
- Assess and reflect on a teaching encounter
- Provide effective feedback
- Describe the principles of ethics with respect to teaching

Contribute to the development, dissemination, and translation of new knowledge and practices

- Describe the principles of research and scholarly enquiry
- Describe the principles of research ethics

Perform original research (clinical or basic science) or a continuous quality initiative (CQI) project

- pose a question
- perform a literature review
- develop a proposal to solve the question using appropriate methodology
- identify, consult and collaborate with content-experts and others to conduct the research
- collect the needed data
- analyze the collected data
- synthesize the literature and new data to solve the question
- defend and disseminate the results of the research
  - for CQI, implement the solution in practice, evaluate the outcome and reassess the solution
- from the results, identify areas for further investigation.

<u>Professional</u>

Definition:

As *Professionals*, physicians are committed to the health and well-being of individuals and society through ethical practice, profession-led regulation, and high personal standards of behavior.

Key and Enabling Competencies: Nephrologists are able to…

Demonstrate a commitment to their patients, profession, and society through ethical practice

- Exhibit appropriate professional behaviors in practice, including honesty, integrity, commitment, compassion, respect and altruism
- Demonstrate a commitment to delivering the highest quality care and maintenance of competence
- Recognize and appropriately respond to ethical issues encountered in practice such as the donation and allocation of living as well as deceased donor organs, initiation and withdrawal of dialysis or genetic counseling of those with hereditary renal disease
- Appropriately manage conflicts of interest
- Recognize the principles and limits of patient confidentiality as defined by professional practice standards and the law
- Maintain appropriate relations with patients

Demonstrate a commitment to their patients, profession and society through participation in profession-led regulation

Appreciate the professional, legal and ethical codes of practice

Fulfill the regulatory and legal obligations required of current practice

Demonstrate accountability to professional regulatory bodies

Recognize and respond to others' unprofessional behaviors in practice

Participate in peer review

Demonstrate a commitment to physician health and sustainable practice

Balance personal and professional priorities to ensure personal health and a sustainable practice recognizing the on-going impact of caring for patients with organ failure and at the end of life

Strive to heighten personal and professional awareness and insight

Recognize other professionals in need and respond appropriately

NEPHROLOGY EXAMINATION

Examination dates are subject to change without notice. Confirmation will be provided in your appointment letter, approximately 2 months before the examination.

Registration deadline: mid May annually
Sites and date of examination Vancouver, Calgary, Toronto, Ottawa, Montréal, Halifax, mid September annually.

Examination format

The examination consists of a written component only, consisting of one, **three-hour**, written paper comprising of approximately 60 short-answer questions. Nephrology and the application to nephrology of related basic sciences including, for example, physiology, pathology, and immunology, are covered in the examination.

Each group of candidates (Certificants in Internal Medicine and in Pediatrics) will be asked to answer questions relevant to their adult or pediatric training.

Registration

Residents who intend to register for the examination must have:

- applied for assessment of credentials/training
- received from the RCPSC an official ruling letter confirming their eligibility for the examination.

Registration forms for the examination are sent, on request, only to those who have been ruled eligible for the examination in their specialty or subspecialty.

Residents who have applied for assessment of credentials/training and who are ruled eligible for the next examination session will receive information about the examination with their official ruling letter.

The "Registration deadline" is the last day for receipt by the RCPSC of the registration form for the examination. To avoid a late registration fee, applicants must request the registration form as soon as possible, preferably 6 to 8 weeks before that deadline. This does not apply to residents who are currently having their credentials/training assessed and have not yet received a letter confirming their eligibility for the examination. For these residents, the registration form for the examination will accompany the letter confirming their eligibility.

SPECIFIC SYNDROME OBJECTIVES

Renal Failure

In a patient with renal failure, the resident will be able to perform and discuss the following in regards to each of the following subcategories of renal failure (Acute Renal Failure (ARF), Chronic Renal Failure, and End Stage Renal Failure). An understanding of End Stage Renal Failure includes its management by hemodialysis, peritoneal dialysis and transplantation.

Acute Renal Failure

Clinical Skills

The focused history and clinical examination will demonstrate the ability to effectively determine the contribution of prerenal, renal and post renal factors, to the development of ARF. Furthermore, the resident will be able to elicit evidence of uremia in a patient with ARF.

The resident must understand the urinalysis findings and the discriminating features that help in differential diagnosis generation.

Differential Diagnosis

Prerenal, renal and post renal categories. Renal categories include: vascular, glomerular, tubulointerstitial disease.

Details as to the common causes of each of the above broad categories and clinical clues must be known.

Diagnostic Tests

The resident will be able to discuss the utility and significance of findings of hematologic, serologic, chemistry, and urinalysis testing. The appropriate use of imaging and biopsy studies. and their interpretation is required. The indications for renal biopsy in the context of acute renal failure and other special investigative techniques involving ultrasound and radiology must be known.

Etiology and Pathophysiology

Details of the common causes of ARF including renal parenchymal diseases and those of pre renal and post renal etiologies must be known.

The essential concepts in the etiology and pathophysiology of ARF include:

- reduction in glomerular filtration rate
- acute tubular necrosis, acute interstitial nephritis, acute and rapidly progressive glomerulonephritis
- obstruction
- prerenal azotemia
- consequences of ARF:

-disorders of fluid and electrolytes,
-calcium and phosphate, acid base, and other metabolic abnormalities
-blood pressure alterations

Management and Complications

- conservative management/goals of therapy
- identification and treatment of reversible causes
- recognition and therapy of complications
- nutrition
- drugs: dose and clearance
- fluid and electrolytes, acid-base balance
- blood pressure
- palliative care
- plasmapheresis

Indications for Dialysis

- differences in modality
- management of dialysis including adequacy and access
- complications of dialysis

Prognosis

- natural history and prognosis
- indicators of prognosis
- follow up plan

Controversies

- role of different modalities
- use of diuretics, vasoactive drugs. calcium channel blockers, atrial natriuretic factor, growth factors

Chronic Renal Failure

In a patient with chronic renal failure, the trainee shall be able to perform and discuss the following:

Clinical Skills

A focused history and physical with special attention to the signs and symptoms of progressive renal dysfunction and the meaning of those findings. Ability to elicit information about co-morbid conditions and complications of CRF.

Differential Diagnosis

The resident will be able to differentiate between acute and chronic renal failure, and to identify causes of deterioration in patients with CRF. An understanding of the importance of defining the different causes of CRF is expected (e.g. patient prognosis in diabetes, polycystic disease, chronic pyelonephritis).

The differential diagnosis is structured as in ARF: Prerenal, renal and post renal.

Diagnostic Tests

The resident will be able to discuss the utility and significance of findings of hematologic, serologic, chemistry, and urinalysis testing. The appropriate use of imaging and biopsy studies and their interpretation is expected. Knowledge of the indications for renal biopsy in established CRF and other special studies must be demonstrated. Tests to evaluate the etiology and severity of co-morbid diseases and complications are to be understood and included in the discussion.

Etiology and Pathophysiology

The details of the causes of CRF including renal parenchymal diseases, vascular diseases, and obstruction are to be known.

The essential concepts in the etiology and pathophysiology of CRF include:

- pathophysiology of the progression of renal disease
- role of BP control
- lipids/protein, phosphate, sodium, potassium restriction
- hemodynamics (intrarenal)
- disease specific differences and genetic predipositions such as ACE polymorphisms

The pathophysiology of the complications of renal disease:

- anemia
- bone disease
- lipids
- coagulation
- CNS/peripheral nervous system
- GI syndromes
- cardiovascular disease
- endocrine abnormalities
- growth failure
- immune dysfunction
- Fluid/electrolytes/acid-base

Disturbances of:

- calcium and phosphate
- blood pressure and metabolic waste products

Management

- conservative management/goals of therapy including patient education
- identification and treatment of reversible causes
- recognition and therapy of complications
- nutrition
- drugs: dose and clearance
- fluid/electrolytes/acid-base
- blood pressure
- hormone replacement therapy (EPO, growth hormone, vitamin D)

Management of complications of CRF (as listed above): prevention vs. remedial.

Management of specific subgroups of patients with CRF due to, for example:

- diabetes

- vasculopathy
- polycystic kidney disease

Indications for Renal Replacement Therapy: (for details see next section on end stage renal failure)

- selection of modality
- palliative care

Prognosis

- natural history and prognosis/determinants of progression
- indicators of prognosis
- follow-up plan

Ethics

- cultural diversity
- role of advanced directives
- management of incompetent patients

Controversies

Role of different interventions in treatments/prevention: use of diuretics, ACE inhibitors and angiotensin receptor blockers, calcium channel blockers, bicarbonate, lipid-lowering agents...

- target level for BP control
- diet/lipids etc,
- timing of dialysis
- timing of transplantation in infants
- target hemoglobin
- pre-emptive transplantation
- appropriate targets for PTH

Renal Replacement Therapy

*******Note that ESRD patients include those on dialysis, or those with a transplant. Issues more specific to transplantation are listed in the subsection below.

Hemodialysis and Peritoneal Dialysis

In a patient with end stage renal failure, the resident will be able to discuss and perform the following:

Clinical Skills

A focused history and physical examination with specific attention to complications associated with modality of renal replacement therapy and the complications and co-morbid conditions associated with ESRF patients.

An understanding of the relevance of the causes of ESRD to management issues must be demonstrated.

Diagnostic Tests

The use of diagnostic tests for the management of patients on renal replacement therapy is important. Understanding the utility of measurements of adequacy of dialysis (both in hemodialysis and peritoneal dialysis), markers for metabolic bone disease, assessment of causes of anemia etc. is expected.

Etiology and Pathophysiology

As above in ARF and CRF.

Essential concepts specific to hemodialysis/peritoneal dialysis include:

- residual renal function
- convection, diffusion
- ultrafiltration
- membrane characteristics and biocompatibility
- formation of filtrate
- dialysate
- access creation and maintenance
- dialysis prescription
- adequacy of dialysis
- reverse osmosis/water treatment
- aluminum and other trace elements
- complications of vascular/peritoneal access
- dialysis amyloidosis

Management of Patient with ESRF

- choice of modality/options
- modality change/selection
- access creation and maintenance, monitoring, surgical/radiologic options
- treatment of complications
- short-term and long-term complications
- familiarity with published guidelines
- infection control: MRSA, VRE, Hepatitis, HIV

Prognosis

- patient prognosis
- modality success and prognosis
- determinants of success

Controversies

- controversies in timing, in patient selection, in delivery of dialysis dose, options within modalities
- dialyzer re-use

Transplantation

Essential concepts specific to transplantation include:

- organization and function of immune system
- indications and contraindications for kidney and kidney-pancreas transplantation
- patient selection/risk stratification

- selection and management of living related, living unrelated and cadaveric donors
- mechanisms of allograft rejection
- mechanism of action of immunosuppressive agents
- principles of tissue typing, cross matching, panel reactive antibodies
- interpretation of results of above tests
- organ allocation strategies
- detection, prophylaxis, management of infections in immunosuppressed host

Management

Each of the issues listed below must be considered in each of 3 specific time frames:

1. acute management (perioperatively)
2. short-term management (0 - 6 months)
3. long-term management (>6 months)

- complications of major immunosuppressive agents
- differential diagnosis and treatment of acute and chronic graft dysfunction
- viral infections
- malignancies
- hypertension/vascular disease
- diabetes
- metabolic and drug-induced bone disease

Prognosis/Controversies

- determinants of outcome, patient and graft
- patient selection, living unrelated donation, older donors, non heart-beating donors
- antilymphocyte preparations, lipid management , osteopenia management
- choice of anti-hypertensive, cyclosporine management
- role of newer immunosuppressives e.g. tacrolimus, mycophenolate, sirolimus, anti-IL2 receptor and other monoclonals
- monitoring of drug levels, area under curve

Controversies

- ethical issues regarding the utilization of scarce resources
- cost benefit analysis of transplantation and immunosuppressive drug strategies

Dysuria/Pyuria

Dysuria

In a patient with dysuria, the resident will be able to discuss and perform:

Clinical Skills

A focused history and physical examination which allows the resident to determine the cause and plan therapy. A recognition of the discriminatory features on the history and physical examination including the urinalysis must be known.

Differential Diagnosis

- Differentiate infectious vs. noninfectious causes of dysuria.
- Differentiate upper and lower tract causes of dysuria and infection.
- The common bacterial causes of infection as well as many of the less common causes.

Diagnostic Tests

The trainee will be able to discuss diagnostic tests and demonstrate an understanding of the utility and indications for tests of renal function and other serum chemistry, urinalysis, microbiology and imaging studies.

Etiology and Pathophysiology

The trainee must be able to discuss specific conditions, which predispose patients to dysuria, and be able to classify high-risk groups. An understanding of the pathophysiology of ascending infections and mechanisms, which predispose to this condition.

The essential concepts include.

- renal parenchymal responses to inflammation (acute and chronic)
- actions of antibiotics vis a vis renal function/parenchyma

Management and Complications

Management of patients with dysuria includes an approach, which differentiates general management issues from site-specific issues (i.e. lower or upper tract inflammation). The ability to recognize and manage complicated situations is required, e.g. inflammation and obstruction, inflammation in a diabetic or pregnant patient, management of infants with urinary infection and obstruction or reflux.

The goals of therapy specific to the underlying disease must be clearly delineated. The choice and duration of therapy and the management of recurrent infections are issues that must be understood.

Prognosis

The trainee will be able to identify, manage and prognosticate outcome in high-risk groups, e.g.: geriatric, diabetic, pregnant patients, those with anatomic abnormalities, the immunocompromised host, those with renal insufficiency.

Controversies

The trainee will be aware of and able to discuss the controversies surrounding: the degree of investigation of patients with dysuria, prophylaxis for recurrent urinary tract infections and other special circumstances, duration of therapy and need and timing for surgical correction in all age groups.

Pyuria

In a patient with pyuria, the resident will be able to discuss and perform:

Clinical Skills

A focused history and physical examination which demonstrates the ability to determine the cause of pyuria, with special attention to possible environmental/geographical differences in causes of pyuria, and associated diseases.

Differential Diagnosis

- inflammatory vs non-inflammatory
- infective vs non infective
- typical vs atypical (include tuberculosis)
- sterile pyuria
- acute/chronic interstitial nephropathies

Diagnostic Tests

- urinalysis
- urine culture
- imaging
- biopsy

Etiology and Pathophysiology

Essential concepts include:

- consequences of acute inflammation
- consequences of chronic Inflammation, chemical inflammation, and cytokine release
- contributions of anatomic abnormalities

Management and Complications

- of the underlying disorder
- complications of short and long-term therapies

Controversies

- sensitivity and specificity of urine eosinophils in diagnosis of allergic nephritis
- duration of treatment
- degree and timing of investigation for recurrent pyuria

Edema

In a patient with edema, the resident will be able to discuss and perform:

Clinical Skills

A focused history and physical examination to differentiate local from general edema and allow the establishment of a probable cause.

Demonstrate the interpretation and understanding of the importance of contributions of abnormalities in the urinalysis in the differential diagnosis.

Differential Diagnosis

The trainee will be able to generate and discuss a differential diagnosis of edema including causes of local edema:

- venous
- lymphatic obstruction
- other

Causes of generalized edema

- low oncotic pressure
- increased intravascular volume e.g. cardiac, hepatic and renal etiologies
- pregnancy
- idiopathic edema

Detailed knowledge of specific entities causing edema is expected.

Diagnostic Tests

Discussion of the diagnostic tests including the value of urinalysis, chemistry and a demonstration of the ability to appropriately select investigations based on clinical examination findings is expected.

Etiology and Pathophysiology

The resident will understand and be able to discuss the following key concepts:

- Starling forces, oncotic and hydrostatic pressures
- capillary permeability
- renal response and contribution to edematous states
- full differential diagnosis of the nephrotic and nephritic syndromes
- systemic hemodynamic and endocrine/autonomic influences on salt and water balance

Management and Complications

For each of the differential diagnostic categories, demonstrate an understanding and describe the goals and principles of management, including:

- conservative management (diet, nutrition)
- diuretic therapy, indications, complications and resistance to treatment
- application of ACEI/AII receptor blockers, calcium channel blockers, and NSAIDs to proteinuric states

Describe “condition”- specific therapy and risks. This should include a detailed knowledge of the therapy of primary and secondary nephropathies.

Prognosis

The resident will demonstrate an understanding of the natural history of the primary underlying process, with in-depth knowledge of the prognosis of the underling renal disorder.

Short-term and long-term follow-up strategies
Risks of therapies

Controversies

- The role of plasma expanders/albumin: when, where and problems.
- Therapy of glomerulopathies, with knowledge of important clinical trials.

Hypertension

In a patient with hypertension, the resident will be able to discuss and perform:

Clinical Skills

A focused history and physical examination which demonstrates the ability to differentiate urgent, emergent and routine hypertension.

The differentiation of primary from secondary causes of hypertension, the assessment of end organ damage (severity and implications), and appreciation of systemic disorders with which hypertension is associated must be known. Knowledge of strategies to differentiate factitious from real hypertension are important and necessary.

Differential Diagnosis

The differential diagnosis must include causes of primary and secondary hypertension, common causes of urgent or emergent hypertension, and specific circumstances (e.g. pregnancy and dissection) for which the different diagnosis generates different actions.

Diagnostic Tests

Demonstrate the interpretation, understanding and selection of appropriate tests for the routine evaluation of non-urgent hypertension, dependent on specific clinical and physical examination findings.

Demonstrate the interpretation, understanding, indications and appropriate selection of special tests used in the evaluation of hypertension (imaging studies invasive and non-invasive), plasma chemistry, endocrine function tests.

Specificity and sensitivity of tests used in the evaluation of renovascular hypertension must be known.

Etiology and Pathophysiology

The resident must understand the following essential components:

- factors relevant to the determination of blood pressure control
- mechanisms of hypertension in both essential and secondary hypertension
- actions of medications on blood pressure and renal function
- mechanisms involved in pregnancy associated hypertension

Management and Complications

- preventive health measures
- conservative and drug therapy
- goals of therapy in general and in specific conditions such as diabetes, pregnancy
- identification and treatment of reversible causes
- special groups (diabetes mellitus, patients on dialysis and with renal transplants, pregnancy)
- issues related to diagnosis, management and long-term implications
- end organ damage, with specific emphasis on renal disease progression
- mode of action and complications of specific classes of drugs
- hypertensive emergencies
- ambulatory blood pressure monitoring

Controversies

- ambulatory monitoring; echocardiograms, screening tests

Renal Colic

In a patient with renal colic, the resident will be able to discuss and perform:

Clinical Skills

The focused history and physical examination will demonstrate the ability to differentiate the cause of flank/abdominal pain; the role of urinalysis in differential diagnosis, and the ability to Identify high risk preconditions and situations including role of diet and fluid intake.

Differential Diagnosis

- urinary tract obstruction vs. other cause of "renal colic/flank pain"
- urinary tract obstruction: intrinsic vs. extrinsic
- intrinsic causes of obstruction:
  -stones
  -other

Diagnostic Tests

- immediate: urinalysis, imaging ultrasound (limitations of and indications for)
- indications for other tests
- recognize specific crystals on urine microscopy

Long-term management: utility of ancillary tests in planning and understanding long-term management strategies.

Etiology and Pathophysiology

The essential concepts include:

-disorders/contributors to stone formation
-types of stones and relative frequency of occurrence
-physicochemical factors in stone formation

Pathophysiology of obstruction (short-term and long-term consequences)

Management and Complications

Determinants of urgent vs. emergent vs. routine evaluation and treatment of renal colic
Post-obstructive diuresis

Long-term strategies

- fluid and diet
- prophylaxis and prevention

Lithotripsy and other forms of therapy

- indications and complications

Prognosis and Controversies

- natural history and prognosis of obstruction
- natural history and prognosis of different stone diseases (i.e.. recurrence, morbidity etc).
- idiopathic stone former: controversies in management
- cost benefit ratio of long-term preventative strategies

Laboratory Abnormalities

Disorders of Water and Sodium: Hypo/Hypernatremia

In a patient with hypo/hypernatremia, the resident will be able to discuss and perform:

Clinical Skills

A focused history, which will include items specific to the diagnosis or hypo/hypernatremia, including a drug history, systemic diseases etc. A focused physical examination will include examination of the CNS, intravascular volume, presence of edema and evidence of systemic disease.

Differential Diagnosis

The differential diagnosis will be categorized according to isoosmolar, hypoosmolar and hyperosmolar causes of hyponatremia, and consider the contributions of water and sodium balance in hyponatremia and hypernatremia. The resident will be able to demonstrate an understanding of the significance of each category.

Diagnostic Tests

The trainee will demonstrate an understanding of the utility of the diagnostic tests useful in the diagnosis and management of hyponatremia/hypernatremia, including the role of

- serum and urine electrolytes
- serum and urine osmolality
- blood sugar
- renal function

Additional special tests (laboratory and other) and their utility should be understood within the context of specific clinical situations.

Etiology and Pathophysiology

The essential concepts about the etiology and pathophysiology include:

- urine dilution mechanisms (free water clearance)
- regulation of antidiuretic hormone and its effects
- interaction of adrenal and thyroid hormones in disorders of salt and water balance water loss (renal and non renal sources
- water intake regulation, thirst
- renal water losses: urine concentration mechanisms
- osmoregulation: normal and compensatory mechanisms, including CNS responses to changes in osmolality.
- effects of drugs on the kidney and its neuro-hormonal regulation

Management and Complications

The goals of therapy must be cleanly understood by the resident and include:

- identification of high risk patients
- restoration of salt and water homeostasis
- prevention of CNS dysfunction

  -strategies to identify and reverse the cause of water loss/gain or Na loss/gain
  -methods and rate of correction
  - choice of replacement therapy (oral, parenteral, solution types)
- complications of therapy and of the condition
- current controversies

Prognosis/Controversies

- prognosis of patient and determinants
- prognosis of underlying disease
- method, rate and degree of correction of abnormality

Disorders of Potassium

In a patient with hypokalemia/hyperkalemia, the resident will be able to discuss and perform:

Clinical Skills

A focused history and physical which is able to elicit signs and symptoms of disorders of potassium. The resident should be able to identity the causes and clinical consequences of disorders of potassium.

Differential Diagnosis

Develop a diagnostic approach, which includes:

- intake
- transcellular shift
- excretion - renal and nonrenal

Diagnostic Tests

- utility and interpretation of urine and serum electrolytes including TTKG
- utility of ECG in assessing consequences and managing patient

Etiology and Pathophysiology

The key concepts include:

- internal and external regulation of potassium balance
- impact of acid base on K shift
- physiology of consequences of changes in lCF:ECF distribution of potassium

Management and Complications

- identification of urgent vs emergent situations
- identify the underlying disorder and treat accordingly
- different management strategies in specific groups, ESRD, diabetics, post-obstructive diuresis
- correction: short-term and long-term strategies

Prognosis and Controversies

Prognosis: dependent on underlying and/or associated conditions, natural history

Acid Base Disturbances

In a patient with disturbances of acid base balance, the resident will be able to discuss and perform:

Clinical Skills

A focused history and physical examination to aid in narrowing the differential diagnosis of acid base disturbances. Identification of clinical consequences of the disturbances of hydrogen ion balance.

Differential Diagnosis

The trainee must be able to classify and define each of the acid base disorders.

The resident will be able to generate the differential diagnosis of each of the primary acid base disorders and mixed acid base disorders, including the renal tubular acidosis syndromes.

Diagnostic Tests

Discuss the utility of each of the tests in the context of specific acid base disorders, both in diagnosis and management.

- arterial and venous blood gases
- electrolytes
- urine electrolytes/net charge and urine osmolar gap
- urine pH and P CO_2
- osmolality
- anion gap

Etiology and Pathophysiology

- regulation of H+
- generation of H+ and buffers
- compensatory responses to primary acid base disorders and the physiological basis of those responses both renal and respiratory

Management and Complications

- goals of therapy
- urgent vs. emergent therapy
- chronic care
- strategies for correction of abnormality(ies)
- risks of therapy (HC03, Na, K)

Prognosis and Controversies

Prognosis of underlying disease process and the actual AB disorder.

Timing, amount and indications for HCO_3 use.

Calcium, Phosphate, Magnesium, and Renal Osteodystrophy

In a patient with disordered divalent ion concentrations or renal osteodystrophy, the resident will be able to discuss and perform:

Clinical Skills

A focused history and physical which will demonstrate the ability to elicit signs and symptoms which aid in the determination of causes and consequences of disorders of divalent ions and metabolic bone disease, including the coexistence of diseases which may alter the significance of certain findings.

Differential Diagnosis

- of underlying disorders
- differential diagnosis of excesses and deficiencies: clinical approach to disorders of divalent ions

Diagnostic Tests

Factors that aid in the interpretation of serum calcium and phosphate levels including:

- pH
- albumin
- ionized vs. total concentration of ions
- nutritional status
- urinalysis
- PTH
- imaging modalities (invasive and noninvasive measurements of bone metabolism and PTH gland function)
- role of bone biopsy
- aluminum
- role of magnesium in the genesis of other electrolyte disorders/clinical states

- interaction between Ca, $P0_4$, K, Mg and PTH
- interpretation of serum magnesium in presence of low albumin

Essential concepts in the primary electrolyte disorders:

- determination of normal calcium and phosphate balance and compensatory/adaptive perturbations occurring in abnormal states
- physiological basis of clinical consequences of disturbances of Ca and/or PO4
- calcium/phosphate balance in patients with renal disease, associated bone disease
- implications of low serum magnesium in regulation of cell systems
- regulation of PTH, calcitonin, and vitamin D systems

Management and Complications

- urgent/emergent/chronic
- short-term and long-term strategies of therapy of hypo/hyper Ca/P04 and combinations of the 2
- management of hypo- and hyper-magnesemia
- treatment of associated bone disease
- identification, classification and Rx of renal osteodystrophy
- risks of therapy: acute and chronic situations
- oral vs parenteral replacement therapy of Mg
- calcific skin necrosis, visceral calcification
- new modalities of phosphate binding and PTH suppression/destruction

Prognosis and Controversies

- prognosis: in context of underlying disease, natural history of acute changes (e.g. in associated rhabdomyolysis)
- phosphate binders in renal disease
- use of vitamin D analogues and calcimimetics in therapy of renal bone disease: timing, method etc.
- role of bone biopsy in patients with renal disease: role of bone imaging techniques in patients with renal disease
- role of Mg in disorders of potassium

Abnormal Urinalysis:

Hematuria

In a patient presenting with hematuria, the resident will be able to discuss and perform:

Clinical Skills

A focused history and physical which allows the resident to evaluate systemic and anatomic causes of hematuria, including the importance of family history and past personal history. The history and physical, which includes the urinalysis, will allow the resident to discern the anatomic site of urinary tract blood loss and the presence or absence of systemic disease or conditions. The ability to recognize red blood cell casts and dysmorphic red cells in a urine specimen is important.

Differential Diagnosis

The importance of the urinalysis, including the significance of associated urine abnormalities in addition to hematuria must be understood. The appropriate use of imaging studies, cystoscopy and renal biopsy within the clinical context must be known.

Etiology and Pathophysiology

Approach to the diversity of disease associated with hematuria:

- detailed knowledge of causes of hematuria in nephrology should include:
  -infectious and non-infectious causes
  -glomerular, tubular and vascular causes
  -isolated hematuria and hematuria mixed with other sediment abnormalities (nephritic syndrome)
  -hereditary hematuric syndromes

- including an understanding of the causes and consequences of these disorders
- a detailed differential of the glomerulonephritides is expected, including rapidly progressive glomerulonephritis, vasculitic syndromes, pulmonary-renal syndromes, and lupus nephritis.

Proteinuria

In a patient with proteinuria, the resident will be able to perform and discuss:

Clinical Skills

A focused history and physical examination with special attention to the importance of:

- fluid balance, edema
- blood pressure
- evidence of systemic disease(s)
- complications of the nephrotic syndrome
- complications of renal dysfunction
- interpretation of the urinalysis including the meaning of cells, casts, oval fat bodies and the need for the quantification and qualification of proteinuria.

Diagnostic Tests

Discussion of diagnostic tests including the utility, indications and complications (where applicable) of a hematology profile, serology, biochemistry profile, renal function tests, lipids, coagulation profile, serum proteins, imaging and renal biopsy in patients with proteinuria. The physiology and testing procedures for microalbuminuria should be understood.

Etiology and Pathophysiology

The resident will understand and appreciate the contributions of light microscopy, immunofluorescence and electron microscopy to the final pathological diagnosis of patients with proteinuria and the ability to integrate these with the clinical diagnosis to form a management plan. Immune renal injury, and the contribution of hemodynamic and proteinuric damage to progressive renal disease should be appreciated. Diabetic nephropathy should be understood in detail.

Differential Diagnosis

The resident will be able to perform a complete differential diagnosis of primary and secondary causes of the nephrotic and nephritic syndromes, as well as of interstitial renal disease.

Management and Complications

Management of patients with proteinuria includes a broad understanding of general patient management/complications and specific therapeutic decisions. General patient issues include: nutrition, blood pressure management and fluid balance; specific therapies include therapeutic options, their indications and durations, complications and current controversies.

Complications to discuss include:

- nephrotic syndrome per se (lipids, coagulation etc.)
- disease specific complications
- therapy complications
- complications of progressive renal decline

Prognosis

The resident will be able to discuss the determinants of both renal and patient prognosis.

- treatment of underlying disease
- management of complications

Growth and Development

Fetal/Neonatal Renal Disorders [Applies chiefly to Pediatric Nephrology Trainees]

In the newborn infant (premature or full-term) the resident will be able to discuss and perform:

Clinical Skills

The focused history and physical examination will demonstrate the ability to delineate and differentiate malformations of the kidney and non-renal organ systems of relevance to the underlying renal disorder; obtain antenatal information of relevance to the renal disease including details of amniotic fluid, placental size, ultrasound and pertinent birth history. Other clinical skills outlined under specific renal syndrome are applicable to the neonate as well.

Differential Diagnosis

A differential diagnosis for each of the renal syndromes that is specific for the neonate. In particular, the resident will have an approach to hydronephrosis, cystic kidney disease, renal failure, hypertension and fluid and electrolyte disorders in the neonate.

Diagnostic Tests

The resident will be able to discuss the utility and significance of findings of hematologic, serologic, biochemical testing and urinalysis. Specific uses/limitations of renal imaging (ultrasound, nuclear scans, contrast studies) in premature and newborn infants are to be understood. Indications for specific genetic testing and counseling are to be known.

Etiology and Pathophysiology

Transitional renal physiology as the fetus adapts to extrauterine life at various gestational ages must be understood, in particular, alterations in renal blood flow and GFR and renal handling of sodium, potassium, protons, water, calcium, magnesium and phosphate.

Risk factors for renal disorders that are acquired in the neonatal period are to be understood including renal vein thrombosis, acute cortical necrosis and hypertension. Congenital and genetic renal disorders must be differentiated from acquired disease.

Etiology and pathophysiology of specific renal syndromes apply to the newborn as well.

Management and Complications

- differentiate congenital/genetic/acquired
- differentiate reversible/irreversible
- differentiate urgent/non-urgent
- differentiate normal/abnormal renal responses of newborn
- know specific therapies relevant to newborn (e.g. drug dosage alterations)
- appreciate parental needs regarding therapeutic decision
- understand indications for antenatal intervention

Prognosis/Controversies

- indications for dialysis in neonates
- treatment of patient with renal agenesis and no major extra renal disease
- treatment of renal vein thrombosis
- management of unilateral multicystic dysplastic kidney
- appropriate investigation of antenatally recognized hydronephrosis

Inherited Renal Disorders

In a patient that has hereditary renal glomerular/cystic/tubular disorders or an inherited metabolic disorder, the resident will be able to discuss and perform:

Clinical Skills

A focused history and physical examination which demonstrates the ability to recognize clinical features that are specific to inherited glomerular, cystic and tubular disorders of the kidney including extrarenal manifestations and to recognize the clinical features of inborn errors of metabolism that cause renal disease (e.g. cystinosis, oxalosis). The resident will be able to perform and document a full Family History.

Differential Diagnosis

The resident will be able to generate a differential diagnosis for glomerular-based diseases, cystic renal diseases including inherited, syndromic, dysplastic and acquired variants; for renal tubular disorders, in particular those with a clinical presentation of hypophosphatemic rickets, Fanconi syndrome, nephrogenic diabetes insipidus, Bartter's syndrome, renal tubular acidosis, glycosuria and nephrocalcinosis. The resident will recognize inborn errors of metabolism as a cause of metabolic acidosis and alkalosis.

Diagnostic Tests

The resident will be able to discuss the work-up of a patient with primary renal glomerular/tubular/cystic disorders, including specific tests of glomerular/tubular function and they will know how to confirm specific diagnoses. The resident will also have an approach to the evaluation of extra renal manifestations and will understand the genetic implications of each disorder. The indications for renal imaging will be understood. The resident will understand the principles of screening, know the screening approach to major forms of hereditary renal disease, and be able to counsel patients and families.

Etiology and Pathophysiology

The resident will understand the underlying alterations in renal physiology that cause the various clinical syndromes that are associated with inherited defects of tubular function and the rationale for specific therapies. Differences between inherited and acquired disease will be understood. The resident will understand recent pathophysiologic concepts regarding PCKD and hereditary glomerulopathies.

The resident will have an understanding of inborn errors of metabolism that may present as metabolic acidosis or that generate toxic molecules that can be effectively removed by dialysis (e.g. hyperammonemia, maple syrup urine disease).

The resident should be able to interpret a pedigree and understand the principles of genetic screening tests.

Management and Complications

- general principles of management
- specific therapies for each inherited defect, including enzyme replacement therapy
- complications of therapy (short and long-term)
- complications of the underlying disease (acute and chronic)
- role of the nephrologist in management of acute metabolic crises in patients with inborn errors of metabolism.

Prognosis and Complications

- duration of treatment of hypophosphatemic rickets (versus risk of nephrocalcinosis)
- duration of cysteamine therapy in patients with cystinosis (e.g., post transplantation)
- optimal management of primary hyperoxaluria
- initial approaches to gene therapy for renal diseases

Poisoning

The resident will be able to assess and manage patients with poisoning treatable by dialysis techniques.

Clinical Skills

The resident will perform a focussed history and physical examination directed at identifying the etiology and consequences of poisoning. This should include the ability to take a history from family/friends regarding an incapacitated/comatose patient. In addition the resident will be able to provide appropriate telephone consultation to referring physicians regarding immediate non-dialytic therapy, and to determine the necessity for patient transfer to a dialysis centre.
Differential Diagnosis

The resident will be able to generate a differential diagnosis of those poisons/overdoses associated with acute renal failure and/or acute acid-base disturbances, and those where a need for extra-corporeal therapies may exist.

Diagnostic Tests

The resident should be able to interpret toxicology screens, anion and osmolal gaps, recognize the products of alcohol metabolism, and identify the presence of oxalate and other crystals in urine. In the case of unusual toxins, the resident must be able to identify literature resources for obtaining further information/case reports.

Pathophysiology

The resident should understand the metabolism of poisons, notably alcohols, lithium, salicylates, theophylline, as well as have an awareness of the few sedatives and anti-epileptics effectively removed by hemodialysis. The pharmacokinetics and kinetics of dialysis of these agents should be understood, as well as the general principles involved in identifying agents best removed by dialysis, hemoperfusion, apheresis, or spontaneous metabolism/excretion.

Management

The resident must be able to identify those poisoned patients with indications for extracorporeal clearance, and be able to provide acute access and appropriate monitoring and therapy. This includes inhibition of alcohol metabolism including ethanol infusions, ethanol-containing dialysate, and fomepizole. The resident must demonstrate knowledge of the indications for and risks of fluid loading and alkali therapy in poisoning.

Controversies

Cost-benefit of fomepizole
Application of volume loading/diuresis in lithium toxicity

Pregnancy and Renal Disease

Patients who are pregnant represent a special group of individuals, who may suffer from any of the syndromes described above. The resident must be equipped to function as an expert consultant in managing such patients, and must be able to work collaboratively with family physicians, obstetricians, and consultants in maternal-fetal medicine to provide appropriate care and advice. The resident must be able to counsel patients directly in addition to providing consultative advice to their colleagues.

Specific situations with which residents should be familiar include but are not limited to:

- Fertility and maternal/fetal risks of pregnancy in nephrotic syndrome, chronic renal failure, and dialysis patients
- Pregnancy in the renal transplant recipient
- Pregnancy in patients with diabetic nephropathy
- Pregnancy in patients with systemic lupus erythematosus/anti-phospholipid antibody syndrome
- Pregnancy and nephrolithiasis
- Pregnancy in patients with severe hypertension
- Pre-eclampsia, eclampsia, and hypertension syndromes of pregnancy

There are some differences in emphasis between Pediatric and Adult Nephrology programs, attributable to the distinct patient populations involved. In addition to the core knowledge objectives applicable to both Adult and Pediatric Nephrology, the Association of Pediatric Nephrology Training Directors has prepared specific guidelines which are included here. These are intended to supplement the general objectives for all Nephrology trainees.

CANMEDS ROLES

[see website]: **http://rcpsc.medical.org/canmeds/index.php**

Definitions (from the Royal College Website):

As **Medical Experts**, physicians integrate all of the CanMEDS Roles, applying medical knowledge, clinical skills, and professional attitudes in their provision of patient-centered care. Medical Expert is the central physician Role in the CanMEDS framework.

As **Communicators**, physicians effectively facilitate the doctor-patient relationship and the dynamic exchanges that occur before, during, and after the medical encounter.

As **Collaborators**, physicians effectively work within a healthcare team to achieve optimal patient care.

As **Managers**, physicians are integral participants in healthcare organizations, organizing sustainable practices, making decisions about allocating resources, and contributing to the effectiveness of the healthcare system.

As **Health Advocates**, physicians responsibly use their expertise and influence to advance the health and well-being of individual patients, communities, and populations.

As **Scholars**, physicians demonstrate a lifelong commitment to reflective learning, as well as the creation, dissemination, application and translation of medical knowledge.

As **Professionals**, physicians are committed to the health and well-being of individuals and society through ethical practice, profession-led regulation, and high personal standards of behaviour.

Specific descriptions for the Nephrology trainee in each of these roles are integrated into both general and specific objectives.

History:

Since 1996 the Royal College of Physicians and Surgeons of Canada has adopted an innovative framework of physician competencies called the CanMEDS Roles. CanMEDS now forms the basis for the Royal College's accreditation standards, specialty-specific objectives of training, exam blueprints and in-training evaluations. The RCPSC was first in the world to implement a national educational framework of the core competencies that all specialists need to know. CanMEDS made explicit the abilities that have long been recognized in highly skilled physicians, and updated them for contemporary medicine. This framework includes the roles of: medical expert (the central role),

communicator, collaborator, health advocate, manager, scholar and professional. This framework is now extensively implemented in Canada, and recognized worldwide.

The Office of Education continues its world-leading initiative in specialty medical education with the launching of the 4th phase of the CanMEDS project. The program to date has undergone three phases: Framework Development (1990B96), Pilot Projects (1996B97), and Implementation (1997B2002). The fourth phase, Faculty Development, was formally launched in November 2003.

Working groups for each of the CanMEDS Roles are re-examining the current CanMEDS standards and competencies. This will allow the RCPSC to publish an authoritative series of medical education publications and develop CanMEDS teaching, learning and evaluation tools. These innovative materials will be posted on the RCPSC web site for use by program directors and educators. For more information, contact us at canmeds@rcpsc.edu

CURRICULUM OVERVIEW

Curriculum Outline

Block:

Year 1

- 2 months Transplant Service
- 2 months General Inpatient Nephrology Service
- 2 months Dialysis
- 2 months Ambulatory Clinics
- 1 month 'City' Consultation Service
- 1 month Pathology
- 2 month Elective

Year 2

- 2 months Transplantation Service
- 2 months General Inpatient Nephrology Service
- 1 month Dialysis
- 1 month Community Nephrology
- 1 month Pathology
- 5 months Elective

Longitudinal:

Half-day Resident's Clinic

General Inpatient Nephrology Service

This rotation is split into two 2-month blocks, the first carried out early in year 1 and the latter block in year 2. As a nephrology trainee you will round with the attending physician and junior medical residents (1-2) on the inpatient service. This includes patients on the 3-Nephrology ward (~15 patients), consults in the ER, Urology, and ICU. Non-active patients on 3-Nephrology will be rounded on by the attending only and will be considered non-teaching patients. The 3-Nephrology ward has a variety of patients, including patients established on renal replacement therapy with a variety of dialysis- and medical-complications as well as patients presenting with ARF, RPGN, nephrotic syndrome etc. Consults on the other wards typically are patients with acute and chronic renal failure and less commonly with acid-base or fluid/electrolyte disorders. Staff-attended rounds typically occur at 8:30 Mondays and Fridays and immediately after Medical Grand Rounds (~ 9:10) on Wednesdays. It is expected that in the final 1-2 months the trainee will function relatively independent of the staff and perform at the consultant level by the end of the rotation.

See the Objectives (next) and Evaluation Form (appendix) for this rotation.

Objectives - Inpatient Nephrology Rotation

Medical Expert/Clinical Decision-Maker

Develop ability to carry out a focused history and physical examination on patients presenting with a variety of nephrological problems as well as patients on an established mode of renal replacement.

Demonstrate an approach to the investigation and management of patients with acute renal failure and its associated complications.

Demonstrate an ability to manage a large number of inpatients with a variety of nephrological problems. During the final month the trainee should be able to effectively manage the inpatient service with minimal involvement of the attending staff

Essential concepts specific to the inpatient nephrology rotation which must be mastered include:

- basic sciences
- dialysis prescription
- adequacy of dialysis
- access creation and maintenance
- complications of vascular/peritoneal access
- peritonitis and ultrafiltration failure
- cardiovascular complications of patients with ESRD
- acute renal failure
- RPGN
- chronic renal failure
- fluid and electrolytes
- radiologic investigation of renal insufficiency
- indications for renal biopsy

Communicator/Collaborator

Demonstrate ability to establish therapeutic relationships with patients/families
Demonstrate ability to work and consult effectively with other physicians and health care professionals, specifically as it pertains to the care of patients in hospital

Manager

Develop the skill-set to be able to manage a large number of inpatients and provide a consultative service
Utilize resources effectively to balance patient care, learning needs, and outside activities
Demonstrate the ability to allocate finite health care resources such as dialysis wisely
Utilize information technology to optimize patient care, life-long learning and other activities

Health Advocate

Identify the important determinants of health affecting patients with renal insufficiency recognize and respond to those issues where advocacy is appropriate

Scholar

Demonstrate ability to develop, implement and monitor a personal continuing education strategy
Critically appraise sources of medical information
Facilitate learning of patients, house-staff/students and other health professionals

Professional

Deliver highest quality care with integrity, honesty and compassion
Exhibit appropriate personal and interpersonal professional behaviors
Practice medicine ethically consistent with obligations of a physician

Transplantation Service

This rotation is split into two 2-month blocks, the first carried out in year 1 and the latter block in year 2.

Year 1
In the first month you will round with the attending physician and junior medical resident on the renal transplant unit (RTU), a 6-bed unit, and 4th floor (CCU, Cardiac Step-down, Medicine) [starting at 8:30 each day]. In the second month, you will be based in the transplant clinic, seeing patients at various post-transplant stages. You will also see potential donor and recipients for workups. There is typically a significant amount of time in the afternoons available for reading.

Year 2
In the first month you will round with the attending physician and junior medical resident on the renal transplant unit (RTU), a 6-bed unit, and 4th floor (CCU, Cardiac Step-down, Medicine) [starting at 8:30 each day]. In the second month, you will be based in the transplant clinic, seeing patients at various post-transplant stages. You will also see potential donor and recipients for workups as well as any new transplants on the ward.

The RTU has a variety of patients, including patients who have undergone live or cadaveric kidney transplantation, patients with transplant complications (rejection, infection etc), and occasionally general nephrology patients. It is expected that in the final a month the trainee will function relatively independent of the staff and perform at the consultant level by the end of the rotation.

See the attached Objectives (next) and Evaluation Form (appendix) for this rotation.

Objectives - Transplantation Rotation

Medical Expert/Clinical Decision-Maker

Develop ability to carry out a focused history and physical examination with specific attention to assessment for potential renal transplantation as well as complications associated with renal transplantation and immunosuppressive therapy

Essential concepts specific to transplantation which should be mastered include:

- organization and function of immune system
- indications and contraindications for kidney and kidney-pancreas transplantation
- patient selection/risk stratification
- selection and management of living related, living unrelated and cadaveric donors
- mechanisms of allograft rejection
- mechanism of action of immunosuppressive agents
- principles of tissue typing, cross matching, panel reactive antibodies
- interpretation of results of above tests
- organ allocation strategies
- detection, prophylaxis, management of infections in immunosuppressed host

Demonstrate appropriate management of the following areas, in each of 3 specific time frames: acute management (perioperatively), short-term management (0 - 6 months), and long-term management (>6 months):

- complications of major immunosuppressive agents
- differential diagnosis and treatment of acute and chronic graft dysfunction
- viral infections
- malignancies\
- hypertension/vascular disease
- diabetes
- metabolic and drug-induced bone disease

Become familiar with various controversies surrounding renal transplantation, including: determinants of outcome (patient and graft)

- patient selection, living unrelated donation, older donors, non heart-beating donors
- antilymphocyte preparations, lipid management, osteopenia management
- choice of anti-hypertensive, cyclosporine management
- role of newer immunosuppressives e.g. tacrolimus, mycophenolate, sirolimus, anti-IL2 receptor and other monoclonals
- monitoring of drug levels, area under curve

Communicator/Collaborator

Demonstrate ability to establish therapeutic relationships with patients/families

Demonstrate ability to work and consult effectively with other physicians and health care professionals, specifically as it pertains to the care of patients who are transplant recipients

Manager

Develop an understanding of the selection process for the transplant waiting list
Utilize resources effectively to balance patient care, learning needs, and outside activities
Demonstrate the ability to allocate finite health care resources such as cadaveric kidneys wisely
Utilize information technology to optimize patient care, life-long learning and other activities

Health Advocate

Identify the important determinants of health affecting renal transplant recipients
Recognize and respond to those issues where advocacy is appropriate
Demonstrate an understanding of the issues of advocacy for both individual patients and society when dealing with a limited resource such as cadaveric kidneys

Scholar

Demonstrate ability to develop, implement and monitor a personal continuing education strategy
Critically appraise sources of medical information
Facilitate learning of patients, housestaff/students and other health professionals

Professional

Deliver highest quality care with integrity, honesty and compassion
Exhibit appropriate personal and interpersonal professional behaviors
Practice medicine ethically consistent with obligations of a physician

Dialysis Rotation

This rotation is split into a 2-month block in year 1 and a flexible 3rd month in year 2. In the first 2 months, you will be expected to arrange to participate in 6-7 outpatient dialysis clinics each week for the first month. Clinics for the period are compiled and booked by the Program Administrator. In addition, several tutorial-structured practical sessions will be organized with staff on select topics/issues in hemodialysis and peritoneal dialysis. In the second month, the resident is based in the hemodialysis unit under the supervision of your longitudinal clinic supervisor. Participating staff will round with the resident on a frequent basis. In addition, the resident would be responsible for these nephrologists' patients during the daytime. Residents would be first call with an opportunity to gain first hand experience troubleshooting in the dialysis unit. In addition, residents should have the opportunity to sit down with staff and review hemoglobin values and associated orders on their mutual patients. This list is shown below. You will also be expected to carry the dialysis unit pager on evenings you are on call for the in-patient service.

The third month is rather flexible and can be tailored to meet specific needs. This may consist of additional clinics, rounding on hemodialysis shifts, radiological assessment of accesses etc. Meet with the Program Director prior to the third month of the rotation to organize the rotation.

There is a significant amount of time available for reading.

See the attached Objectives (next) and Evaluation Form (appendix) for this rotation.

See the ISPD Recommended Trainee PD Curriculum in the appendix

Teaching Sessions

Hemodialysis Water Treatment (Hemodialysis Technicians)
The Hemodialysis Machine (Hemodialysis Technicians)
Assessment of the Hemodialysis Patient at the Bedside (DC)
Peritoneal Dialysis B Management of Complications (SB)
Evaluation of the Hemodialysis Access at the Bedside (CR)
Management of the Hypotensive Hemodialysis Patient at the Bedside (EC)
Anemia Management B A Problem-Based Approach (SB)
PD Modality and the PET (SB)
CRRT (CR)

Objectives - Dialysis Rotation

Medical Expert/Clinical Decision-Maker

Develop ability to carry out a focused history and physical examination with specific attention to complications associated with modality of renal replacement therapy and the complications and co-morbid conditions associated with ESRD patients.

An understanding of the relevance of the causes of ESRD to management issues must be demonstrated.

Become proficient at the use of diagnostic tests for the management of patients on renal replacement therapy. Understanding the utility of measurements of adequacy of dialysis (both in hemodialysis and peritoneal dialysis), markers for metabolic bone disease, assessment of causes of anemia etc. is expected.

Essential concepts specific to hemodialysis/peritoneal dialysis which must be mastered include:

- residual renal function
- convection, diffusion
- ultrafiltration
- membrane characteristics and biocompatibility
- formation of filtrate
- dialysate
- access creation and maintenance
- dialysis prescription
- adequacy of dialysis
- reverse osmosis/water treatment
- aluminum and other trace elements
- complications of vascular/peritoneal access
- dialysis amyloidosis
- nutrition in ESRD

Demonstrate appropriate management of patients with ESRD, including:

- choice of modality/options
- modality change/selection
- access creation and maintenance, monitoring, surgical/radiologic options
- treatment of complications
- short-term and long-term complications
- familiarity with published guidelines
- infection control: MRSA, VRE, Hepatitis, HIV

Become familiar with various controversies surrounding dialysis care, including:

- controversies in timing, in patient selection, in delivery of dialysis dose, options within modalities
- dialyzer re-use

Communicator/Collaborator

Demonstrate ability to establish therapeutic relationships with patients/families

Demonstrate ability to work and consult effectively with other physicians and health care professionals, specifically as it pertains to the care of patients on dialysis

Manager

Develop the skill-set to be able to manage a hemodialysis unit effectively as a medical director
Utilize resources effectively to balance patient care, learning needs, and outside activities
Demonstrate the ability to allocate finite health care resources such as dialysis wisely
Utilize information technology to optimize patient care, life-long learning and other activities

Health Advocate

Identify the important determinants of health affecting patients on dialysis
Recognize and respond to those issues where advocacy is appropriate

Scholar

Demonstrate ability to develop, implement and monitor a personal continuing education strategy
Critically appraise sources of medical information
Facilitate learning of patients, house-staff/students and other health professionals

Professional

Deliver highest quality care with integrity, honesty and compassion
Exhibit appropriate personal and interpersonal professional behaviors
Practice medicine ethically consistent with obligations of a physician

Ambulatory Clinics

This is a 2 month rotation. During this time you are expected to attend on a regular basis 7-8 outpatient clinics each week. You will be exposed to a variety of outpatient general nephrology patients, including patients with renal impairment, proteinuria, hematuria, nephrolithiasis, hypertension etc. A schedule of available clinics is attached. By pre-arranging clinic times, staff can try to ensure a good mix of consults as well as interesting follow-ups. By the end of the rotation you should be able to carry out a history and physical examination and generate independently a reasonable differential diagnosis and management strategy for the presenting problem. Dictations to referring physicians should be at the level of a consultant.

See the attached Objectives (next) and Evaluation Form (appendix) for this rotation.

Objectives - Ambulatory Clinics Rotation

Medical Expert/Clinical Decision-Maker

Develop ability to carry out a focused history and physical with special attention to the signs and symptoms of progressive renal dysfunction, hypertension, and glomerular disease, and the meaning of those findings.

Essential concepts specific to outpatient nephrology which must be mastered include:

- chronic renal failure
- dysuria/pyuria
- edema
- hypertension
- renal colic
- disorders of sodium balance
- disorders of potassium balance
- acid-base disturbances
- calcium, magnesium, and phosphate disorders
- hematuria
- proteinuria
- inherited renal disorders
- pregnancy and renal disease

It is recognized that many of these clinical problems may also be seen during inpatient rotations.

Demonstrate appropriate management of patients with the clinical problems described above

Communicator/Collaborator

Demonstrate ability to establish therapeutic relationships with patients/families

Demonstrate ability to work and consult effectively with other physicians and health care professionals, specifically as it pertains to the care of patients with renal disease (especially chronic renal insufficiency)

Manager

Develop the ability to manage many outpatients with a myriad of clinical problems in a longitudinal clinic format

Utilize resources effectively to balance patient care, learning needs, and outside activities
Utilize information technology to optimize patient care, life-long learning and other activities

Health Advocate

Identify the important determinants of health affecting patients with renal disease
Recognize and respond to those issues where advocacy is appropriate

Scholar

Demonstrate ability to develop, implement and monitor a personal continuing education strategy
Critically appraise sources of medical information
Facilitate learning of patients, housestaff/students and other health professionals

Professional

Deliver highest quality care with integrity, honesty and compassion
Exhibit appropriate personal and interpersonal professional behaviors
Practice medicine ethically consistent with obligations of a physician

City Consultative Service

This is a 1 month rotation which takes advantage of the wealth of challenging and complex patients which are referred to the nephrology service at the other hospital sites. It is strictly a consult service with a focus on ARF in patients with a history of trauma, burns or recent cardiovascular/vascular surgery. You will consult and follow on patients at the MUMC and Hamilton General Hospital Sites (and occasionally the Henderson site) in conjunction with the attending staff. Many of the patients will be on intermittent or continuous dialysis and often are hemodynamically unstable, presenting many challenges in achieving adequate hemodialysis. By the end of the rotation you should be functioning relatively independently at the level of a consultant and have a clear grasp of the mechanisms of acute renal failure, know when to initiate dialysis, and know how to prescribe hemodialysis in patients with hemodynamic instability.

See the attached Objectives (next) and Evaluation Form (appendix) for this rotation.

Objectives – "City" Consultative Rotation

Medical Expert/Clinical Decision-Maker

Develop ability to carry out a focused history and physical examination on patients presenting with a variety of nephrological problems, including patients with acute renal failure

An understanding of the common causes and initial management of patients with acute renal failure and its associated complications.

Demonstrate an ability to provide comprehensive consultation on a large number of inpatients with a variety of nephrological problems

Essential concepts specific to the consultative rotation which must be mastered include:

- basic sciences
- indications for dialysis
- acute renal failure
- dialysis prescription
- adequacy of dialysis in ARF
- continuous and intermittent hemodialysis modalities
- convection, diffusion, and ultrafiltration
- hemodialysis management in patients with hemodynamic instability
- membrane characteristics and biocompatibility
- complications of vascular/peritoneal access
- renovascular disease
- fluid and electrolytes
- patient and renal prognosis in the ICU

Demonstrate appropriate management of patients with acute renal failure in the ICU

Communicator/Collaborator

Demonstrate ability to establish therapeutic relationships with patients/families
Demonstrate ability to work and consult effectively with other physicians and health care professionals, specifically as it pertains to the care of patients in the ICU

Manager

Develop the skill-set to be able to manage a large number of inpatients in a consultative setting
Utilize resources effectively to balance patient care, learning needs, and outside activities
Demonstrate the ability to allocate finite health care resources such as dialysis wisely
Utilize information technology to optimize patient care, life-long learning and other activities

Health Advocate

Identify the important determinants of health affecting patients with acute renal failure in the ICU
Recognize and respond to those issues where advocacy is appropriate

Scholar

Demonstrate ability to develop, implement and monitor a personal continuing education strategy
Critically appraise sources of medical information
Facilitate learning of patients, house-staff/students and other health professionals

Professional

Deliver highest quality care with integrity, honesty and compassion
Exhibit appropriate personal and interpersonal professional behaviors
Practice medicine ethically consistent with obligations of a physician

Pathology Rotation

This is a 2 month block, typically split between the two years (i.e. June and July). During this time you will be expected to review teaching cases as well as new cases coming in over the 2 months. It is recommended that you take a systematic approach, following one of the recommended textbooks. The pathologist will review cases with you and provide instruction. Typically several hours in the afternoon each day are allotted for reading.

See the attached Objectives (next) and Evaluation Form (appendix) for this rotation.

Objectives - Pathology Nephrology Rotation

Medical Expert/Clinical Decision-Maker

Develop ability to evaluate renal biopsy specimens and recognize the histopathologic characteristics of both normal kidney and disease states as outlined below.

Become familiar with the preparation of renal biopsy specimens:

i. type of solutions used for light (LM), immunofluorescence (IF), and electron microscopy (EM)
ii. the basics of specimen preparation for LM, IF, and EM.

Explain the uses and advantages of specific stains to include hematoxylin and eosin (H&E), periodic acid Schiff (PAS), Trichrome (Masson), silver-stains, elastin stain, congo red, methyl violet, thioflavine T, immunoperoxidase staining.

Recognize the histopathologic characteristics of the following disease states on LM, IF, and EM (using a combination of actual cases and teaching slides).

1. Minimal change disease.
2. Focal glomerulosclerosis
3. Membranoproliferative GN
4. Membranous GN
5. World Health Organization classes of lupus nephritis
6. IgA nephropathy
7. Diabetic nephropathy
8. Amyloidosis
9. Myeloma kidney
10. Crescentic GN to include Wegener's granulomatosis, PAN, and idiopathic RPGN
11. Anti-GBM disease
12. Post-infectious GN (especially PSGN and SBE)
13. Renal vasculitis
14. Scleroderma kidney
15. Hypertensive nephropathy/nephrosclerosis
16. Thrombotic microangiopathy
17. Interstitial nephritis, chronic and acute
18. Acute tubular necrosis
19. Transplant
    a. Acute cellular rejection
    b. Acute vascular rejection
    c. Calcineurin toxicity

Communicator/Collaborator

Obtain adequate clinical background and information from the appropriate nephrologist submitting the specimen to allow optimal interpretation of the biopsy.

Demonstrate ability to work and consult effectively with other physicians and health care professionals

Manager

Utilize resources effectively to balance patient care, learning needs, and outside activities
Utilize information technology to optimize patient care, life-long learning and other activities

Health Advocate

Identify the important determinants of health affecting patients with renal disease
Recognize and respond to those issues where advocacy is appropriate

Scholar

Demonstrate ability to develop, implement and monitor a personal continuing education strategy
Critically appraise sources of medical information
Facilitate learning of patients, house-staff/students and other health professionals

Professional

Deliver highest quality care with integrity, honesty and compassion
Exhibit appropriate personal and interpersonal professional behaviors
Practice medicine ethically consistent with obligations of a physician

Community Nephrology

This is a 1 month elective (can be extended) which can take place at any of a number of sites. Previous trainees have gone to Hotel Dieu Hospital (St. Catharines), Credit Valley Hospital (Mississauga), Guelph, Oakville, and St. Joseph=s (Toronto). Other sites can be considered. During this time you will be exposed to general nephrology and dialysis patients and practice with a community perspective. This will include inpatient care, dialysis patient care, and outpatient consults. Different sites may have varying strengths so you are strongly encouraged to discuss your needs further with the Program Director.

See the attached Objectives (next) and Evaluation Form (appendix) for this rotation.

Objectives - Community Nephrology Rotation

Medical Expert/Clinical Decision-Maker

Develop ability to carry out a focused history and physical examination on patients presenting with a variety of nephrological problems as well as patients on an established mode of renal replacement

Demonstrate an approach to the investigation and management of patients with acute renal failure and its associated complications.

Demonstrate an ability to manage a large number of inpatients with a variety of nephrological problems.

Essential concepts specific to the community nephrology rotation which must be mastered include:

- basic sciences
- dialysis prescription
- adequacy of dialysis
- access creation and maintenance
- complications of vascular/peritoneal access
- peritonitis and ultrafiltration failure
- cardiovascular complications of patients with ESRD
- acute renal failure
- RPGN
- chronic renal failure
- fluid and electrolytes
- radiologic investigation of renal insufficiency
- indications for renal biopsy

Communicator/Collaborator

Demonstrate ability to establish therapeutic relationships with patients/families
Demonstrate ability to work and consult effectively with other physicians and health care professionals, specifically as it pertains to the care of patients in hospital

Manager

Develop the skill-set to be able to manage a large number of inpatients and provide a consultative service in a community setting.
Utilize resources effectively to balance patient care, learning needs, and outside activities
Demonstrate the ability to allocate finite health care resources such as dialysis wisely

Utilize information technology to optimize patient care, life-long learning and other activities

Health Advocate

Identify the important determinants of health affecting patients with renal insufficiency recognize and respond to those issues where advocacy is appropriate

Scholar

Demonstrate ability to develop, implement and monitor a personal continuing education strategy
Critically appraise sources of medical information
Facilitate learning of patients, house-staff/students and other health professionals

Professional

Deliver highest quality care with integrity, honesty and compassion
Exhibit appropriate personal and interpersonal professional behaviors
Practice medicine ethically consistent with obligations of a physician

Elective Rotation

This is a flexible 7-month block which includes (but is not limited to) radiology, pediatric nephrology, ambulatory clinics, community nephrology, course work and research (basic or clinical). An outline of the rotation with objectives (next) and an evaluation form (appendix) for Pediatric Nephrology is included. Arrange well in advance to discuss with the Program Director your particular needs during this Elective rotation.

Pediatric Nephrology

This is an elective rotation (1-2 months) which takes place at the MUMC site under the supervision of Dr. Brian Steele. It is primarily an outpatient-based experience. During this time you are expected to participate in a number of outpatient clinics where you will be exposed to a variety of nephrological problems. This may include the care of pediatric patients with CRI, transplant patients, patients with nephrotic syndrome, patients with renal morphological problems etc. As there are typically only 2-4 clinics per week it is expected that you also supplement this rotation with other activities. These may include radiology, adult outpatient clinics, research etc. You may also want to look into non-nephrology clinics at MUMC, including the diabetes clinic, the hypertension clinic, or the lupus clinic, during this block.

See the attached Objectives (next) and Evaluation Form (appendix) for this rotation.

Objectives - Pediatric Nephrology Rotation

Medical Expert/Clinical Decision-Maker

Develop ability to carry out a focused history and physical examination on pediatric patients presenting with a variety of nephrological problems

Essential concepts specific to the pediatric nephrology rotation which must be mastered include:

- hematuria and glomerulonephritis
- proteinuria and nephrotic syndrome
- diagnosis/management of recurrent urinary tract infection
- hypertension in pediatric population
- congenital diseases affecting renal morphology
- hereditary diseases affecting renal tubular function
- fluid and electrolytes
- dialysis in pediatric population
- growth and nutrition in CRI/ESRD
- transplantation complications

Communicator/Collaborator

Demonstrate ability to establish therapeutic relationships with patients/families

Demonstrate ability to work and consult effectively with other physicians and health care professionals

Manager

Utilize resources effectively to balance patient care, learning needs, and outside activities
Utilize information technology to optimize patient care, life-long learning and other activities

Health Advocate

Identify the important determinants of health affecting pediatric patients
Recognize and respond to those issues where advocacy is appropriate

Scholar

Demonstrate ability to develop, implement and monitor a personal continuing education strategy
Critically appraise sources of medical information
Facilitate learning of patients, house-staff/students and other health professionals

Professional

Deliver highest quality care with integrity, honesty and compassion
Exhibit appropriate personal and interpersonal professional behaviors
Practice medicine ethically consistent with obligations of a physician

Longitudinal Clinics

The longitudinal clinic is a recent initiative designed to give trainees an improved experience in the care of interesting and challenging outpatients. Such patients will have a variety of nephrologic problems, and include patients with chronic renal failure, nephrolithiasis, nephrotic syndrome, glomerulonephritis etc.

After 2-3 months of training the trainee is asked to approach one of the staff nephrologists about arranging a regular clinic time. This should take place regularly for a half-day each week. It should be arranged ideally in the afternoons so as not to interfere with regularly scheduled inpatient rounds.

Initially, trainees may want to have the attending involved to a varying level in the care of these patients. The goal, however, is that over time the trainee can work completely independently in the outpatient setting and become familiar and comfortable with the care of many outpatients. Results of investigations and telephone inquiries from patients should be routed through the attending physician's office to the trainee.

Academic Half-Day

Every Thursday morning from 8:00 to 11:00, 2 scheduled teaching sessions will take place. They will be 1 to 2 hours in duration and encompass a wide variety of topics relevant to Nephrology and Transplantation.

The format of these sessions have been revised to be more structured. In the initial 8-10 weeks, didactic core topics will be covered and are repeated yearly. Objectives and reading material will be forwarded to trainees in advance. Following these sessions, interactive sessions will take place on a variety of topics on a 2 year schedule. Objectives and reading material (references) will be forwarded to trainees ahead of time. These sessions will have a didactic component but will also continue to rely heavily on the involvement and preparedness of the trainees. It is hoped that towards the last 2 hour of these sessions, cases (when appropriate) will be presented to the trainees for discussion. A list of the topics follows and is subject to revision.

CanMeds Topics	
Brimble	Career counseling
Carlisle	Admin aspects of dialysis
Clase	Good clinical practices course
Clase	Clinical research
Margetts	Intro to basic science
Su	Problem based learning
Treleaven	Morbidity and mortality
Treleaven	Harassment, intimidation, privacy
Core Topics	
Arlen	Fundamentals of hemodialysis adequacy
Brimble	Fundamentals of PD
Carlisle	The hemodialysis prescription
Carlisle	Fundamentals of CRI
Clase	Fundamentals of Out-patient Hemodialysis Care
Gangji	Transplantation - review of manual
Krepinsky	Management of poisonings
Ludwin	Overview of acute allograft rejection
Margetts	Peritoneal dialysis adequacy
Rabbat	Fundamentals of ARF
Russell	Biology of the immune response
Year 1 Topics	
Arlen	Polycystic kidney disease
Arlen	SLE I
Arlen	SLE II
Brimble	Sodium Handling
Brimble	Metabolic acidosis I
Brimble	Metabolic acidosis II
Carlisle	Dialysis membranes

Carlisle	Potassium physiology
Carlisle	Water physiology
Clase	EPO/NESP
Clase	Pregnancy and renal disease I
Gangji	Pretransplant immune testing
Gangji	Approach to GN
Gangji	Microangiopathies
Gangji	PLEX
Ingram	Fundamentals of Hemodialysis access
Ingram	Intradyalitic complications
Ingram	Membranous
Juneja	Renal nutrition
Kapoor	Surgical aspects of renal transplantation
Krepinsky	Diuretics/Edema
Krepinsky	Chronic renal failure -- progression and therapy
Ludwin	Opportunistic infection
Ludwin	Anti-rejection Drugs II: MMF and rapamycin
Ludwin	GFR
Margetts	Tubulointerstitial disease
Margetts	Urinalysis
Rabbat	Chronic renal failure
Rabbat	Acute renal failure in the ICU
Rabbat	Overview of nephrotic syndrome
Russell	Cardiovascular disease in dialysis patients
Russell	Transplant outcomes: effect of rejection, age, DM, cardiac disease
Snider	Graft rejection/immune mechanisms
Steele	Interesting pediatric issues
Steele	Reflux nephropathy
Treleaven	Metabolic alkalosis
Treleaven	Chronic allograft nephropathy
Treleaven	CMV
Woods (Anne)	Palliative Care - part 2
Woods (Anne)	Palliative Care - part 1
Yang	Hematuria
Yang	Diabetic nephropathy I
Yang	Diabetic nephropathy II
Year 2 Topics	
Arlen	Calcium I
Arlen	Calcium II
Arlen	Hemodialysis adequacy 2
Brimble	Complications of PD
Brimble	IgA nephropathy
Carlisle	Dysuria/Pyuria/Reflux Nephropathy
Carlisle	Overview of the dialysis unit

Carlisle	Treatment of hyperkalemia
Clase	Wegeners 2
Clase	Pauci immune GN and Wegener's I
Clase	Pregnancy and renal disease 2
Gangji	CRRT 1
Gangji	CRRT 2
Gangji	Nocturnal and slow dialysis
Ingram	Calcium, magnesium and phosphate physiology
Ingram	Access 2
Ingram	Hepatitis C and MPGN
Kapoor	Kidney malignancies
Kapoor	Urologic approach to stones
Krepinsky	GN with organized deposits
Krepinsky	RPGN
Ludwin	Anti-rejection drugs III: ATG, OKT3, IL-2
Ludwin	Overview of HLA
Margetts	Medical approach to kidney stones
Mosakoski	surgical aspects of vascular access creation
Rabbat	FSGS
Rabbat	Obstruction
Russell	Trials in transplantation: an overview
Russell	Recipient/donor workups
Russell	Recurrent and de novo disease in renal transplantation
Steele	Management of the child with renal failure
Steele	Pediatric Renal Disorders: vesicoureteric reflux
Treleaven	Lab assessment of renal disease
Treleaven	Treatment of hypo and hypernatremia
Treleaven	Cancer after transplant
Treleaven	Polyoma and viral nephritis
Yang	Essential Hypertension I
Yang	Essential Hypertension II
Yang	Non-nephrotic proteinuria

WEEKLY ROUNDS

Tuesday 8:00-9:0	Rotating residents didactic core nephrology topic Brimble/Treleaven
Wednesday 8:00-9:00	Medical Grand Rounds (Fontbonne auditorium)
Wednesday 12:00-1:00 (~1x/m)	Research Rounds (Fontbonne auditorium)
Thursday 10:30-11:15	Bedside Teaching (rotating residents/on-service trainees)
Thursday 12:00-1:00	Weekly lunch-time case-based rounds (presented by rotating residents and trainees (Chief resident to make schedule) (3 Nephrology classroom)
Friday 12:00-1:00	Nephrology Regional Rounds (Fontbonne auditorium). Schedule available, trainees will typically do 4 per year
Friday 1:00-1:30	Sign-over Rounds (Fontbonne auditorium)

MAD Days

Periodically Postgraduate Education organizes multi-disciplinary sessions for all residents on Wednesday afternoons at McMaster University. Topics may include issues of stress and harassment, career planning, financial planning etc. All trainees are expected to attend (attendance is taken). If on service they should sign out to the staff on service.

CANMEDs Subspecialty Rounds

These rounds are unique to the subspecialty fellows training at St. Joseph's Healthcare and are meant to address common needs amongst our training programs. They are located at SJH out of convenience are being pilot tested for 2008-2010. They are meant to expose the trainees to content in CANMEDs topics outside the usual Medical Expert domain. The schedule for 2008-2010 follows:

Sub-Specialty Medicine CanMEDS Rounds

Schedule for Academic Year 2008 to 2009

General Internal Medicine, Geriatrics, Infectious Diseases, Nephrology, Respirology, Rheumatology

Date	Time	Location	CanMEDS Competency	Topic	Speaker	PD Organizer	PD Evaluators
Wed Aug 6 2008	1730 to1900	T2208 2nd Level Tower	Professional	Ethics Workshop – Truth Telling	Dr. Giles Scofield	Whitehead	Treleaven El Helou
Mon Aug 25 2008	1730 to 2000	Miller Amphi-theatre	Communicator	Workshop: How to be a Great Presenter	Mr. Tom Mucciolo	Treleaven Whitehead	Treleaven Whitehead
Tues Oct 7 2008	1730 to1900	T2208 2nd Level Tower	Collaborator	Multidisciplinary Team Dynamics	Dr. El Helou	El Helou	Hanmiah Khalidi
Tues Jan 19 2009	1730 to1900	T2208 2nd Level Tower	Scholar	Educational Evaluation Tools	Dr. Khalidi	Khalidi	Whitehead Hanmiah
Tues May 5 2009	1730 to1900	T2208 2nd Level Tower	Manager	Balancing Personal and Professional Life	Dr. Hanmiah	Hanmiah	Whitehead Treleaven

Sub-Specialty Medicine CanMEDS Rounds

Schedule for Academic Year 2009 to 2010

General Internal Medicine, Geriatrics, Infectious Diseases, Nephrology, Respirology, Rheumatology

Date	Time	Location	CanMEDS Competency	Topic	Speaker	PD Organizer	PD Evaluators
August 2009	1730 to1900	TBA	Scholar			Treleaven	Whitehead Hanmiah
October 2009	1730 to1900	TBA	Communicator	Presentation Skills Workshop	Mr. Maracollo	Whitehead	Hanmiah Khalidi
January 2010	1730 to1900	TBA	Professional		Dr. Hanmiah	Hanmiah	El Helou Treleaven
March 2010	1730 to1900	TBA	Manager	Billing Workshop	Dr. Khalidi	Khalidi	El Helou Treleaven
May 2010	1730 to1900	TBA	Advocate			El Helou	Whitehead Khalidi

Biomedical Ethics

This increasingly important topic will be covered over the course of the two years in a variety of ways. Sessions on a variety of topics, including ethical issues surrounding end-of-life decision-making, futility and withholding dialysis, and organ donation/procurement will be covered in several of the academic half-day sessions with input from the Clinical Ethicist here at SJH, Dr. Giles Scofield. Additional topics on biomedical ethics included in MAD day and CANMEDS subspecialty sessions should also be attended. Several papers on bioethics which are relevant to Nephrology are included in the resources attached to this manual. Finally, several modules from the RCPSC on selected topics in Biomedical Ethics are included and can be used as a template for academic half-day sessions. Evaluation will take place informally at the bedside and in clinics by staff as well as by direct observation of the academic half-day sessions by the Program Director.

Further information and resources are available from the RCPSC at the following website:

http://rcpsc.medical.org/ethics/medicine/index.php

Communication Skills

Another area of importance is the development and appropriate evaluation of communication skills. It is assumed that in the previous 3 years of internal medicine training the trainee has already developed these skills to a high level and that these skills have been evaluated. Communication skills can now be evaluated in the OSCE format of the Internal Medicine Specialty examinations which all trainees are required to complete prior to sitting for the Nephrology examinations. In addition to this, these skills will be discussed from time to time in MAD day sessions. In addition, direct observation of these skills is routinely carried out and evaluated in the ambulatory clinic setting and on ward rounds. Evaluation forms for these rotations provide for communication skills evaluation. The RCPSC position paper on the teaching and assessment of communication skills is provided below.

Accreditation Committee Position Paper (2001)

Teaching and Assessment of Communication Skills in Residency Programs

Communication skills are of vital importance for physicians as they communicate with other physicians on an individual or group basis, work with other health care workers in developing plans for patient care, advocate for the general public, and as they assume roles as physician administrators. Communication takes place in a number of different manners including both written and verbal means. It is well known that most of the complaints brought against physicians to licensing bodies are related to communication skills. There is also well-documented evidence that patient outcome can be influenced by the ability of a physician to communicate with patients.

CanMEDS 2000 describes the competencies of the communicator as follows. The specialist (resident) must be able to:

- establish a therapeutic relationship with patients/families,
- obtain and synthesize relevant history from patients/families/communities,
- listen effectively, and
- discuss appropriate information with patients/families and the health care team

Good communication is required to impart information, to educate, to solicit opinion, to convey a treatment plan as well as to be a health care advocate and a life long learner. It is assumed that postgraduate trainees will start their residency with a set of communication skills learned during undergraduate education directed toward obtaining a medical history. These communication skills will need refinement as the trainee gains experience. Communication skills can be taught through a variety of processes including didactic sessions, role-playing, reflection, and evaluation with specific objectives for improvement. Communication skills can also be evaluated. Assessment may be performed informally by discussion with peers, other health care professionals, students and by the review of written records by the trainee. Formal assessment is also possible through observation (direct or videotaped), use of standardized patients, role playing and other structured programs. Assessment and feedback should be done on a standard marking scale to allow the identification of areas which require improvement or modification. Additionally, such a scale may provide a framework for the reflective physician to modify and refine skills throughout a practice career.

Residents will find themselves in new situations as they enter postgraduate training and the relationship between physician and patients become part of a daily routine. The relationship with

colleagues and teachers also changes as new responsibilities are encountered. Areas that may require special emphasis are the delivery of bad news, obtaining informed consent, helping families make life and death decisions, and being an empathetic listener without compromising truth or principles.

Techniques for interviewing patients with difficult behaviors (e.g. sadness, seductiveness, vagueness, etc.) must be developed and assessed. Areas that residents may need to develop include the ability to communicate with patients where there is a language or physical communication barrier, in a situation where they disagree with a patient, and situations where they are challenged by patients. Residents must be able to understand the principles and practices of obtaining informed consent.

All residency programs should ensure that the principles of appropriate communication skills are taught in a variety of venues and that there is a formal method of assessing communication skills. This should take place in addition to the regular "on the job" feedback given regularly to the residents by consultants. Assessment may take place in a standardized environment, by review of videotaped interviews, by direct observation of interactions and in consultation with other health care professionals. The method of evaluation will differ with the situation and context of the assessment.

Further information is available from the RCPSC website:

http://rcpsc.medical.org/residency/accreditation/positionpapers/commskills_e.php

EVALUATION

Trainee Evaluation

Rotation-specific evaluations (ITER's) will take place every 2 months, objectives and evaluation forms for the specific rotations are in the CANMEDS format and can be found below. The evaluation system is now web-based, nevertheless a final sit-down session will take place at the end of the rotation with a designated staff to summarize your performance. Verbal evaluation should be provided by the attending physicians at the end of their time on service. You have a shared responsibility to schedule this time with your attending.

'Mock' written exams in the style of the Royal College final examination will be administered approximately every 12 months. Results of these should be reviewed with the trainee's mentor and the Program Director and should be used as a tool to guide reading etc. for the upcoming months.

A review (ITER) takes place every six months with the Program Director based on staff evaluation. These forms are included in the Appendix.

A final evaluation form (FITER) will be prepared by the Program Director. This is to be forwarded to the Royal College, and is used specifically in cases of borderline final examination results.

The final Royal College Nephrology Examination takes place in the fall after the 2 years of training. The examination is in a short answer format, a mark of 70% or greater is considered a passing grade. Consult the Royal College website for further information.

Staff Evaluation

Staff evaluation forms are to be done by trainees every six months and are web-based. These are the same forms used by rotating internal medicine residents to evaluate individual nephrology staff. These evaluation forms are then collated and a summary sent to each of the nephrologists. Any problems with staff identified by this process would then be addressed at the Residency Program Committee. A sample of the staff evaluation form can be found in the appendices.

Rotations

Rotations are evaluated and reviewed on a yearly basis by the Residency Program Committee. Specific problems which require prompt action can be brought to the attention of the Program Director as necessary.

RESIDENCY PROGRAM COMMITTEE

This committee meets at least quarterly and is responsible for the ongoing monitoring and evaluation of the residency training program. An agenda is sent out prior to the meeting date with the opportunity for trainees and members to have issues/concerns added to the agenda ahead of time. A trainee representative from each year will be elected by peers to sit on this committee and represent the interests of their colleagues. The view of the RCPSC on the role of the committee and the program director follows.

1. There must be a residency program committee to assist the program director in the planning, organization, and supervision of the program.

    - This committee should include a representative from each participating institution and each major component of the program.

    - This committee must include representation from the residents in the program, at least one of whom is to be a resident representative elected by his or her peers.

    - The residency program committee must meet regularly, at least quarterly, and keep minutes.

2. The responsibilities of the program director, assisted by the residency program committee include:

    - development and operation of the program such that it meets the general standards of accreditation as set forth in this document, and the specific standards of accreditation of programs in the specialty or subspecialty as set forth in the specialty or subspecialty document;

    - selection of candidates for admission to the program and the evaluation and promotion of residents in the program in accordance with policies determined by the faculty postgraduate medical education committee;

    - maintenance of an appeal mechanism. The residency program committee should receive and review appeals from residents and, where appropriate, refer the matter to the faculty postgraduate medical education committee or faculty appeal committee;

    - establishment of mechanisms to provide career planning and counseling for residents and to deal with problems such as those related to stress;

    - an ongoing review of the program to assess the quality of the educational experience and to review the resources available in order to ensure that maximal benefit is being derived from the integration of the components of the program. The opinions of the residents must be among the factors considered in this review. Appropriate faculty/resident interaction and communication must take place in an open and collegial atmosphere so that a free discussion of the strengths and weaknesses of the program can occur without hindrance.

This review must include:

- an assessment of each component of the program to ensure that the educational objectives are being met;
- an assessment of resource allocation to ensure that resources and facilities are being utilized with optimal effectiveness;
- an assessment of teaching in the program, including teaching in areas such as biomedical ethics, medicolegal considerations, teaching and communication skills, issues related to quality assurance/improvement, equity issues, and administrative and management issues; and
- an assessment of the teachers in the program.

Current Members:
Dr. Darin Treleaven (Program Director)
Dr. Catharine Clase (Research Coordinator)
Dr. Azim Gangji
Dr. Christian Rabbat
Mrs. Wendy Clark, Program Assistant
PGY 4 resident
PGY 5 resident

RESEARCH

The Division of Nephrology has become increasingly productive in clinical and basic science research over the last few years. During the 2 year fellowship training it is expected that all trainees will become involved in a research project. This can include quality assurance projects, clinical research in nephrology, dialysis, and/or transplantation, or basic science research. It is anticipated that much of the research will be carried out longitudinally during the two years with the goal of presenting an abstract at a conference, however, elective time is available if needed to work on research projects. Dr. Catherine Clase is the Research Coordinator and, in conjunction with the Research Committee, will meet with all trainees early on in to help them identify potential projects and/or provide assistance when needed.

Further postgraduate training in either basic science or clinical research is available as a Clinical Scholar. This position is available for two years after completion of the Nephrology Fellowship. Tracking to this position needs to occur in the R5 year. Interested candidates should identify themselves to the PD early in the R5 year. Longitudinal work on a scholarship grant (Kidney Foundation, CIHR, Krescent) will need to begin early in the R5 year with a Divisional mentor. Candidates must be successful in this award as a necessary but not sufficient component of obtaining a Clinical Scholar position. The other components are: identification of a research mentor, outline of a training path and satisfactory clinical evaluations. The Program Director and Research Director are committed to helping with this process.

Attached is a list of research interests of the Divisional members as well as recent publications.

Research Activities in the Division of Nephrology McMaster University

Dianne Arlen MD FRCPC, Assoc Prof Nephrology
- Prevention of osteoporosis in recipients of renal transplants
- Problem-based learning
- Clinical rejection
- Cardiovascular disease after transplantation

Scott Brimble MD MSc FRCPC, Asst Prof Nephrology
- Optimization of erythropoietin use in dialysis patients
- Erythrocyte deformability in renal failure
- Abnormalities in muscle and exercise capacity in chronic renal insufficiency
- Solute transport in peritoneal dialysis

Euan Carlisle MD FRCPC, Assoc Prof Nephrology
- Optimal management of patients with advanced chronic renal insufficiency
- Optimization of erythropoietin use in dialysis patients

Catherine Clase MB MSc (HRM) FRCPC, Assoc Prof Nephrology
- Population epidemiology of chronic renal insufficiency
- Diagnosis of the aetiology of chronic renal insufficiency
- Prognosis of chronic renal insufficiency in unreferred patients
- Optimizing the transition to dialysis for patients with advanced chronic renal insufficiency
- Prevention of vascular and thrombotic complications in chronic renal insufficiency and dialysis

Alistair Ingram MD FRCPC, Assoc Prof Nephrology

- Prevention of vascular and thrombotic complications in chronic renal insufficiency and dialysis
- Diagnosis of the etiology of chronic renal insufficiency
- TGF-B and NO in progressive renal disease

Joan Krepinsky MD MSc FRCPC, Asst Prof Nephrology

- mechanisms of progression of chronic renal insufficiency with a focus on glomerular sclerosis
- utilize 2 major models: (1) intraglomerular hypertension, (2) diabetes
- study mesangial cell signaling in response to: (1) mechanical stress as an in vitro model for intraglomerular hypertension, (2) high glucose as a model for diabetes
- pathways which lead to mesangial cell production of extracellular matrix (scar) proteins
- test results from cell-based studies in animal models to see if we can reduce glomerular injury and development or progression of renal insufficiency.

David Ludwin MD FRCPC, Prof Nephrology

- Intelligent internet-based systems in transplant donation
- Sirolimus based regimes in renal transplantation

Peter Margetts MD FRCPC, Asst Prof Nephrology

- Peritoneal fibrosis and angiogenesis in peritoneal dialysis
- Tubulointerstitial fibrosis in progressive renal disease
- Continuous dialysis in acute renal failure
- Markers of activation of coagulation in chronic renal insufficiency

Christian Rabbat MD FRCPC, Asst Prof Nephrology

- Diagnosis and prognosis of chronic renal insufficiency
- Noninvasive testing and prognosis in dialysis patients wait-listed for cadaveric transplantation
- Prevention of contrast nephrotoxicity
- Risk of acute renal failure in the ICU
- Warfarin nomograms in hemodialysis patients
- Venous thrombosis in the ICU
- Bleeding risk factors in hemodialysis patients

David Russell MD FRCPC, Assoc Prof Nephrology

- Impact of duration of brain death on outcomes in cadaveric transplantation
- Gender bias in renal transplantation
- Non-invasive cardiac testing for wait-listed transplant patients
- Cardiovascular disease after renal transplantation
- Clinical trials in immunosuppressive drugs

Damu Tang PhD, Asst Prof Nephrology

- pTEN and prostate cancer
- p53independent tumor suppressor functions of p14 ARF
- Mesothelial cell apoptosis in PD

Darin Treleaven MD, MSc FRCPC, Asst Prof Nephrology

- Outcomes in kidney donors
- Skin Cancer in transplant recipients
- Diabetes and Atherosclerosis after transplant

RECOMMENDED READING LIST

General Nephrology

Comprehensive Clinical Nephrology*
Johnson & Feehally

The Kidney (reference only)
Brenner & Rector

Clinical Physiology of Acid-Base and Electrolyte Disorders*
Rose

Dialysis and Transplantation: A Companion to The Kidney*
Owen, Pereira, and Sayegh

Principles and Practice of Dialysis
Henrich

Pathology

Handbook of Renal Biopsy Pathology
Howie

Heptinstall's Pathology of the Kidney (reference only)
Jennette

Renal Biopsy Interpretation*
Silva

Transplant

Kidney Transplantation : Principles and Practice
Morris

Handbook of Kidney Transplantation*
Danovitch

Principles and Practice of Renal Transplantation
Kahan & Ponticelli

* Particularly good texts

RELEVANT JOURNALS

Journal of American Society of Nephrology (JASN)*†
Hypertension*
Kidney International (KI)* †
American Journal of Kidney Diseases (AJKD)* †
American Journal of Physiology-Renal*
Transplantation*†
Seminars in Nephrology
Peritoneal Dialysis International (PDI)* †
Nephrology Dialysis and Transplantation (NDT)* †
Seminars in Dialysis

General Medicine
New England Journal of Medicine*
JAMA*
Lancet*
Annals of Internal Medicine*
Archives Internal Medicine*
British Medical Journal*
Canadian Medical Association Journal*

* Available for free through university/hospital subscription or online
† Key nephrology/transplantation journals

USEFUL WEB SITES

General Nephrology
http:///www.hdcn.com
www.nephron.com/links.html
www.ispd.org
www.renalnet.org
www.thekidney.org
www.usrds.org
www.asn-online.org
www.renalresearch.com/index.html
www.cybernephrology.org/education/eduPhysicians.htm

Pathology
http://medlib.med.utah.edu/WebPath/RENAHTML/RENALIDX.html
www.gamewood.net/rnet/renalpath/tutorial.htm
www.renalpathsoc.org

Transplantation
www.transweb.org
www.medicalsimulations.com/sim00004/
www.a-s-t.org/

EBM
http://hiru.mcmaster.ca/
www.eboncall.co.uk/
www.cche.net/che/home.asp

Other
http://rcpsc.medical.org/index.php3?pass=1 (Royal College)
www.fhs.mcmaster.ca/nephrores (residency program)
http://csnscn.ca/english/home/default.asp?s=1 (Canadian Society of Nephrology)
www.oma.org (Ontario Medical Association)
www.fhs.mcmaster.ca/postgrad (Postgraduate Office)
www.stjosham.on.ca (St. Joseph's Healthcare)
www.cmpa-acpm.ca (CMPA)
www.city.hamilton.on.ca (Information on City of Hamilton)

RESIDENT ON-CALL GUIDELINES

Call frequency will vary depending on the number of trainees and rotating residents. The expectation is that in the first year trainees will be first on-call approximately 1:6 to 1:7. In the second year, trainees will do call as second-call to the rotating residents with some first-call as necessary (depending on numbers). The Chief Nephrology Resident is responsible for the call schedule and any concerns should be taken up with him/her. Number of residents and trainees and holidays etc. will influence the final distribution. Call is >home-call= and a long-range pager is available at paging. It is expected that if you do go home that you are within 15-20 minutes of the hospital. A key for a call room can be obtained from paging.

When you are on-call, you are responsible for all inpatients under the care of the nephrology or transplant service at SJH. You are not responsible for patients at outside hospitals and you are not normally responsible for the outpatient dialysis unit. If patients are acutely ill or require an admission, you may be asked by the nephrologist on call to see the patient. A nephrologist is in the hemodialysis unit every evening. You are responsible for all consult requests during the time on-call. Only under very exceptional circumstances should a consult be left for the morning team as they are often quite busy with the large inpatient services. As per PAIRO guidelines residents may go home at noon the next day.

Chief Resident Call Schedule Guidelines for Internal Medicine Rotators

PAIRO Rules

1. The call schedule must be available and finalized at the latest two weeks prior to the start of the rotation.
2. Call must be prorated for all vacation-professional-lieu days. (This also means that any prorated call exemptions will be made up by the colleagues who take less leave.)
3. Residents should have two free weekends a month at a minimum and this includes Fridays. Consecutive weekends are allowed for inpatient calls.
4. Vacations must be approved/declined within two weeks of receipt.

Vacation Requests

1. Vacation requests for the schedule should be received one month before the start date to ensure priority: for example, the rotation schedule beginning July 1 will be finalized by the first of the prior month, June 1. To summarize:
    a. Priority vacation requests used to create the schedule: **one month before**
    b. Vacation requests that may be accomodated (see below): **two weeks before**
    c. **All later requests,including lieu days, are the responsibility of the resident**
2. Vacation requests are on a first come, first served basis and are priorized according to when they are received.
3. Residents are permitted to request one week off each month of the rotation. However, taking two weeks off through the rotation is discouraged: additional time off places significant stress on those residents that remain on the rotation. A second week will be considered if clinical circumstances can be accommodated and once all vacation requests have been reviewed.
4. Lieu days requested before call schedule finalization will be honored as per PAIRO and IM guidelines.
5. The rotation is broken down into the Nephrology Side and Transplant Side with one month on

each side. Rotators works as SMR's and should not be absent for the same week on the same side. We will try and organize the rotation to avoid this.

6. If there are issues, this should be reviewed with the Nephrology Site Director.

Weekend Call

When booking a week off, only one flanking weekend is mandated but if requesting one week for the block, try to give both flanking weekends. Rotators as per PAIRO guidelines should have at least two entire weekends off per month.

Steps in Making the Call Schedule

1. Start and End
   Please review the information with regards to start and end dates of the month and changeover dates. Some months start and end later than the usual dates because of statutory holidays and weekends. This is a frequent source of error.

2. Making the teams:
   a. Requests for either transplant or nephrology side timing cannot be accommodated because of the need to balance outpatient experience and vacation time.
   b. Review the vacation requests and put together teams that have non-overlapping vacation requests.

3. Call frequency guidelines:
   a. The call frequency for an R2 will be 1:4 to 1:5 depending on the number of rotators.
   b. The call frequency for an R4 should be 1:6 to 1:6
   c. The call frequency for an R5 should be 1:7 to 1:8
   d. The preference would be to balance the calls through the rotation rather than bunch up calls to protect teams.
   e. Rotators generally prefer not to be post-call for Wednesday Half-day
   f. Call frequencies will be audited
   g. It is the responsibility of the Chief Resident to fix mistakes in the call schedule. It is not the responsibility of the Chief Resident to make changes after the schedule completion date unless there was an error.

4. Vacation Requests and Changes After The Final Schedule:
   a. Vacation requests will be priorized on a first received basis.
   b. Vacation requests received after one month prior to initiation of rotation will only be processed if the call schedule has not been finalized by the Chief Nephrology Resident.
   c. Changes in call after call schedule finalized are to be handled by the individual residents on the call schedule. The time off should be cleared with the attending on clinical service.

POLICY ON CALL AND LEAVE

Trainees on call keep their pagers with them at all times and must be available. In the event of pager malfunction, the trainees provide their exact location at all times to the units and switchboard. In the event that a trainee scheduled to take call in unavailable for any reason, it will be the responsibility of the trainee to inform the Attending Staff and the switchboard.

Vacation and Leave Policy

All requests for vacation or leave of any other form must be communicated in writing to the postgraduate program director at least two months prior to the requested date of departure. The decision of the Program Director will be final, as provided under the PAIRO contract. Requests must be made by February 15. Total amounts of vacation and leave time permissible are governed for trainees by the PAIRO contract. Trainees from departments other than Nephrology should also ensure that requests for vacation time are made early. In general, it is considered inappropriate for a trainee doing a two months rotation in Nephrology to request more than one week of vacation time, as longer periods of vacation will greatly impair the educational experience. Trainees who are doing a one month rotation in Nephrology are discouraged from taking vacation for similar educational reasons.

DEPARTMENTAL / HOSPITAL CONTACTS

Program Director	Dr. D. Treleaven	905-522-1155 x33261	trelead@mcmaster.ca
Program Assistant	Wendy Clark	905-522-1155 x33386	macneph@stjoes.ca

Nephrologist	Admin Assistant	Office	Telephone
Dr. Dianne Arlen	Patty Cutulle	Level 0 Marian Wing	905-522-1155 x34055
Dr. Scott Brimble	Laura LeDonne	708-25 Charlton Ave E	905-522-1155 x33787
Dr. Euan Carlisle	Lois McLean	Level 0 Marian Wing	905-522-1155 x33741
Dr. Catherine Clase	Deirdre Hobeck	708-25 Charlton Ave E	905-521-6094
Dr. Azim Gangji	Michelle Kavanaugh	4 Marian Wing	905-522-1155 x33261
Dr. Alistair Ingram	Mary Sexton	708-25 Charlton Ave E	905-521-6151
Dr. Joan Krepinsky		3 Juravinski Tower	905-522-1155 x34991
Dr. David Ludwin	Lois McLean	Level 0 Marian Wing	905-522-1155 x33323
Dr. Peter Margetts		3 Juravinski Tower	905-522-1155 x32299
Dr. Christian Rabbat	Tanya Webb	708-25 Charlton Ave E	905-522-1155 x33542
Dr. David Russell	Wendy Clark	Level 0 Marian Wing	905-522-1155 x33679
Dr. Darin Treleaven	Michelle Kavanaugh	4 Marian Wing	905-522-1155 x33261
Dr. Robert Yang	Patty Cutulle	Level 0 Marian Wing	905-522-1155 x34055

Resident's Office	4 Marian Wing	905-522-1155 x33010
Nephrology Outpatient Reception	Level 0 Marian	905-521-6049 or 36409

Kidney Function Program

Susan Porteous	4 MarianWing	905-522-1155 x34943
KFP Secretary	4 Marian Wing	905-522-1155 x34940

Dialysis Units

Centre Hemodialysis	Level 1 Marian Wing	905-522-1155 x33601
Hemodialysis Charge Nurse	Level 1 Marian Wing	905-522-1155 x33772
Peritoneal Dialysis	101-25 Charlton Ave E	905-522-1155 x33775
Vascular Access Coordinator	Level 1 Marian Wing	905-522-1155 x3321

Renal Transplant Program

Renal Transplant Outpatient Clinic	Level 0 Marian Wing	905-522-1155 x33780
Renal Transplant Outpatient Clinic	Level 0 Marian Wing	905-522-1155 x32937
Transplant Coordinators Office	4 Marian Wing	33236/33136/33193/34289
Transplant Coordinator Secretaries	4 Marian Wing	33161 / 33715
Renal Transplant Unit	4 Juravinski Tower	34048

St. Joseph's Hospital Directory:
http://intranet.stjosham.on.ca/twp/en/Directory.asp?R=F__NAMES_WR&P=F
Hamilton Health Science Directory:
http://corpweblib/hhs_phone/hhsphone.asp

MENTORSHIP

Trainees are strongly encouraged to approach one of the staff people in the first 3-6 months of training and request ongoing mentorship. The selection of the faculty member should be completely up to the individual trainee: the role of the mentor is varied and includes, stress counseling, career planning, educational guidance etc. Please notify the Program Director when a mentor whom is agreeable to both individuals has been selected.

OMSBUDSPERSON

Trainees may require additional support during the program, especially in cases of conflict. This may occur for any personal or professional problem. Dr. Peter Margetts was elected by members of the RPC to act in this role within the Division. Dr. Margetts has a strong reputation as an impartial and pro-resident faculty member with a strong history in providing supervision to learners. Dr. Margetts will represent the trainee to the RPC or Division as required with the understanding that he must act as an advocate for the trainee. If Dr. Margetts is involved personally or cannot be impartial, a delegate from outside the Division can be nominated by Dr. Margetts (eg, Internal Medicine PD or Chief of Staff at SJH).

CONFERENCES

International Conference on Dialysis

Canadian Society of Transplantation

Canadian Society of Nephrology

NKF Clinical Nephrology

American Society of Transplantation

American Society of Nephrology

Conference Resources
Depending on resources (typically from industry and staff donations) trainees will be reimbursed for up to one conference per year. Typically this includes the ASN and the CSN although trainees with an interest in transplantation may elect to choose others. Trainees will be reimbursed for additional conferences if they are presenting scientific material (i.e poster or talk). Fresenius (dialysis company) has reimbursed trainees in the past for attending the International Conference on Dialysis. This is essentially a review of key areas (i.e. daily dialysis, hemoglobin normalization) in dialysis by prominent physicians in the field. Personally I found this more useful than some of the larger conferences such as the ASN.