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Saudi Commission for Health Specialties

Adult Nephrology


بسم الله الرحمن الرحيم

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INTRODUCTION

The goal of postgraduate medical education is to produce competent physicians able to practice safely and meet the healthcare needs of society. Medical educators, trainees, patients, and the public recognize that being well trained in the scientific aspects of medicine is necessary but insufficient for effective medical practice; a good doctor must draw upon a wide array of knowledge and skills. *The Canadian Medical Education Directives for Specialists* (CanMEDS) framework, which is applied in postgraduate training programs in many countries, offers a model of physician competencies that emphasizes not only medical expertise but also multiple additional nonmedical expert roles that aim to serve society's needs effectively. Therefore, the Saudi Commission for Health Specialties (SCFHS) is adopting the CanMEDS framework to establish a core curriculum for all training programs, including that of the Saudi Fellowship Program in Nephrology certification. Therefore, as a nephrologist, you will function within the seven CanMEDS roles, namely medical expert, communicator, collaborator, leader, health advocate, scholar, and professional.

The Nephrology Fellowship is designed specifically to meet the practical and educational needs necessary to produce physicians with sound knowledge, and the skills to take appropriate decisions and actions in all areas of nephrology, such as chronic renal failure, acute renal failure, hypertension disorders, renal disorders in pregnancy, urinary tract infection, tubulointerstitial renal diseases, heredito-familial renal diseases, glomerular and vascular disease, urological disorders affecting renal function, mineral metabolism, dialysis, and transplantation.

The Saudi Fellowship Program in Nephrology program consists of two years of full-time supervised training in adult nephrology and related fields. The training institution must be accredited by the SCFHS to offer training in adult nephrology. Comprehensive training that includes inpatients, ambulatory care, hemodialysis, peritoneal dialysis, and kidney transplantation will be offered. Trainees will be actively involved in patient care, with responsibility increasing as further experience and competence are gained. Trainees must adhere to the rules and regulations of the training program. Upon successful completion of the program, trainees will be awarded the "**Saudi Fellowship Program in Nephrology**" qualification.

STRUCTURE OF THE TRAINING PROGRAM

TRAINING OVERVIEW

The Saudi Fellowship Program in Nephrology program is fellow-centered and is designed to provide an educational environment in which the fellow thrives and is provided extensive exposure to both ambulatory and inpatient nephrology care.

The program involves two years of training, during which the fellow conducts a number of mandatory rotations in order to acquire the knowledge necessary to develop expertise in adult nephrology. In addition, during the second year of training, an elective is introduced to meet the needs and goals of individual fellows.

Throughout both years of training, there are several educational rounds, journal clubs, and conference opportunities that are mandatory for fellows to attend. The fellows are excused from clinical duties to attend these educational opportunities. These rounds further enhance their educational experience.

Please refer to the updated executive policy of SCFHS on admission and registration. Website: www.scfhs.org.sa

First year of Nephrology Fellowship

During the first year of training, the fellows have four mandatory rotations in order to acquire the core knowledge and skills needed to practice nephrology. These rotations include inpatient, consultative, hemodialysis, and peritoneal dialysis rotations.

Second year of Nephrology Fellowship

The second year of the Nephrology Fellowship is designed to complete the requirements and meet the career objectives of the fellow. Four blocks (i.e., 16 weeks) of kidney transplantation is included in the second year of training. An elective of four weeks is provided for rotations in renal imaging/interventional radiology or renal pathology. Trainees may choose one or more of such rotations in a SCFHS-accredited program. Throughout both years of training, nephrology trainees are expected to perform all temporary dialysis catheter insertions under the supervision of the staff nephrologist. The trainees are also given the opportunity to perform kidney biopsies and to learn about the insertion of permanent hemodialysis catheters, and the insertion of peritoneal dialysis catheters.

SCHEDULES OF CLINICAL ROTATIONS

- Fellows are assigned clinical rotations in blocks. Each block takes four weeks.
- A four-week elective is allowed in the second year. Choices include renal pathology, renal imaging, radiology and urology.
- Annual vacation is four weeks per year.
- Distribution of clinical rotations and the clinical rotations roadmap are described in Tables 1

Table 1: Distribution of Clinical Rotations

Clinical Rotation	Total number of blocks	Distribution per training level	
		F1	F2
Inpatient	6	4	2
Consultation	6	3	3
Hemodialysis	4	3	1
Peritoneal Dialysis	3	2	1
Kidney Transplantation	4	-	4
Elective	1	-	1
Vacation	2	1	1
NB. Each block consists of four weeks. Annual total number of blocks is 13 (i.e., 52 weeks)			

Table 2: Example of Clinical Master Rotations Plan per Training Level

Block number	First Year	Second Year
Block 1	IP	IP
Block 2	IP	IP
Block 3	IP	C
Block 4	IP	C
Block 5	C	KTx
Block 6	C	KTx
Block 7	C	KTx
Block 8	HD	KTx
Block 9	HD	HD
Block 10	HD	HD
Block 11	PD	E
Block 12	PD	PD
Block 13	V	V

IP: Inpatient, C: Consultation, HD: Hemodialysis, PD: Peritoneal Dialysis, KTx: Kidney Transplantation, E: Elective, V: Vacation.

SPECIFIC CLINICAL ROTATIONS AND OTHER RESPONSIBILITIES

HEMODIALYSIS

Description

The hemodialysis (HD) rotations consist of four (4) blocks distributed over the two years. Trainees are expected to function as the junior consultant assisting in the care of HD patients under the supervision of a nephrology consultant.

Roles and Responsibilities:

1. Perform rounds regularly and make treatment decisions with appropriate supervision.
2. Attend multidisciplinary review meetings about HD patients, minimum twice weekly, to gain exposure to urea kinetic modeling, dialysis prescription, transonics for evaluation of access, chronic kidney disease – mineral and bone disorder (CKD-MBD), and anemia management.
3. Placement of temporary dialysis catheters, when necessary, for HD patients.
4. Attend and actively participate in vascular access joint meetings between the nephrology vascular surgery and interventional radiology departments to discuss management of difficult HD vascular access.
5. Meet with the nephrology consultant or nephrology team once a week for didactic teaching around important HD topics. It is mandatory that the following eight topics be covered during the four-block HD Rotation. These teaching sessions are in addition to the Academic Half Day.
   a) Urea Kinetic Modeling in HD: Principles and Clinical Application
   b) HD Access: Choice, Initiation, Monitoring and Management of Complications. HD accesses include temporary lines and permanent accesses (arteriovenous fistula, arteriovenous graft, and tunneled vascular HD catheters)
   c) Management of Hypotension/Hypertension in the HD Patient
   d) Management of Anemia in the HD Patient
   e) Management of Calcium/Phosphate/PTH Disorders in the HD Patient
   f) Appropriate Management of Line Sepsis -- Exploring Controversies
   g) Dialyzer Reactions -- Presentation and Management
   h) Water Treatment in the Dialysis Unit

Specific Objectives:

During HD rotation, the trainee is expected to develop competency in:

1. Demonstrating all seven CanMEDS core competencies while learning the basic skills required for management of chronic HD patients.
2. Demonstrating principles and practice of HD including the establishment of vascular access and the advantages/disadvantages related to each type.
3. Demonstrating the technology of HD related to HD machines and dialyzers.
4. Writing HD prescriptions taking into account the different choices in a patient-centered approach.
5. Assessment of HD adequacy including the use of urea kinetic modeling.
6. Evaluation and management of medical complications in patients during and between dialyses and other extra-corporeal therapies, and an understanding of their pathogenesis and prevention.

7. The pharmacology of commonly used medications and their kinetic and dosage alteration with HD.
8. Addressing the nutritional status and requirements of HD patients.
9. Understanding the psychosocial, economic, and ethical issues of dialysis.
10. Understanding dialysis water treatment, delivery systems, and dialyzer reuse.
11. Understanding end-of-life care and pain management in the care of patients undergoing chronic dialysis.
12. Practicing a team approach in the care of patients on HD.

Although not mandatory, trainees also have the opportunity to learn how to place tunneled HD catheters during this rotation.

PERITONEAL DIALYSIS

Description

The peritoneal dialysis (PD) rotations consists of three (3) blocks distributed over the two years. Trainees are expected to work under the supervision of a nephrology consultant.

Roles and Responsibilities

1. Attend PD clinics and meetings and make treatment decisions with appropriate supervision.
2. Attend the PD unit for assessment and management of cases with PD-related complications, including PD catheter exit site infection, peritonitis, and catheter dysfunction.
3. Meet with the nephrology consultant or nephrology team once a week for didactic teaching around important PD topics. It is mandatory that the following five topics be covered during the three-block PD rotation. These teaching sessions are in addition to the Academic Half Day.
   a) PD Adequacy: Principles and Clinical Application
   b) PD Solutions and PD Prescription: Choice, Initiation, and Monitoring
   c) Peritoneal Equilibration Test: Principles and Clinical Application
   d) Management of infectious PD Complications
   e) Management of PD Patients: Anemia, CKD-MBD, and Nutritional

Specific objectives

During PD rotation, the trainee is expected to develop competency in:
1. Demonstrating principles and practice of PD including the establishment of peritoneal access, principles of dialysis catheters, and the choice of appropriate PD catheters.
2. Demonstrating the technology of PD including the use of PD cyclers.
3. Writing PD prescriptions, taking into account the different choices and solutions in a patient-centered approach.
4. Assessment of PD adequacy including the use of urea kinetic modeling and weekly creatinine clearance.
5. Interpretation of peritoneal equilibration testing and its relevance to PD prescription.
6. Management of the complications of PD including peritonitis and its treatment, exit site and tunnel infections and their management, hernias, plural effusions and other less common complications and their management.

7. The pharmacology of commonly used medications and their kinetic and dosage alteration with PD.
8. Addressing the nutritional status and requirements of PD patients.
9. Understanding the psychosocial, economic, and ethical issues of dialysis.
10. Understanding end-of-life care and pain management in the care of patients undergoing chronic dialysis.
11. Practicing a team approach in the care of patients on PD.

Although not mandatory, trainees also have the opportunity to learn how to percutaneously insert PD catheters during this rotation.

KIDNEY TRANSPLANTATION

Description

The kidney transplantation (KTx) rotation consists of four (4) blocks distributed over the second year. It is a combined inpatient and outpatient rotation in which trainees work under the supervision of the transplant team, which includes transplant nephrologists and transplant surgeons. Over the last few years, 550-700 kidney transplants have been performed in Saudi Arabia annually; this includes deceased, living related, and living non-related donor transplants.

Roles and Responsibilities

1. Follow patients admitted for KTx in the perioperative period and during their hospital stay under appropriate supervision.
2. Attend two transplant follow-up clinics, a transplant donor assessment clinic, and a transplant recipient assessment clinic each week.
3. Attend all combined medical and surgical transplant rounds to review program policies and review complex patients for the wait list.
4. Prepare a comprehensive medical report for transplant candidate patients.
5. Meet with the transplant nephrology consultant or team once a week for didactic teaching around important KTx topics. It is mandatory that the following eight topics be covered during the four-block transplantation rotation. These teaching sessions are in addition to the Academic Half Day.
   a) Pretransplant Donor Workup
   b) Pretransplant Recipient Workup
   c) Transplantation Immunobiology and Immunosuppressive Medications
   d) Desensitization and Transplantation Across Immunologic Barriers
   e) Acute Rejection
   f) Chronic Allograft Dysfunction
   g) Post-Transplant Infections Including BK virus and Post-Transplant Lymphoproliferative Disorders (PTLD)
   h) Post-Transplant Complications: Medical and Surgical

Specific objectives

During KTx rotation, the trainee is expected to develop competency in:
1. Selection, evaluation, and preparation of transplant recipients and donors.
2. Understanding the choice of immunosuppressive medications and protocols.

3. Immediate postoperative management of transplant recipients.
4. Immunologic principles of types and mechanisms of renal allograft rejection.
5. Diagnosis and management of all forms of rejection.
6. Approach to management of allograft dysfunction including delayed graft function and non-rejection causes.
7. Understanding major causes of post-transplant morbidity and mortality.
8. Long-term follow-up and management of transplant recipients in the ambulatory setting including economic and psychosocial issues.
9. Understanding principles of organ harvesting, preservation, and sharing.

Although not mandatory, trainees also have the opportunity to perform or learn how to perform transplant kidney biopsies during this rotation.

OUTPATIENT CLINICS

Fellows are not assigned separate rotations for outpatient clinics, therefore they are attended during clinical rotations and assessed as part of the rotation, based on the end of rotation evaluation form. Given the joint nature of the program, a different schedule for outpatient clinics including longitudinal fellows' clinics is expected. However, each fellow is required to do a minimum of one general nephrology clinic per week during their clinical rotations. The exception for these rotations is the transplantation rotation during which fellows are required to attend transplant clinics as described in the previous "Kidney Transplantation" section.

ELECTIVES

Fellows have one block elective during the second year of their training. The following are optional rotations available to fellows during the elective block:

Immunology or Tissue Typing Lab

Fellows spend 1-2 weeks in the tissue typing lab, learning about the techniques used to screen potential living donors and to assess for circulating donor-specific antibody levels.

Renal Pathology

Fellows spend 2-4 weeks reviewing and reporting pathology slides under the supervision of a renal pathologist to learn the basics of nephropathology. Fellows will participate in renal pathology conferences.

Critical Care Nephrology

Fellows may choose to rotate with the ICU team in order to gain experience with critical care nephrology. This elective is also helpful to gain experience with central venous access.

Radiology

Fellows spend 1-2 weeks reviewing and reporting renal imaging under the supervision of a specialized radiologist to orient the clinical fellow to basic renal imaging including ultrasound, computed tomography, and/or nuclear medicine.

Interventional Radiology

Fellows spend 2-4 weeks reviewing vascular access imaging, participating in vascular interventional procedures in HD patients under the supervision of an interventional radiologist to learn the basic interventional nephrology. Fellows will participate in vascular access rounds.

RESEARCH

Although research is an optional requirement, fellows are encouraged to be involved in clinical research. In addition, such involvement will be recognized as part of continuous formative assessment for second-year fellows. Within the first few months of the Fellowship, fellows are expected to meet with all nephrologists in their respective training region, and meet faculty with an interest in research to discuss possible clinical research projects and mentorship. Fellows can initiate their own research idea/question or get involved in research projects already in progress, rather than being responsible for designing a new project. Fellows are not expected to obtain independent funding to support their research activities. After identifying a mentor and a project, fellows are actively involved in the faculty-directed clinical research project while on clinical rotations.

SPECIFIC LEARNING OBJECTIVES

OVERVIEW

Fellows 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, sexual orientation, ethnicity, and ethics in a professional manner.

CanMEDS PHYSICIAN COMPETENCY FRAMEWORK

Adapted from the Royal College of Physicians and Surgeons of Canada - Objectives of Training in the Subspecialties of Adult and Pediatric Nephrology.

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

Medical Expert

Definition:

As *Medical Experts*, nephrologists 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…

1. **Function effectively as consultants, integrating all of the CanMEDS roles to provide optimal, ethical and patient-centered medical care.**
   - 1.1. Perform a consultation effectively, 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.
   - 1.2. Demonstrate effective use of all CanMEDS competencies relevant to nephrology.
   - 1.3. Identify and appropriately respond to relevant ethical issues arising in patient care.
   - 1.4. Demonstrate the ability to prioritize professional duties effectively when faced with multiple patients and problems.
   - 1.5. Demonstrate compassionate and patient-centered care.
   - 1.6. Recognize and respond to the ethical dimensions in medical decision-making.
   - 1.7. Demonstrate medical expertise in situations other than patient care.

2. **Establish and maintain the knowledge, skills, and attitudes of the clinical, socio-behavioral, and fundamental biomedical sciences appropriate to nephrology.**
   - 2.1. Apply knowledge of the clinical, socio-behavioral, and fundamental biomedical sciences relevant to nephrology.
     - 2.1.1. The anatomy and histology of the kidney, including the structure and function of the glomerular filtration barrier.
     - 2.1.2. The physiology and pathophysiology of:
       - 2.1.2.1. Renal blood flow and glomerular filtration.
       - 2.1.2.2. Regulation of acid-base, electrolyte, and water homeostasis.

2.1.2.3. Mineral metabolism and its alteration in renal disease, metabolic bone disease, and nephrolithiasis.
2.1.2.4. Hypertension.
2.1.3. Clinical pharmacology as it pertains to:
2.1.3.1. Drug prescribing in renal disease.
2.1.3.2. Transplantation, especially with regards to immunosuppression.
2.1.4. Toxicology as it relates to the use of dialysis therapies for poisonings.
2.1.5. Immunology as it pertains to mechanisms of renal injury (including but not limited to glomerulonephritis, vasculitis, tubulointerstitial disease, and renal transplant rejection) and diagnostic testing relevant to renal disease.
2.1.6. Microbiology as it pertains to infections of the renal system and infectious complications of renal transplantation.
2.1.7. Growth and development of the kidney in the normal and disordered state, including but not limited to vesicoureteral reflux, cystic diseases of the kidney, and renal changes with ageing.
2.1.8. Mechanisms of fluid delivery, machine mechanics, and membrane physiology as they relate to all dialysis modalities.
2.1.9. Pathology of disease in the native and transplanted kidney, including but not limited to glomerulonephritis, vasculitis, and systemic disease such as diabetes and hypertension.
2.1.10. Epidemiology of acute renal failure and chronic kidney diseases, including those conditions commonly causing end-stage renal failure, such as diabetes and hypertension.
2.1.11. Principles of genetics as they relate to the inheritance and transmission of diseases that affect the kidney.
2.1.12. Psychology of chronic illness such as chronic kidney disease.
2.1.13. The effects of systemic diseases on the kidney as well as the effect of disordered kidney function on systemic health.
2.2. Demonstrate the CanMEDS framework of competencies relevant to nephrology.
2.3. Apply the lifelong learning skills of the Scholar role, implementing a personal program to remain up-to-date and enhance areas of professional competence.
2.4. Contribute to the enhancement of quality care and patient safety in nephrology, integrating currently available best evidence and best practices.

3. **Perform a complete and appropriate assessment of a patient**
3.1. Identify and explore issues to be addressed in a patient encounter effectively, including the patient's context and preferences.
3.2. Elicit a history that is relevant, concise, and accurate.
3.3. Perform a focused physical examination that is relevant and accurate for the purposes of prevention and health promotion, diagnosis and/or management.
3.4. Select medically appropriate investigative methods in a resource-effective and ethical manner.
3.5. Interpret the results of the following investigations in the context of the patient who presents with manifestations of renal disease.
3.5.1. Measures of renal function.
3.5.2. Serology.
3.5.3. Urine microscopy.
3.5.4. Other urine tests, including but not limited to electrolytes.

3.5.5. Blood pressure data, including automated and ambulatory blood pressure monitoring.
3.5.6. Renal imaging.
3.5.7. Renal histology.

3.6. 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.
3.6.1. Acute kidney injury.
3.6.2. Chronic kidney disease of all stages including transplantation.
3.6.3. Proteinuria.
3.6.4. Hematuria.
3.6.5. Nephrolithiasis.
3.6.6. Hypertension.
3.6.7. Genetic renal disorders (cystic, metabolic, tubular, nephritis).
3.6.8. Pyuria.
3.6.9. Disorders of fluid, electrolyte, and acid-base.

4. **Use preventive and therapeutic interventions effectively**
4.1. Implement a management plan in collaboration with the patient and their family.
4.2. Demonstrate appropriate and timely application of preventive and therapeutic interventions relevant to nephrology.
4.2.1. Strategies for renal protection, including but not limited to control of blood pressure, minimization of proteinuria, and prevention of contrast nephrotoxicity.
4.2.2. Immunosuppression in patients with renal disease and management of its complications.
4.2.3. Plasmapheresis in patients with renal disease.
4.2.4. Hemodialysis (HD).
4.2.5. Peritoneal dialysis (PD).
4.2.6. Renal transplantation.
4.2.7. Strategies for management of complications of kidney disease, including but not limited to bone disease, anemia, growth delay, infection, and malnutrition.
4.3. Ensure appropriate informed consent is obtained for therapies.
4.4. Ensure patients receive appropriate end-of-life care.

5. **Demonstrate proficient and appropriate use of procedural skills, both diagnostic and therapeutic**
5.1. Demonstrate effective, appropriate, and timely performance of diagnostic and therapeutic procedures relevant to nephrology.
5.1.1. Urine microscopy.
5.1.2. Insertion of central venous access.
5.1.3. Prescription, monitoring and adjustment of dialysis for renal replacement as well as in the treatment of poisonings and metabolic disorders.
5.2. Ensure appropriate informed consent is obtained for procedures.
5.3. For the procedures not necessarily performed by nephrologists, describe the risks and benefits and make appropriate recommendations.
5.3.1. Renal biopsy.
5.3.2. Obtaining and maintaining access for dialysis (central venous catheter, arterial venous fistula, arterial venous graft, and PD catheter).

5.3.3. Plasmapheresis.
5.3.4. Renal artery revascularization.
5.3.5. Renal transplantation surgery.
5.3.6. Living kidney donation (adult nephrology only).
5.3.7. Renal replacement therapy in critically ill patients.

5.4. Document and disseminate information relating to procedures performed and their outcomes.
5.5. Ensure adequate follow-up is arranged for procedures performed.

6. **Seek appropriate consultation from other health professionals, recognizing the limits of their own expertise**
   6.1. Demonstrate insight into their own limits of expertise.
   6.2. Demonstrate effective, appropriate, and timely consultation with other health professionals as needed for optimal patient care.
   6.3. Arrange appropriate follow-up care services for the patient and their family.

Communicator

Definition:

As *Communicators*, nephrologists 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…

1. **Develop rapport, trust, and ethical therapeutic relationships with patients, families, and caregivers**
   1.1. 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.
   1.2. Establish positive therapeutic relationships with patients and their families and caregivers that are characterized by understanding, trust, respect, honesty, and empathy.
   1.3. Respect patient confidentiality, privacy, and autonomy.
   1.4. Listen effectively.
   1.5. Be aware of and responsive to nonverbal cues.
   1.6. Facilitate a structured clinical encounter effectively.

2. **Accurately elicit and synthesize relevant information and perspectives of patients and families, caregivers, colleagues, and other professionals**
   2.1. Gather information about a disease and about a patient's beliefs, concerns, expectations, and illness experience.
   2.2. Seek out and synthesize relevant information from other sources, such as a patient's family, caregivers, and other professionals.

3. **Convey relevant information and explanations accurately to patients and families, caregivers, colleagues, and other professionals**
   3.1. Deliver information to patients, families, caregivers, colleagues, and other professionals in a compassionate manner and in such a way that it is understandable, and encourages discussion and participation in decision-making.

4. **Develop a common understanding on issues, problems, and plans with patients, families, caregivers, and other professionals to develop a shared plan of care**
   - 4.1. Identify and explore problems to be addressed from a patient encounter effectively, including the patient's context, responses, concerns, and preferences.
   - 4.2. Respect diversity and difference, including but not limited to the impact of age, level of functioning, gender, religion, and cultural beliefs on decision-making.
   - 4.3. Encourage discussion, questions, and interaction in the encounter.
   - 4.4. Engage patients, families, and relevant health professionals in shared decision-making to develop a plan of care.
   - 4.5. Address challenging communication issues effectively, such as:
     - 4.5.1. Obtaining informed consent.
     - 4.5.2. Delivering bad news.
     - 4.5.3. Addressing anger, confusion, and misunderstanding.
     - 4.5.4. Initiating and withdrawing dialysis.
     - 4.5.5. Appropriateness and choice of renal replacement modality.

5. **Convey effective oral and written information about a medical encounter**
   - 5.1. Maintain clear, accurate, and appropriate records of clinical encounters and plans.
   - 5.2. Provide clear, accurate, and appropriate consultation reports.
   - 5.3. Present verbal reports of clinical encounters and plans.
   - 5.4. Present medical information effectively to the public or media about a medical issue.

Collaborator

Definition:

As *Collaborators*, nephrologists effectively work within a health care 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…

1. **Participate effectively and appropriately in an interprofessional health care team**
   - 1.1. Describe the specialist's roles and responsibilities to other professionals.
   - 1.2. Describe the roles and responsibilities of other professionals within the health care team. Members of this team may include nurses, clinical nutritionists, social workers, pharmacy staff, physiotherapists, occupational therapists, teachers, child life specialists, psychologists, hospital management staff, biomedical technicians, and other physicians, in addition to the nephrologist.
   - 1.3. Recognize and respect the diversity of roles, responsibilities, and competences of other professionals in relation to their own.
   - 1.4. Work with others to assess, plan, provide, and integrate care for individuals or groups of patients, in particular those with progressive kidney disease, on dialysis and with a renal transplant.
   - 1.5. Where appropriate, work with others to assess, plan, provide, and review other tasks, such as research problems, educational work, program reviews, or administrative responsibilities.
   - 1.6. Participate effectively in interprofessional team meetings.
   - 1.7. Enter into interdependent relationships with other professions for the provision of quality care.

1.8. Describe the principles of team dynamics.
1.9. Respect team ethics, including confidentiality, resource allocation, and professionalism.
1.10. Demonstrate leadership in a health care team as appropriate.

2. **Work with other health professionals effectively to prevent, negotiate, and resolve interprofessional conflict**
   2.1. Demonstrate a respectful attitude towards other colleagues and members of an interprofessional team.
   2.2. Work with other professionals to prevent conflicts.
   2.3. Employ collaborative negotiation to resolve conflicts.
   2.4. Respect differences and address misunderstandings and limitations in other professionals.
   2.5. Recognize one's own differences, misunderstanding, and limitations that may contribute to interprofessional tension.
   2.6. Reflect on interprofessional team function.

Leader

Definition:

As *Leaders*, nephrologists are integral participants in health care organizations, organizing sustainable practices, making decisions about allocating resources, and contributing to the effectiveness of the health care 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…

1. **Participate in activities that contribute to the effectiveness of their health care organizations and systems**
   1.1. Work collaboratively with others in their organizations.
   1.2. Participate in systemic quality process evaluation and improvement, such as patient safety initiatives or quality assurance processes in the dialysis unit.
   1.3. Describe the structure and function of the health care 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.
   1.4. Describe principles of health care financing, including physician remuneration, budgeting, and organizational funding.

2. **Manage their practice and career effectively**
   2.1. Set priorities and manage time to balance patient care, practice requirements, outside activities, and personal life.
   2.2. Manage a practice including finances and human resources.
   2.3. Implement processes to ensure personal practice improvement.
   2.4. Employ information technology appropriately for patient care.

3. **Allocate finite health care resources appropriately**
   3.1. Recognize the importance of just allocation of health care 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.
   3.2. Apply evidence and management processes for cost-appropriate care for individual patients with kidney disease as well as at a systems level.

4. **Serve in administration and leadership roles, as appropriate**
   4.1. Chair or participate effectively in committees and meetings.
   4.2. Lead or implement change in health care.
   4.3. Plan relevant elements of health care delivery (e.g., work schedules).

Health Advocate

Definition:

As *Health Advocates*, nephrologists 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…

1. **Respond to individual patient health needs and issues as part of patient care**
   1.1. Identify the health needs of an individual patient, including but not limited to that patient's ability to access services in the health care and social services system.
   1.2. Identify opportunities for advocacy, health promotion, and disease prevention with individuals to whom they provide care.

2. **Respond to the health needs of the communities they serve**
   2.1. Describe the practice communities they serve.
   2.2. Identify opportunities for advocacy, health promotion, and disease prevention in the communities they serve, and respond appropriately, including but not limited to identification and treatment of diabetes and hypertension, access to dialysis therapies, and promotion of organ donation.
   2.3. Appreciate the possibility of competing interests between the communities served and other populations.

3. **Identify the determinants of health for the populations they serve**
   3.1. Identify the determinants of health, including barriers to access to care and resources, in patients with native kidney disease, on dialysis therapies and with a renal transplant.
   3.2. Identify vulnerable or marginalized populations within those served and respond appropriately.

4. **Promote the health of individual patients, communities, and populations**
   4.1. Describe an approach to implementing a change in a determinant of health of the populations they serve, such as organ donation initiatives, early diagnosis of chronic kidney disease with estimated glomerular filtration rate (eGFR) reporting, and advocacy for dietary salt restriction.
   4.2. Describe how public policy impacts on the health of patients with renal disease.

4.3. Identify points of influence in the health care system and its structure.
  4.3.1. Describe the role of advocacy groups, public education bodies, and private organizations, such as the Saudi Society of Nephrology and Saudi Center for Organ Transplantation, in promoting the health needs of patients with renal disease.
4.4. Describe the ethical and professional issues inherent in health advocacy, including altruism, social justice, autonomy, integrity, and idealism.
4.5. Appreciate the inherent possibility of conflict between their role as a health advocate for a patient or community and their role as a manager or gatekeeper.
4.6. Describe the role of the medical profession in advocating collectively for health and patient safety.

Scholar

Definition:

As *Scholars*, nephrologists 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…

1. **Maintain and enhance professional activities through ongoing learning**
   1.1. Describe the principles of maintenance of competence.
   1.2. Describe the principles and strategies for implementing a personal knowledge management system.
   1.3. Recognize and reflect on learning issues in practice.
   1.4. Conduct a personal practice audit.
   1.5. Pose an appropriate learning question.
   1.6. Access and interpret the relevant evidence.
   1.7. Integrate new learning into practice.
   1.8. Evaluate the impact of any change in practice.
   1.9. Document the learning process.

2. **Critically evaluate medical information and its sources, and apply this appropriately to practice decisions**
   2.1. Describe the principles of critical appraisal.
   2.2. Critically appraise retrieved evidence in order to address a clinical question.
   2.3. Integrate critical appraisal conclusions into clinical care.

3. **Facilitate the learning of patients, families, students, fellows, other health professionals, the public and others, as appropriate**
   3.1. Describe the principles of learning relevant to medical education.
     3.1.1. Recognize potential barriers to learning such as illness, literacy, and language skills.
   3.2. Identify collaboratively the learning needs and desired learning outcomes of others.
   3.3. Select effective teaching strategies and content to facilitate others' learning.
   3.4. Demonstrate an effective lecture or presentation.
   3.5. Assess and reflect on a teaching encounter.
   3.6. Provide effective feedback.
   3.7. Describe the principles of ethics with respect to teaching.

4. **Contribute to the development, dissemination, and translation of new knowledge and practices**
   - 4.1. Describe the principles of research and scholarly enquiry.
   - 4.2. Describe the principles of research ethics.
   - 4.3. Perform original research (clinical or basic science) or a continuous quality initiative (CQI) project.
     - 4.3.1. Pose a question.
     - 4.3.2. Perform a literature review.
     - 4.3.3. Develop a proposal to solve the question using an appropriate methodology.
     - 4.3.4. Identify, consult, and collaborate with content-experts and others to conduct the research.
     - 4.3.5. Collect the necessary data.
     - 4.3.6. Analyze the collected data.
     - 4.3.7. Synthesize the literature and new data to solve the question.
     - 4.3.8. Defend and disseminate the results of the research.
       - 4.3.8.1. For CQI, implement the solution in practice, evaluate the outcome, and reassess the solution.
     - 4.3.9. From the results, identify areas for further investigation.

Professional

Definition:

As *Professionals*, nephrologists 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…

1. **Demonstrate a commitment to their patients, profession, and society through ethical practice**
   - 1.1. Exhibit appropriate professional behaviors in practice, including honesty, integrity, commitment, compassion, respect, and altruism.
   - 1.2. Demonstrate a commitment to delivering the highest quality care and maintenance of competence.
   - 1.3. Recognize and appropriately respond to ethical issues encountered in practice, including but not limited to the donation and allocation of living as well as deceased donor organs, initiation and withdrawal of dialysis, and genetic counseling of those with hereditary renal disease.
   - 1.4. Manage conflicts of interest.
   - 1.5. Recognize the principles and limits of patient confidentiality as defined by professional practice standards and the law.
   - 1.6. Maintain appropriate relations with patients.

2. **Demonstrate a commitment to their patients, profession, and society through participation in profession-led regulation**
   - 2.1. Demonstrate knowledge and understanding of the professional, legal, and ethical codes of practice.
   - 2.2. Fulfill the regulatory and legal obligations required of current practice.
   - 2.3. Demonstrate accountability to professional regulatory bodies.

2.4. Recognize and respond to others' unprofessional behaviors in practice.
2.5. Participate in peer review.

3. **Demonstrate a commitment to physician health and sustainable practice**
   3.1. Balance personal and professional priorities to ensure personal health and a sustainable practice, recognizing the ongoing impact of caring for patients with organ failure and at the end of life.
   3.2. Strive to heighten personal and professional awareness and insight.
   3.3. Recognize other professionals in need and respond appropriately.

TRAINING MILESTONES

First-Year Fellows (F1)	Second-Year Fellows (F2)
• Demonstrate proficiency in renal procedures, including the evaluation of urine sediment, the placement of dialysis access, and the removal of tunneled, cuffed hemodialysis catheters. Fellows will be supervised until they have demonstrated competency in these procedures. • Learn to write patient-specific prescriptions for all modalities of renal replacement therapy and plasmapheresis. • Discern when a patient requires emergent renal replacement therapy and when alternative measures should be attempted. • Demonstrate ability to evaluate chronic dialysis inpatients and develop case-appropriate diagnostic and therapeutic plans. • Approach electrolyte abnormalities, acute renal failure, and renal transplant complications with a clear and logical approach. • Write or dictate comprehensive initial evaluation notes, with an emphasis on the assessment and plans. • Demonstrate professionalism in communicating with other members of the health care team in a timely and respectful fashion.	• Independently perform urine evaluations and dialysis access placement without direct supervision by faculty. • Demonstrate ability to address common complications of all procedures. • Demonstrate ability to address common complications of all modalities of renal replacement therapy. • Independently formulate an assessment and plan for each patient, thereby demonstrating progressive autonomy. These patient care plans will be verified by their supervising faculty member before implementation. • Demonstrate an ability to teach by being responsible for the education of medical students and internal medicine residents who are rotating through the renal service. Second-year fellows will also be expected to present topics for the Renal Grand Rounds lecture series and provide in-depth critical analysis of published data in journal clubs. • Present (either through oral presentation or publication) the results of their academic endeavors and research.

LEARNING OPPORTUNITIES

GENERAL PRINCIPLES

- Teaching and learning will be structured and programmed with more responsibility for self-directed learning
- Every week, at least 4-6 hours should be reserved for formal training time. Formal teaching time excludes bedside teaching, clinic postings, etc.
- The Core Education Programme (CEP) includes the following three formal teaching and learning activities:
  a) Universal topics: 20-30%
  b) Core specialty topics: 40-50%
  c) Trainee selected topic: 20-30%
- At least three hours per week should be allocated to CEP
- CEP will be supplemented by other forms of practice-based learning (PBL) such as:
  1. Morning report or case presentations
  2. Morbidity and mortality reviews
  3. Journal clubs, systematic reviews, etc.
  4. Hospital grand rounds and other continuous medical education (CME) activities
- Every two weeks, at least one hour should be assigned to meeting with mentors, portfolio review, mini-clinical examination (mini-CEX), etc.

UNIVERSAL TOPICS

These are high-value, interdisciplinary topics of utmost importance to the trainee, developed and delivered centrally to ensure that every trainee receives high-quality teaching and develops essential core knowledge. These topics are common to all specialties with a suggested time of one and a half hours per topic. The topics will be delivered in a modular fashion. At the end of each module there will be online formative assessment. After completion of all topics, there will be a combined summative assessment in the form of context-rich multiple choice questions (MCQ). All trainees must attain minimum competency in the summative assessment. These topics can be assessed in a summative manner along with a specialty examination.

Module: Introduction
- Safe drug prescribing.
- Hospital acquired infections.
- Sepsis, systemic inflammatory response syndrome (SIRS), disseminated intravascular coagulation (DIC).
- Antibiotic stewardship.
- Blood transfusion.

Module: Acute Care
- Preoperative assessment.
- Postoperative care.
- Acute pain management.
- Chronic pain management.
- Management of fluids in the hospitalized patient.
- Management of electrolyte imbalances.

Module: Ethics and Healthcare
- Patient advocacy.
- Ethical issues: transplantation/organ harvesting, withdrawal of care.
- Ethical issues: treatment refusal, patient autonomy.
- Role of doctors in death and dying.

CORE SPECIALTY TOPICS

Adopted from Division of Nephrology, Department of Medicine; Columbia University Medical Center

Core specialty topics are important adult nephrology clinical problems. They are taught using case-based discussions with prepared resources. They include workshops and simulations to develop skills in core procedures.

Topics	Learning Objectives
Renal Function Testing	Develop knowledge and expertise in the following areas, including indications, contraindications, complications, performance, interpretation of results, cost effectiveness, and application to patient care of: 1. Urinalysis, including dipstick and sediment 2. Measurement of renal plasma flow and glomerular filtration rate (GFR), including interpretation of serum creatinine concentration and calculation of its clearance rate 3. Measurement of renal concentrating and diluting capacity 4. Measurement of albuminuria 5. Measurement of proteinuria, using semi-quantitative and quantitative methods 6. Assessment of urinary acidification 7. Assessment of renal sodium and potassium handling 8. Renal radiology a. Urography b. Ultrasonography c. Radionuclide scans d. Computed tomography e. Magnetic resonance imaging f. Renal circulation imaging (angiography)
Pharmacology of Drugs in Renal Disease	Acquire knowledge and understanding of the following areas during the course of their training: 1. Principles of drug pharmacokinetics 2. Renal handling of drugs and chemicals 3. Mechanisms of drug metabolism 4. Drug prescribing in disease states and during dialysis 5. Relevant drug-drug interactions 6. Mechanisms of drug nephrotoxicity 7. Management of drug-induced renal diseases 8. Therapeutic drug monitoring 9. Renal transplant immunosuppression

	To be familiar with, and preferably have experience in the following areas, in both an outpatient and inpatient setting: 1. Diagnose and manage patients with different drug-induced renal syndromes. 2. Prescribe for and adjust drug dosage in patients with renal dysfunction. 3. Understand indications of therapeutic drug monitoring. 4. Access drug and poison information. 5. Common overdoses and the need for extracorporeal therapy. 6. Prescribe and manage immunosuppression for renal transplantation.
Acute Kidney Injury	Acquire knowledge and understanding of the following areas during the course of their training: 1. Normal regulation of renal and glomerular hemodynamics 2. Differential diagnosis of acute renal failure a. Pathophysiology of prerenal azotemia b. Pathophysiology of intrinsic renal failure including acute glomerular diseases, acute tubular necrosis, and acute interstitial disease c. Pathophysiology of obstructive renal failure 3. Mechanisms of acute kidney injury (AKI) in the postoperative patient 4. Mechanisms of AKI in patients with hepatobiliary disease 5. Causes of AKI in patients with cancer and immunosuppression 6. Causes of AKI in patients with AIDS 7. Metabolic consequences of AKI a. Hormonal b. Nutritional c. Electrolyte d. Acid-base e. Volume 8. Evaluation and management of AKI a. Radiologic techniques in AKI b. Biochemical evaluation of AKI c. Role of the renal biopsy in AKI d. Non dialytic therapy e. Dialytic therapies i. Role of hemodialysis (HD) ii. Role of peritoneal dialysis (PD) iii. Role of continuous renal replacement therapy (CRRT) 9. Hemodynamic monitoring of the critically ill patient 10. Management of electrolyte/acid-base disturbances in the critically ill patient 11. Fluid management of the critically ill patient

	12. Use of vasoactive drugs in the critically ill patient 13. Role of extracorporeal therapy in the management of drug overdose, specifically ethylene glycol, methanol, lithium, theophylline, salicylate, and barbiturate Furthermore, trainees should have experience in the: 1. Evaluation and management of AKI. 2. Evaluation and management of fluid-electrolyte and acid-base disturbances in the critically ill patient. 3. Evaluation of hemodynamics and the proper use of fluids and vasoactive drugs in critically ill patients. 4. Use of various dialytic techniques, including HD, PD, and CRRT. 5. Use of extracorporeal therapy to remove specific toxins. 6. Placement of central lines.
Renal Replacement Therapy in Acute Kidney Injury	1. Recognize the indications and the timing of renal replacement therapy (RRT) in AKI patients 2. Determine the modality choice for AKI patients requiring RRT 3. Understand the principles of RRT and learn how to write the prescription for the procedure 4. Managing anticoagulation during dialysis treatment including heparin and citrate anticoagulation 5. Determine RRT discontinuation for AKI cases and to assess for renal recovery 6. Recognize the outcomes of RRT in AKI patients
Chronic Kidney Diseases	Trainees must acquire knowledge and understanding of the following areas during the course of their training: 1. Various etiologies of chronic kidney diseases (CKD) 2. Evaluation, diagnosis, and treatment of CKD resulting from glomerular, interstitial, vascular, and obstructive processes including: ● Diagnosis of glomerular processes ● Diagnosis of interstitial processes ● Diagnosis of prerenal processes ● Diagnosis of obstructive processes ● Diagnosis of systemic processes that led to CKD, specifically diabetes mellitus, hypertension, and ischemic renal disease 3. Current concepts and the results of clinical studies pertaining to the role of hypertension, dietary composition, and divalent cations on the progression of chronic renal diseases 4. Predialysis management of CKD with particular regard to diet, anemia, metabolic bone diseases, and drug dose adjustments 5. Role of anemia in the management of patients with CKD ● Management of the anemia of CKD with the use of iron, erythropoietin and other appropriate agents

	6. Indications for initiation of end-stage renal disease (ESRD) therapy and placement of ESRD access in patients with CKD 7. Appropriate use of drugs, including dose modification, for patients with progressive CKD 8. Interpretation of radiographic tests, including intravenous pyelography, computed tomography, ultrasound, and radionuclide scan, in patients with CKD Furthermore, trainees must: 1. Have at least one year of continuous outpatient clinic experience in the management of patients with CKD. 2. Have a sufficient number of patients to evaluate and manage so that they acquire expertise in the management of patients with glomerular, interstitial, and obstructive renal processes. In addition, trainees should have a sufficient number of patients to work with to be competent in the management of hypertension, anemia, and diabetes mellitus. 3. Be competent to interpret intravenous pyelograms, radiopharmaceutical studies, renal arteriography, and renal ultrasound in the diagnosis of patients with CKD. 4. Be competent to perform and must have performed a sufficient number of percutaneous renal biopsies. 5. Have interpreted an appropriate number of renal biopsies so that they are comfortable in reviewing histologic features and assigning appropriate diagnoses.
Hypertension	Acquire knowledge and understanding of the following areas during the course of their training: 1. Epidemiology of hypertension 2. Pathogenesis and natural history of primary hypertension 3. Evaluation of the hypertensive patient 4. Nonpharmacologic therapies of hypertension 5. Pharmacology and clinical use of antihypertensive agents 6. Hypertension in renal parenchymal disease during chronic dialysis and after renal transplantation 7. Renovascular hypertension: pathogenesis, causes, clinical features, screening and diagnostic tests, and management 8. Oral contraceptive-induced hypertension 9. Pheochromocytoma: pathophysiology, clinical features, diagnosis, and management 10. Primary aldosteronism: pathophysiology, clinical features, diagnosis, and management 11. Other forms of secondary hypertension: Cushing's syndrome, congenital adrenal hyperplasia, coarctation of the aorta, thyroid disease, hyperparathyroidism, acromegaly, sleep apnea, and drugs 12. Hypertensive emergencies and urgencies

	Trainees must be familiar with and have experience in the following areas in both the outpatient and inpatient setting: 1. Assessing the severity of hypertension and end-organ damage. They should be familiar with the role of ambulatory blood pressure monitoring in the evaluation of the hypertensive patient. 2. Defining treatment goals, acquiring familiarity with nonpharmacologic modalities as well as the use and side-effects of antihypertensive agents, and making appropriate therapeutic choices in the context of comorbid conditions. 3. Management of hypertension in renal parenchymal disease during chronic dialysis and after renal transplantation. 4. Identifying symptoms and signs suggestive of secondary causes of hypertension and familiarity with the various screening and diagnostic tests as well as the management of these disorders. 5. Management of the various hypertensive emergencies and urgencies.
Diabetes Mellitus and Diabetic Nephropathy	Acquire a general understanding of current concepts of the pathophysiology of diabetic glomerulosclerosis (DGS), including: 1. Epidemiology and course of nephropathy in insulin-dependent diabetes mellitus (IDDM) and non-insulin-dependent diabetes mellitus (NIDDM) 2. Pathophysiologic mechanisms and histologic manifestations of diabetic nephropathy (DN) 3. Strategies for prevention of DN 4. Therapy of established DN 5. Modalities of therapy for ESRD in DN, including HD and PD, kidney transplantation, and kidney-pancreas transplantation Trainees should develop an in-depth knowledge of: 1. Various ways in which diabetes mellitus (DM) may affect the kidneys and urinary tract 2. Cardinal clinical and histological features, as well as the epidemiology and course of DGS in patients with IDDM and NIDDM 3. Results of clinical trials designed to prevent DN or slow its progression 4. Relative merits of different modalities of therapy for ESRD in diabetic patients, including HD and PD, kidney transplantation, and kidney-pancreas transplantation Trainees should be familiar with: 1. Definition, interpretation, prognostic value, and clinical use of "microalbuminuria" 2. Unique medical and surgical problems facing patients with advanced DN as well as their management

	Furthermore, trainees must have experience in the: Evaluation and management of patients with progressive diabetic nephropathy, both insulin-dependent and non-insulin-dependent. Treatment of blood pressure, fluid-electrolyte disorders, glycemia, and non-renal diabetic complication is needed. Evaluation and management of patients with end-stage diabetic nephropathy who are receiving HD and PD. Evaluation of patients with diabetic nephropathy for renal transplantation. Management of patients with diabetic nephropathy during and after renal transplantation.
Cystic and Inherited Diseases of the Kidney	Trainees should acquire knowledge of the following areas: 1. Genetics of inherited diseases: a. Understanding of Mendelian genetics, b. Understanding of gene linkage analysis, and c. Knowledge of chromosomal localization and characteristics of the gene responsible for the more common inherited renal disorders 2. Clinical, diagnostic, and epidemiologic differences between simple, acquired, and inherited cystic disorders and their potential for renal malignancies 3. Diagnosis of inherited and cystic disease: a. Use of gene link analysis and mutational analysis in the screening, b. Role of urinalysis, renal function testing, and radiologic testing, and c. Possibilities of prenatal diagnosis and pretest counseling 4. Approach to the symptomatic patient: a. Familiarity with the natural history of inherited cystic and non-cystic disease, b. Knowledge of clinical presentations, and c. Familiarity with extra renal manifestations 5. Treatment: a. Knowledge of strategies to manage progression of renal failure, proteinuria, and hypertension in non-cystic inherited disease, b. Knowledge of management of pain, hypertension, renal stone, hematuria, infection, and progressive renal failure in patients with cystic disease, and c. Familiarity with management of extra renal manifestation of autosomal dominant polycystic kidney disease (ADPKD), including mitral valve prolapse diverticular disease, intracranial aneurysm, and hepatic cystic disease Furthermore, trainees should: Have experience in the diagnosis and management of various forms of cystic renal disease, with particular emphasis on ADPKD and its various renal and extra renal complications.

	Have experience in the diagnosis and management of patients with non-cystic inherited diseases, with emphasis on Alport's syndrome and its renal and extrarenal complications. Be familiar with the principles of genetic counseling of patients with inherited renal disorders.
Tubulointerstitial Disease and Urinary Tract Infections	Trainees should acquire a general understanding of: 1. Structure and function of the normal renal tubules and interstitium 2. Pathophysiological mechanisms of acute and chronic interstitial diseases: a. Immunologically mediated interstitial nephritides, b. Interstitial scarring as a consequence of primary, c. Reflux nephropathy, and d. Obstructive nephropathy 3. Pathophysiology of interstitial disease: a. Immunopathogenetic and non-immune mechanisms, b. Relationship to glomerular function, c. Association with major tubular defects, including diabetes insipidus, acidification, and potassium excretion, and d. Effects of acute and chronic urinary obstruction 4. Diagnostic procedures: a. Assessment of tubular defects, b. Evaluation of obstruction, and c. Definition of acute and chronic interstitial nephritis 5. Pathogenesis and treatment of bacterial urinary tract infections: a. Major pathogenetic species, routes, and course of infection, b. Appropriate antibiotic choices, and c. Appropriate workup of the patient with multiple or resistance infections Trainees should develop an in-depth knowledge of: 1. Clinical features, causes, course, and treatment of acute allergic interstitial nephritis 2. Clinical features, pathogenesis, course, and treatment of IgG4-related kidney diseases. 3. Clinical features, predisposing factors, complications, bacteriological profile, and treatment of acute pyelonephritis 4. Management of patients with symptomatic and asymptomatic bacteriuria, including familiarity with: a. Major pathogenic species, routes, and course of infection, b. Appropriate antibiotic choices, c. Appropriate workup and treatment of patients with recurrent or resistant infections, and d. Related syndromes, such as nonspecific urethritis, prostatitis, and hemorrhagic cystitis 5. Clinical and radiological features, course, and treatment of reflux nephropathy (chronic pyelonephritis) and analgesic nephropathy, and the differential diagnosis of papillary necrosis

	Trainees should be familiar with: 1. Pathological features of acute and chronic interstitial nephritides 2. Clinical laboratory tests to evaluate aspects of tubular function, concentrating ability, urine acidification, potassium handling, and various reabsorptive functions Trainees should be aware of unusual syndromes affecting the renal interstitium, such as xanthogranulomatous pyelonephritis, lymphomatous infiltration, and various granulomatous diseases.
Acid-Base Disorders	Acquire knowledge and understanding of the following areas during the course of their training: 1. Acid-base chemistry and buffering 2. Determinants of arterial carbon dioxide tension and carbon dioxide balance 3. Determinants of plasma bicarbonate concentration and hydrogen ion balance, including renal acidification processes and the physiology of bicarbonate reabsorption, titratable acid excretion, and ammonium excretion 4. Clinical evaluation of acid-base disorders 5. Renal tubular acidosis: pathogenesis, clinical features, causes, diagnosis, and management 6. Uremic acidosis: acid-base homeostasis in ESRD 7. Other types of metabolic acidosis: pathogenesis, clinical features, causes, diagnosis, and management 8. Metabolic alkalosis: pathogenesis, clinical features, causes, diagnosis, and management 9. Respiratory acidosis: pathogenesis, clinical features, causes, diagnosis, and management 10. Respiratory alkalosis: pathogenesis, clinical features, causes, diagnosis, and management 11. Mixed acid-base disturbances Trainees must be familiar with and have experience in the following areas in both the outpatient and inpatient setting: 1. Assessing the accuracy of the acid-base parameters and interpreting serum and urine acid-base data, including the anion gap. 2. Determining from the patient's history, physical findings, and laboratory data the nature of the prevailing acid-base disorder and whether a simple or mixed acid-base disorder is present. 3. Managing renal tubular acidosis, uremic acidosis, and acid-base homeostasis in end-stage renal disease. 4. Managing all other types of metabolic acidosis. 5. Management of metabolic alkalosis. 6. Management of respiratory acidosis and alkalosis. 7. Management of mixed acid-base disorders.

Fluid and Electrolyte Disorders	Acquire knowledge and understanding of the following areas during the course of their training: 1. Physiology of sodium balance, including sensors of extracellular volume, effecter systems, tubular sodium transport processes, and the regulation of renal sodium excretion 2. Hypovolemia: pathophysiology, causes, clinical features, diagnosis, and management 3. Edematous disorders: pathophysiology, causes, clinical features, diagnosis, and management 4. Clinical use and complications of diuretics 5. Physiology of water balance, including tonicity sensors, effecter systems, the countercurrent mechanism for urine concentration, the cellular physiology of collecting duct water reabsorption, and the regulation of water excretion by the kidney 6. Hyponatremia: pathophysiology, causes, clinical features, diagnosis, and management 7. Hypernatremia: pathophysiology, causes, clinical features, diagnosis, and management 8. Evaluation and management of the polyuric patient 9. Physiology of potassium balance, including the regulation of transcellular potassium movement, tubular transport processes for potassium reabsorption and secretion, and the regulation of potassium excretion by the kidney 10. Hypokalemia: pathophysiology, causes, clinical features, diagnosis, and management 11. Hyperkalemia: pathophysiology, causes, clinical features, diagnosis, and management 12. Disorders of sodium, water, and potassium balance in ESRD Trainees must be familiar with and have experience in the following areas in both the outpatient and inpatient setting: 1. Assessing the validity and relevance of serum and urine electrolyte measurements for patient management 2. Assessing volume status (including the interpretation of central venous pressure, inferior vena cava diameter, and Swan-Ganz measurements) and recognizing and managing hypovolemic and edematous disorders. 3. The use and complications of diuretic therapy. 4. Evaluating and managing hyponatremia in the acute and chronic setting. 5. Evaluating and managing hypernatremia in the acute and chronic setting. 6. Evaluating and managing the polyuric patient.

	7. Evaluating and managing the patient with hypokalemia/hyperkalemia. They must be familiar with the acute as well as the long term management of these disorders. 8. Evaluating and managing disorders of sodium, water, and potassium in patients with ESRD.
Disorders of Mineral and Bone Metabolism	Trainees must acquire knowledge and understanding of the following areas during the course of their training: 1. Calcium and phosphorus balance in humans 2. Renal handling of calcium, magnesium, and phosphorus 3. Physiology of calciotropic hormones, specifically parathyroid hormone, vitamin D, calcitonin, and parathyroid hormone-related peptide 4. An integrated view of calcitropic hormone regulation in normal situations and in the context of acute and chronic renal failure 5. Methods to diagnose and treat different types of CKD-mineral and bone disorder (CKD-MBD), the interpretation of bone turnover markers, bone mineral density and bone biopsies 6. Pathogenesis and treatment of vascular calcification and calciphylaxis 7. Pathogenesis and treatment of calcium nephrolithiasis, urate nephrolithiasis, infected stones, and cystine stones 8. Surgical procedures necessary for the treatment of stone disease Trainees should also be familiar with, and preferably have experience in, the direct diagnosis and management of the following areas, in both an outpatient and inpatient setting: 1. Different types of CKD–MBD 2. Hyper- and hypocalcemia, hyper- and hypophosphatemia, and hypo- and hypermagnesemia 3. Various forms of nephrolithiasis
Glomerular Diseases	Acquire a general understanding of the following areas: 1. Structure and function of the normal glomerulus and how alteration of these leads to the cardinal features of glomerular injury (proteinuria and reduced GFR) 2. Principal immunologic mechanisms causing human glomerular diseases and the features that distinguish them by immunofluorescence and electron microscopy 3. Fundamental features of the normal immune response and an awareness of current concepts of autoimmunity and the factors that may be responsible for and mediate immunologic glomerular injury

	Trainees should be familiar with and develop an in-depth knowledge of: 1. The causes, clinical decision making, and treatment of common and uncommon causes of hematuria and proteinuria 2. Etiology and clinical findings of glomerular syndromes including nephrosis, nephritis, and rapidly progressive glomerulonephritis manifesting as renal-limited processes or associated with systemic disease Trainees should develop an in-depth knowledge of idiopathic glomerular diseases with respect to pathology, clinical features, and response to treatment of: 1. Minimal change nephropathy presenting in adolescents and adults, especially the response to corticosteroid treatment, the development of acute renal failure in adults, and the association with malignant tumors 2. Membranoproliferative glomerulonephritis, including immune complex and complement mediated types, and the clinical and pathological features of this disorder in association with hepatitis C and cryoglobulinemia 3. Focal segmental glomerulosclerosis (FSGS), including its various pathological and clinical syndromes and the association with conditions of reduced renal mass. The demographics, clinical course, and outcome of the clinicopathologic syndromes of "primary" focal sclerosis, including collapsing FSGS, glomerular tip lesion, and perihilar FSGS 4. Membranous nephropathy, including the clinical, pathological, and diagnostic features of both idiopathic membranous nephropathy and secondary membranous disease, and in-depth knowledge of the controversies regarding treatment of this disease 5. IgA nephropathy, especially its clinical course, natural history, and prognostic markers 6. Post-infectious glomerulopathies, including bacterial, viral, parasitic, rickettsial, and fungal infections, and their epidemiology, clinical course, and response to therapy, especially with respect to HIV infections Trainees should develop an in-depth knowledge of glomerular diseases associated with systemic diseases with respect to pathology, clinical and serological features, and response to treatment of: 1. Necrotizing and crescentic glomerulonephritis: a. Anti-glomerular basement membrane disease, b. Immune complex diseases, including lupus nephritis, postinfectious glomerulonephritis, and Henoch-Schonlein purpura, and c. Pauci-immune glomerulonephritis and small vessel vasculitis

	2. Renal manifestations of other rheumatic disorders, including systemic sclerosis, Sjogren's syndrome, mixed connective tissue disease, rheumatoid arthritis, Bechet's syndrome, relapsing polychondritis, and familial Mediterranean fever 3. Renal disease in the dysproteinemias, including multiple myeloma, amyloidosis, fibrillary glomerulopathy/immunotactoid glomerulopathy, and mixed cryoglobulinemia Trainees should be familiar with and have experience in: 1. Diagnosis and management of patients with isolated proteinuria, hematuria, nephrotic syndrome, and acute glomerulonephritis 2. Serological evaluation of glomerulonephritis, including the diagnostic value and limitations of anti-glomerular basement membrane (anti-GBM), ANCA, antinuclear and anti-microbial antibodies, hypocomplementemia, and cryoglobulinemia 3. Indications for and complications of renal biopsy, as well as the morphological and immunohistological features of the major glomerular diseases 4. Treatment of patients with nephrotic syndrome and acute glomerulonephritis, both renal-limited and secondary to systemic diseases, including the indications, complications, and value of various immunosuppressive protocols
Renal Disease in Pregnancy	Trainees must acquire knowledge and understanding of the following areas during the course of their training: 1. Changes in the anatomy and function of the urinary tract during pregnancy, focusing on the relevance of these changes to clinical circumstances, stressing alterations in the calyces and ureters, renal hemodynamics, and tubular function (principally potassium and glucose). 2. Changes in acid-base metabolism in pregnancy, focusing on normal pH, HCO3, and PCO2. 3. An integrated view of volume homeostasis during pregnancy. This includes knowledge of the normal gestational changes in weight, intravascular and extracellular volume status, renal salt handling, and the production of volume-regulating hormones. 4. Altered osmoregulation in pregnancy, focusing on changes in plasma sodium and osmolality levels, as well as on certain disorders of water metabolism peculiar to gestation. 5. Course and control of blood pressure in normal pregnancy 6. Tests of kidney function, including indications for renal biopsy during pregnancy.

	7. Familiarity with the clinical spectrum and management of renal disorders in gestation. This includes: pathogenesis and treatment or urinary tract infections; acute renal failure (especially those primarily associated with gestation, i.e., septic abortion, abruption, preeclampsia, acute fatty liver, and idiopathic postpartum renal failure); and chronic glomerular and interstitial renal diseases antedating pregnancy. 8. Recognition of the presentation of stone disease during gestation and familiarity with the effect of pregnancy on patients with nephrolithiasis. 9. Familiarity with the administration of both acute and chronic renal replacement therapy in pregnant women. 10. Knowledge of the effects of pregnancy on the natural history of renal allografts and of the conditions required for undertaking pregnancy in transplant recipients. 11. Recognition and treatment of the hypertensive disorders of pregnancy, particularly preeclampsia and its variants such as HELLP syndrome. This includes the use in gravidas of antihypertensive drugs and the prevention and treatment of eclampsia, including the administration of magnesium sulfate. 12. Capability to perform preconception counseling pertinent for the maternal and fetal prognoses for women with chronic hypertension and/or underlying kidney disorders. Trainees must diagnose and manage women whose pregnancies are complicated by acute or chronic renal dysfunction as well as gestations complicated by hypertension. They should have exposure to the presentation and management of gravidas experiencing acute hypertensive crises, especially those crises complicated by systemic manifestations such as liver dysfunction, thrombocytopenia, and microangiopathic hemolytic anemia.
Hemodialysis	Trainees must acquire knowledge and understanding of the following areas during the course of their training: 1. Types, advantages, disadvantages, and complications of HD vascular access 2. Water treatment 3. Currently available hemodialyzers and their advantages and disadvantages, with emphasis on differences in membrane composition, biocompatibility, and solute and water flux 4. Principles of HD, dialysis prescription and adequacy of HD 5. Most common complications of HD, including hypotension, cramps, arrhythmias, hemolysis, and air embolism 6. HD modalities: conventional HD, hemofiltration, home HD and continuous dialytic therapies, including continuous arteriovenous hemodiafiltration and continuous venovenous hemodiafiltration.

	7. Nutritional considerations and management of ESRD patients. 8. Evaluation and management of complications of ESRD, including anemia, CDK-MBD, dialysis amyloidosis, hypertension, hyperlipidemia, and acquired cystic disease. 9. Appropriate use of drugs, including dose modifications for dialysis patients. Furthermore, trainees must manage patients with: Acute renal failure requiring dialysis treatment including intermittent HD, continuous PD, and extracorporeal CRRT. Chronic renal failure on maintenance HD longitudinally for a sufficient time to allow participation in the prescription of and monitoring of the dose of delivered dialysis, assessment and adjustment of the need for and dose of erythropoietin, evaluation and treatment of renal osteodystrophy, and ongoing evaluation of the dialysis access. Chronic renal failure on maintenance PD longitudinally as outlined above for HD patients. In addition, trainees must participate in the assessment of patients for suitability of various forms of dialytic therapy along with a multidisciplinary team.
Peritoneal Dialysis	Trainees must acquire knowledge and understanding of the following areas during the course of their training: 1. Principles of PD 2. Advantages of PD, patient selection, and contraindications to PD 3. PD access 4. PD fluids 5. PD modalities and prescription 6. Adequacy of PD 7. Peritoneal equilibration test 8. Infectious complication of PD 9. Mechanical complication of PD 10. Metabolic complication of PD 11. Encapsulating peritoneal sclerosis 12. Ultrafiltration failure 13. Nutritional considerations and management of PD patients
Kidney Transplantation	Acquire a general understanding of the following areas: Immunology/Immunogenetics: 1. Normal immune response 2. Immune response to allograft 3. Inflammatory response to allograft 4. Mechanisms of tolerance 5. Immunogenetics and tissue typing, crossmatching, and surveillance for panel-reactive antibodies

	Transplant Pharmacology: 1. Basic principles of pharmacology and the mechanisms of action of immunosuppressant agents, including glucocorticoids, azathioprine, mycophenolate mofetil, cyclosporine, tacrolimus, sirolimus, and monoclonal and polyclonal antibodies 2. Basic principles of pharmacology of nonimmunosuppressive medications used in transplant for the prophylaxis of infection and the treatment of concurrent illnesses, with an emphasis on anticipating and managing drug interactions Organ Sharing and Allocation, and Clinical Kidney and Pancreas Transplantation: 1. Historical perspective. 2. Pretransplant evaluation of the recipient. 3. Pretransplant evaluation of the living donor. 4. Pretransplant evaluation of the cadaver donor/organ procurement. 5. Surgical technique and surgical management. 6. Physiology of the transplanted kidney. 7. Pathogenesis and pathology of allograft dysfunction. 8. Post-transplant care/in-hospital care. 9. Post-transplant care/outpatient care short- and long-term. 10. Expected clinical outcomes/analysis of risk factors. 11. Special considerations in pediatric renal transplantation. 12. Special considerations for pancreas and kidney/pancreas transplantation. Infectious diseases in transplantation/pre- and post-transplantation Pregnancy and transplantation Chronic allograft dysfunction Ethics of transplantation Economics of transplantation Trainee must have experience in: 1. Pretransplant: education, counseling, and evaluation of donor and recipient 2. Immediate postoperative management: evaluation and management of extracellular fluid volume, falling urine output, and primary nonfunction of the transplanted kidney 3. Early post-transplant management: establishment of adequate immunosuppression; diagnosis and therapy of rejection, infection, the hemolytic uremic syndrome, and urological and vascular complications; and diagnosis and management of drug interactions and toxicities

	4. Long-term post-transplant management: assessment for adequacy of immunosuppression: management of complications of long-term immunosuppression, including medication-induced allograft dysfunction, recurrence of the primary disease, *de nova* post-transplant glomerulo-nephritis, post-transplant polycythemia, avascular necrosis, dyslipidemias, glucose intolerance, liver function abnormalities, lymphoproliferative diseases, and cancers affecting the skin and other organs 5. Managing patient with failing renal allograft

Essential Procedures

1. Percutaneous renal biopsy (native and transplant kidneys)
   - All renal biopsy procedures are performed under the supervision of an attending physician.
   - Both native kidney and transplant kidney biopsies to be done under ultrasound guidance.

2. Insertion of temporary vascular access for HD
   - Placement of non-cuffed temporary vascular access lines is performed by the fellow, with the first five lines placed under the supervision of the attending physician.

3. Removal of tunneled, cuffed HD catheters
   - Removal of tunneled, cuffed HD catheters is performed by the fellow under the supervision of the attending physician.

4. Urinalysis
   - Fellows are expected to perform and interpret routine urinalysis tests. Special emphasis is placed on examination of urine sediment (cells, casts, crystals, and other formed elements).
   - Fellows will be observed and supervised by the attending physician or specialized laboratory personnel.
   - Fellows will be observed and supervised by the attending physician or specialized laboratory personnel.

5. Ultrasound kidneys
   - Fellows are requested to attend renal ultrasound studies during their clinical rotations. Fellows are expected to participate in performing, interpreting, and generating reports for the ultrasound studies under the supervision of specialized personnel.

Tabulated below (Table 4) are the types and numbers of essential procedures required for each training level.

Table 4: Essential Procedures

Procedure	Required number of procedures	
	F1	F2
Native kidney biopsy	10	10
Transplant kidney biopsy	0	10
Temporary hemodialysis catheter insertion	25	20
Tunneled, cuffed hemodialysis catheter removal	10	5
Urinalysis	50	30
Ultrasound kidneys	10	10

Dialysis Prescription

During their clinical rotations, fellows are trained and evaluated for writing the following dialysis orders:

1. Acute HD orders
   - Orders for acute HD are written by the fellow. The first ten are to be ordered under the supervision of the attending physician.

2. Continuous renal replacement therapy
   - Orders for continuous renal replacement therapy are written by the fellow. The first ten are to be ordered under the supervision of the attending physician.

3. Acute PD
   - Orders for PD are written by the fellow. The first five are to be ordered under the supervision of the attending physician.

Volunteering participation

Second-year fellows (F2) are required to participate in one of the following:

1. An awareness event related to kidney diseases (e.g., World Kidney Day), either held by local hospitals or local organizations.
2. Being an active member in the scientific or organizing committees of any conferences related to nephrology.
3. Writing an article to increase public awareness of kidney health in a newspaper, magazine, or website.
4. Research (published paper or accepted for publishing) either as research paper or poster presentation. Fellow can be a primary or co-author.
5. Charity nephrology clinics (at least two sessions).
6. Participation in Hajj mission.
7. Giving a public lecture about kidney health (at least once).

The fellow is required to provide a proof of participation to the program director.

EDUCATIONAL ACTIVITIES

The Program is a joint program with a different region in Saudi Arabia. Different institutions or training sites belong to one regional supervisory committee that is led by a regional program director and site coordinators or directors. Part of the function of the committee is to initiate, maintain, and supervise teaching activities. There are two types of activity:

1) Academic Half Day: this is a **joint activity** that must be attended by all fellows belonging to any one region. The topics covered in this activity are chosen by the fellows and the regional supervisory committee. The whole educational curriculum is covered over one to two years. The teaching methods used include case discussions, tutorials, didactic presentations and board review. The frequency of the academic half days is every 2-4 weeks, depending on the region. Table 3 describes a first-year example of Academic Half Days:

Table 3: Schedule of the Academic Half Day Activities (example)

Date	Time	Topics	Presenters	Venue
07/03/2016	1330 – 1630	Introduction to Nephrology Fellowship program	Program Director	
21/03/2016	1330 – 1430 1500 – 1630	Proteinuric states NephSAP review	Fellow Consultant	
04/04/2016	1330 – 1430 1500 – 1630	When to start dialysis HD access monitoring	Fellow Consultant	
18/04/2016	1330 – 1430 1500 – 1630	Post-transplant infectious complications Transplant medications	Fellow Consultant	
02/05/2016	1330 – 1430 1500 – 1630	Living kidney donation Post-transplant surgical complications	Fellow Consultant	
16/05/2016	1330 – 1430 1500 – 1630	Potassium disorders AKI	Fellow Consultant	
30/05/2016	1330 – 1430 1500 – 1630	Disorders of water metabolism: hypo/hyper-Na Adequacy of HD	Fellow Consultant	
13/06/2016	1330 – 1430 1500 – 1630	Membranous nephropathy Rapidly progressive glomerulonephritis (RPGN)	Fellow Consultant	
27/06/2016	1330 – 1430 1500 – 1630	HIV nephropathy NephSAP Review	Fellow Consultant	
19/10/2015	1330 – 1430 1500 – 1630	PD peritonitis Adequacy of PD	Fellow Consultant	
02/11/2015	1330 – 1430 1500 – 1630	Renal disease in pregnancy Lupus nephritis	Fellow Consultant	
16/11/2015	1330 – 1430 1500 – 1630	Approach to acid-base disorders Acid-base disorder cases	Fellow Consultant	
30/11/2015	1330 – 1430 1500 – 1630	Tubulointerstitial diseases NephSap review	Fellow Consultant	

14/12/2015	1330 – 1430 1500 – 1630	Evaluation of kidney transplant candidate Management of renal transplant rejection	Fellow Consultant	
28/12/2015	1330 – 1430 1500 – 1630	Calciphylaxis Approach to CKD-MBD	Fellow Consultant	
11/01/2016	1330 – 1430 1500 – 1630	Approach to highly sensitized renal Tx recipient Tissue type and cross-match	Fellow Consultant	
Saturday 23/01/2016	**Written Exam (for F1 & F2)**			SCFHS-Riyadh
25/01/2016	1330 – 1430 1500 – 1630	AKI and ICU nephrology CRRT	Fellow Consultant	
08/02/2016	1330 – 1430 1500 – 1630	Management of post-transplant cytomegalovirus (CMV) infection Post-transplant medical complications	Fellow Consultant	
22/02/2016	1330 – 1430 1500 – 1630	Anemia in CKD CKD: epidemiology and management approach	Fellow Consultant	
Tuesday 23/02/2016	**Oral Exam (for F2)**			SCFHS-Jeddah

2) Ongoing local activities: this is ongoing teaching that takes place in each hospital/institution and is supervised by the site coordinators/directors. The frequency and content varies based on each institution. However, it is the responsibility of the members of the regional committee to ensure adequate variety of topics and teaching methods. The following activities must be run in each hospital:
   - Journal club: every 2-4 weeks
   - Pathology round: every 2-4 weeks
   - Vascular access meetings: every 2-4 weeks

In addition to the above mandatory activities, fellows attend the other meetings held by the respective department of medicine and nephrology section. Such activities include morning reports, research methodology, hand-over and sign-out meetings, case discussions, morbidity and mortality meetings, lectures, and grand rounds.

CALLS

Fellows are required to be on call for 24-hours 5 to 7 times monthly. Depending on the institution, the fellows may be required to stay in-house during their call duty, as first on call nephrology staff in the hospital, or be a second on call from home, receiving calls from the in-house on call medical team. In case a fellow is on call in-house, he/she must be released post-call as per the SCFHS regulation for the in-house on call system. In case fellows are on call from home, they will be on call for the weekend once a month, beginning Thursday night and lasting until Sunday morning. Fellows will work with the attending on call team, notifying them at 5 pm that they are on call. Formal sign-out rounds will occur every afternoon between the fellows on different services. Calls will not be scheduled during elective and vacation time. As these regulations can be subject to changes, readers are advised to refer to the SCFHS rules and regulations.

VACATION

Fellows are entitled to one block (four weeks) of annual vacation. It is advised that only one fellow at a given level of training may be on vacation at any one time within the same institution. For more details see the Policy and Procedures, "Leave" section.

ASSESSMENT

Assessment of competence is an essential component of postgraduate medical training because it enhances effectiveness by providing constructive feedback. Assessment for certification and recertification at the end of and beyond training ensures safe clinical practice at the specialist level.

The purpose of the assessment during training is to:

- Support learning
- Develop professional growth
- Monitor progression
- Judge and certify competency
- Evaluate the quality of the training program

GENERAL PRINCIPLES

- Judgment should be based on holistic profiling of a trainee rather than individual traits or instruments.
- Assessment should be continuous in nature.
- Trainee and faculty must meet to review the logbook once every two months and at the end of a given rotation.
- Assessment should be strongly linked to the curriculum and the content.
- The ITER (In-Training Evaluation Report) form must be completed (handwritten or electronic format) and discussed with the fellow within two weeks of the end of each rotation.

FORMATIVE ASSESSMENT OF ADULT NEPHROLOGY PROGRAM

Objectives

- The general objective of the annual promotion assessment is to evaluate whether the trainee has satisfactorily acquired the theoretical knowledge and clinical competences that he/she should have acquired during the relevant year(s).
- The annual promotion assessment consists four continuous assessment formats.

Continuous Assessment Formats

Continuous assessment formats consist of four (4) methods in each of the training years:

- **First-Year Fellows (F1):**
  1. In-Training Evaluation Reports (ITER).
     a. ITERs should be conducted at least three times, covering 10 training blocks per year.
     b. ITERs are submitted to the local supervisory committee for each trainee based on a series of workplace-based assessments (WBA) considered relevant for the specialty.
  2. Structured Oral Exam (SOE).
  3. Procedure Logbook.
  4. Promotion Written Examination.

- **Second-Year Fellows (F2):**
  1. In-Training Evaluation Reports (ITER).
     a. ITERs should be conducted at least three times, covering 10 training blocks per year.
     b. ITERs are submitted to the local supervisory committee for each trainee based on a series of workplace-based assessments (WBA) considered relevant for the specialty.
  2. Structured Oral Exam (SOE).
  3. Procedure Logbook.
  4. Volunteering Participation.

Promotion Written Examination

For regulations, please refer to the executive policy of continuous assessment and annual promotion on the SCFHS website www.scfhs.org.

Blueprint

Table 5 provides an example of the blueprint; however the blueprint is subject to revision and change. Therefore, **trainees are directed to check the published exam blueprint annually on the SCFHS website (**www.scfhs.org**).**

Table 5: Blueprint Outlines (example for 100-item exam)

No.	Sections	Total	Total	Cognition		Domains		
		%	n	K1	K2	Pathophysiology	Diagnosis	Treatment
1	Hemodialysis	14	14	5	9	3	6	6
2	Peritoneal Dialysis	14	14	5	9	3	6	6
3	Kidney Transplantation	0	0	0	0	0	0	0
4	Chronic Kidney Diseases: Detection & Management	10	10	3	7	2	4	4
5	Acute Kidney Injury	12	12	4	8	2	5	5
6	Acid-Base Disorders	7	7	2	5	1	3	3
7	Fluid and Electrolytes	7	7	2	5	1	3	3
8	Hypertension	8	8	3	5	2	3	3
9	Glomerular & Vascular	12	12	4	8	2	5	5
10	Tubulointerstitial & Cystic	5	5	2	3	1	2	2
11	Nephrolithiasis	3	3	1	2	1	1	1
12	Ethics & Research	8	8	3	5	2	3	3
	Total	**100**	**100**	**33**	**67**	**20**	**40**	**40**

Suggested References

- Floege J, Johnson R, Feehally J. **Comprehensive clinical nephrology.** Philadelphia, PA: Saunders/Elsevier (Latest Edition).
- Brenner B, Rector F. **Brenner and Rector's the kidney.** Philadelphia, PA: Saunders (Latest Edition).
- Daugirdas J, Blake P, Ing T. **Handbook of dialysis.** Philadelphia, PA: Lippincott Williams & Wilkins (Latest Edition).

Notes:

- This list of references is intended for use as a study aid only. SCFHS does not intend the list to imply endorsement of these specific references, nor are the exam questions necessarily taken solely from these sources.
- The blueprint distributions of the examination may differ up to +/-3% in each category.

Promotion of Fellows

Passing Score for Promotion

Please refer to SCFHS executive policy for continuous assessment and annual promotion regarding scoring guidelines.

Score Report

- All written examination score reports shall go through a post-hoc item analysis before being approved by Executive Director of Assessment, within two weeks of the examination.

SUMMATIVE ASSESSMENT OF ADULT NEPHROLOGY PROGRAM

Objectives

- Determine that the quantity and quality of specialty knowledge is ranked as competent, so that the individual can be used as a referral source for the specialty.
- Using theoretical data, determine the candidate's ability to think logically, to solve problems, to apply basic medical science to clinical problems, and to make judgments with valid comparisons.
- Screen candidates for the purposes of being allowed to take the final clinical examination.

Certification of Training-Completion

In order to be eligible to sit for final specialty examinations, each trainee is required to obtain "*Certification of Training-Completion.*" Based on the training bylaws and executive policy (please refer to www.scfhs.org) trainees will be granted "Certification of Training-Completion" once the following criteria are fulfilled:

a. Successful completion of all training rotations.
b. Completion of training requirements as outlined by the specialty's scientific committee (e.g., logbook, research, etc.).
c. Clearance from SCFHS training affairs, that ensure compliance with tuition payment and completion of universal topics.

"Certification of Training-Completion" will be issued and approved by the local supervisory committee or its equivalent according to SCFHS policies.

Final Assessment Formats

Please refer to SCFHS general bylaws and executive policy of assessment for regulations and guidelines of final written exams (available on website: www.scfhs.org).

- Final assessment formats consist of:
  1. Final Written Examination
  2. Objective Structured Clinical Exam (OSCE)

1. Final Written Examination

Final written examination format

The final written exam of the Fellowship specialties will consist of one of the exam forms described below:

A. A Saudi Fellowship specialty final written examination shall consist of one paper with 80-120 Single Best Answer (SBA) multiple-choice questions (MCQs). These questions focus on clinical scenarios with 4 SBA options each. Ten unscored MCQ items can be added for pretesting purposes.

B. If any other assessment format (including addition of short answer questions, [SAQs]) is used, the Specialty Scientific and Specialty Examination Committees must agree to its implementation.

Blueprint

Table 6 provides an example of the blueprint; however this blueprint is subject to revision and change. Therefore, **trainees are directed to check the published exam blueprint annually on the SCFHS website (**www.scfhs.org**).**

Table 6: Blueprint Outlines (example for 120-item exam)

No.	Sections	Total	Total	Cognition		Domains		
		%	n	K1	K2	Pathophysiology	Diagnosis	Treatment
1	Hemodialysis	12	15	5	10	3	6	6
2	Peritoneal Dialysis	10	12	4	8	2	5	5
3	Kidney Transplantation	14	17	6	11	3	7	7
4	Chronic Kidney Disease: Detection & Management	10	12	4	8	2	5	5
5	Acute Kidney Injury	10	12	4	8	2	5	5
6	Acid-Base Disorders	6	7	2	5	1	3	3
7	Fluid and Electrolytes	6	7	2	5	1	3	3
8	Hypertension	6	7	2	5	1	3	3
9	Glomerular & Vascular	12	15	5	10	3	6	6
10	Tubulointerstitial & Cystic	3	3	1	2	1	1	1

11	Nephrolithiasis	3	3	1	2	1	1	1
12	Ethics & Research	8	10	5	5	4	2	4
	Total	**100**	**120**	**40**	**80**	**24**	**48**	**48**

Suggested References

- Floege J, Johnson R, Feehally J. **Comprehensive clinical nephrology.** Philadelphia, PA: Saunders/Elsevier (Latest Edition).
- Brenner B, Rector F. **Brenner and Rector's the kidney.** Philadelphia, PA: Saunders (Latest Edition).
- Daugirdas J, Blake P, Ing T. **Handbook of dialysis.** Philadelphia, PA: Lippincott Williams & Wilkins (Latest Edition).

Notes:

- This list of references is intended for use as a study aid only. SCFHS does not intend the list to imply endorsement of these specific references, nor are the exam questions necessarily taken solely from these sources.
- The blueprint distributions of the examination may differ up to +/-3% in each category.

2. Final Clinical Examination

Objectives

- Determine the ability of the candidate to practice as a specialist and provide consultation in the general domain of his/her specialty to other health care professionals or other bodies that may seek assistance and advice.
- Ensure that the candidate has the necessary clinical competencies relevant to his/her specialty, including but not limited to history taking, physical examination, documentation, procedural skills, communication skills, bioethics, diagnosis, management, investigation, and data interpretation.
- All competencies contained within the specialty core curriculum are subject to inclusion in the examination.

Eligibility

- Passing Saudi Fellowship Final written examination.
- ***Please refer to the SCFHS general bylaws and executive policy of assessment for regulations and guidelines of final clinical exam (available on website:*** *www.scfhs.org).*

Final Clinical Exam Blueprint

Table 7 provides an example of the blueprint; however the blueprint is subject to revision and change. Therefore, **trainees are directed to check the published exam blueprint annually on the SCFHS website (**www.scfhs.org**).**

Table 7: Blueprint Outlines (example for eight objective structured clinical exam stations)

DOMAINS FOR INTEGRATED CLINICAL ENCOUNTER	DIMENSIONS OF CARE				
	Health Promotion & Illness Prevention 1±1 Station(s)	**Acute** 3±1 Station(s)	**Chronic** 3±1 Station(s)	**Psychosocial Aspects** 1±1 Station(s)	**# Stations**
Patient Care 5±1 Station(s)	1	**2**	2		**5**
Patient Safety & Procedural Skills 1±1 Station(s)		**1**			**1**
Communication & Interpersonal Skills 1±1 Station(s)				**1**	**1**
Professional Behaviors 1±1 Station(s)			**1**		**1**
Total Stations	**1**	**3**	**3**	**1**	**8**

Definitions

Dimensions of Care	Focus of care for the patient, family, community, and/or population
Health Promotion & Illness Prevention	The process of enabling people to increase control over their health and its determinants, and thereby improve their health. Illness prevention covers measures not only to prevent the occurrence of illness, such as risk factor reduction, but also to arrest its progress and limit its consequences once established. This includes but is not limited to screening, periodic health exams, health maintenance, patient education and advocacy, and community and population health.
Acute	Brief episode of illness, within the time span defined by initial presentation through to transition of care. This dimension includes but is not limited to urgent, emergent, and life-threatening conditions, new conditions, and exacerbation of underlying conditions.
Chronic	Illness of long duration that includes but is not limited to illnesses with slow progression.
Psychosocial Aspects	Presentations rooted in the social and psychological determinants of health that include but are not limited to life challenges, income, culture, and the impact of the patient's social and physical environment.

Domains	Reflects the scope of practice and behaviors of a practicing clinician
Patient Care	Exploration of illness and disease through gathering, interpreting and synthesizing relevant information that includes but is not limited to history taking, physical examination, and investigation. Management is a process that includes but is not limited to generating, planning, and organizing care in collaboration with patients, families, communities, populations, and health care professionals (e.g., finding common ground, agreeing on problems and goals of care, time and resource management, roles to arrive at mutual decisions for treatment).
Patient Safety & Procedural Skills	Patient safety emphasizes the reporting, analysis, and prevention of medical error that often leads to adverse healthcare events. Procedural skills encompass the areas of clinical care that require the physical and practical skills of the clinician to be integrated with other clinical competencies in order to accomplish a specific and well-characterized technical task or procedure.
Communication & Interpersonal Skills	Interactions with patients, families, caregivers, other professionals, communities, and populations. Elements include but are not limited to active listening, relationship development, education, verbal, non-verbal, and written communication (e.g., patient-centered interviews, disclosure of error, informed consent).
Professional Behaviors	Attitudes, knowledge, and skills based on clinical and/or medical administrative competence, ethics, societal, and legal duties resulting in the wise application of behaviors that demonstrate a commitment to excellence, respect, integrity, accountability, and altruism (e.g., self-awareness, reflection, life-long learning, scholarly habits, and physician health for sustainable practice).

- Frank JR, Snell L, Sherbino J, editors. CanMEDS 2015 Physician Competency Framework. Ottawa: Royal College of Physicians and Surgeons of Canada; 2015.).