SAUDI FELLOWSHIP
PEDIATRIC NEPHROLOGY CURRICULUM

PREPARATION

Curriculum Scientific Group

DR. KHALID ABDULAZIZ AL SARAN
DR. ABDULHADIMUDIEF AL TALHI

SUPERVISION

Curriculum Specialist

DR. ZUBAIR AMIN
DR. SAMI ALSHAMMARI

REVIEWED & APPROVED

Scientific Committee

DR. KHALID ABDULAZIZ AL SARAN
DR. ABDULHADIMUDIEF AL TALHI
DR. HAMAD ABDULLAH AL MOJALLI
DR. OSAMA YOUSOFSAFDAR
DR. SAEED ALI AL GHWERY
DR. ABDULLAH AL ZULFAH AL QAHTANI
DR. ABDULKARIM SALEH AL ANAZI
DR. KHALID ABDULAZIZ AL HASAN

2016
COPYRIGHTS AND AMENDMENTS

All rights reserved. © 2016 Saudi Commission for Health Specialties.

This material may not be reproduced, displayed, modified, distributed, or used in any other manner without prior written permission of the Saudi Commission for Health Specialties, Riyadh, Kingdom of Saudi Arabia.

Any amendment to this document shall be approved by the Specialty Scientific Council and the Executive Council of the commission and shall be considered effective from the date the updated electronic version of this curriculum was published on the commission Web site, unless a different implementation date has been mentioned.

Correspondence:
Saudi Commission for Health Specialties
P.O. Box: 94656
Postal Code: 11614
Contact Center: 920019393

E-mail: systemadmin@scfhs.org
Website: www.scfhs.org.sa

Formatted and Designed by:
Salem M Altamimi (SCFHS)/Manoj Thomas Varghese, CMT (SCFHS)
# TABLE OF CONTENTS

**SAUDI FELLOWSHIP PEDIATRIC NEPHROLOGY CURRICULUM**

---

**TABLE OF CONTENTS**

SAUDI FELLOWSHIP .................................................................................................................. 1

**TABLE OF CONTENTS** ............................................................................................................. 3

**ACKNOWLEDGEMENTS** .......................................................................................................... 6

**INTRODUCTION** ..................................................................................................................... 7

**FELLOWSHIP TRAINING PROGRAM STRUCTURE** ................................................................. 8

A. Core rotations ...................................................................................................................... 8
B. Electives .............................................................................................................................. 8

**REQUIRED ROTATIONS FOR EACH YEAR** ............................................................................. 9

**OUTCOMES AND COMPETENCIES** ...................................................................................... 10

**ELABORATION OF GENERAL CLINICAL PEDIATRIC NEPHROLOGY** ......................... 14

A. Glomerular Diseases ....................................................................................................... 14
B. Hemolytic Uremic Syndrome ....................................................................................... 15
C. Diabetes Mellitus And Diabetic Nephropathy ............................................................. 18
D. Hypertension .................................................................................................................. 19
E. Acute Kidney Injury And Intensive Care Unit Nephrology ........................................... 20
F. Chronic Kidney Disease ............................................................................................... 21
G. Acid-Base Disorders ..................................................................................................... 22
H. Fluid And Electrolyte Disorders .................................................................................. 23
I. Cystic And Inherited Diseases Of The Kidney ............................................................... 25
J. Tubulointerstitial Disease And Urinary Tract Infection ................................................ 25
K. Disorders Of Divalent Cation And Mineral Metabolism ........................................... 26
L. Renal Function Testing ................................................................................................. 27
M. Pharmacology Of Drugs In Renal Disease ................................................................. 28
N. Communicator ............................................................................................................... 28
O. Collaborator .................................................................................................................... 29
P. Manager .......................................................................................................................... 29
Q. Health Advocate ........................................................................................................... 30
R. Scholar ............................................................................................................................ 30
S. Professional ...................................................................................................................... 31

**OUTPATIENT CLINIC ROTATION-SPECIFIC OBJECTIVES** .................................................. 32

A. Medical Expert ............................................................................................................... 32
B. Manager .......................................................................................................................... 32
C. Professional .................................................................................................................... 33
D. Health Advocate .......................................................................................................... 33
E. Scholar ............................................................................................................................ 33
F. Communicator ............................................................................................................... 33

---

**SAUDI FELLOWSHIP PEDIATRIC NEPHROLOGY CURRICULUM**

---
# TABLE OF CONTENTS

G. Collaborator ........................................................................................................... 34

CHRONIC KIDNEY DISEASE (CKD) - DIALYSIS/PERITONEAL DIALYSIS .................. 35

A. Chronic Kidney Disease (CKD) Pre-Dialysis Care .............................................. 35
B. Peritoneal Dialysis Specific Training Objectives .................................................. 35

HEMODIALYSIS AND RELATED COMPLICATIONS .................................................. 44

PEDIATRIC RENAL TRANSPLANT ....................................................................... 45

A. Medical Expert ..................................................................................................... 45
B. Communicator ....................................................................................................... 47
C. Collaborator .......................................................................................................... 48
D. Manager ................................................................................................................ 49
E. Health Advocate .................................................................................................... 50
F. Scholar ..................................................................................................................... 51
G. Professional ............................................................................................................ 51

NEONATAL NEPHROLOGY ..................................................................................... 52

Program content ........................................................................................................ 52

UROLOGY ..................................................................................................................... 53

A. Medical Expert ..................................................................................................... 53

RADIOLOGY ............................................................................................................... 55

A. Medical Expert ..................................................................................................... 55
B. Communicator ....................................................................................................... 55
C. Collaborator .......................................................................................................... 56
D. Manager ................................................................................................................ 56
E. Health Advocate .................................................................................................... 56
F. Scholar ..................................................................................................................... 57
G. Professional ............................................................................................................ 57

LEARNING AND TEACHING OPPORTUNITIES ..................................................... 58

UNIVERSAL TOPICS ............................................................................................ 58

CORE SPECIALTY TOPICS ................................................................................... 59

WORKSHOPS/SIMULATIONS/INTERPRETATION SESSIONS ................................. 67

CLINICAL RESEARCH ............................................................................................. 68

ASSESSMENT ............................................................................................................. 69

A. Annual Assessment ............................................................................................... 69
B. Continuous formative evaluation ......................................................................... 69
C. Summative continuous evaluation ....................................................................... 70
# TABLE OF CONTENTS

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>D. Final In-training Evaluation Report (FITER)/Comprehensive Competency Report (CCR)</td>
<td>70</td>
</tr>
<tr>
<td>E. Final Pediatric Nephrology Saudi Fellowship Examination</td>
<td>70</td>
</tr>
<tr>
<td>F. Certification</td>
<td>70</td>
</tr>
<tr>
<td><strong>TOOLS FOR ASSESSMENT</strong></td>
<td>71</td>
</tr>
<tr>
<td>A. Mini-Clinical Evaluation Exercise (CEX)</td>
<td>71</td>
</tr>
<tr>
<td>B. The Logbook</td>
<td>72</td>
</tr>
<tr>
<td>I. Procedure logs</td>
<td>74</td>
</tr>
<tr>
<td>C. Conference presentation and evaluation</td>
<td>79</td>
</tr>
<tr>
<td>D. 360 degree/Peer evaluations</td>
<td>79</td>
</tr>
<tr>
<td>E. Patient Care Milestones</td>
<td>81</td>
</tr>
<tr>
<td>F. Practice-Based Learning And Improvement</td>
<td>99</td>
</tr>
<tr>
<td>G. Professionalism</td>
<td>103</td>
</tr>
<tr>
<td>H. Interpersonal And Communication Skills</td>
<td>104</td>
</tr>
<tr>
<td><strong>PEDIATRIC NEPHROLOGY PROGRAM</strong></td>
<td>105</td>
</tr>
<tr>
<td>A. Grand Rounds Evaluation</td>
<td>105</td>
</tr>
<tr>
<td>B. Case Presentation Evaluation</td>
<td>106</td>
</tr>
<tr>
<td>C. Guidelines For Mentoring</td>
<td>108</td>
</tr>
<tr>
<td>D. Roles of the Fellow:</td>
<td>111</td>
</tr>
<tr>
<td>E. Tasks during the Meeting:</td>
<td>111</td>
</tr>
<tr>
<td>F. Recommended Reading</td>
<td>111</td>
</tr>
<tr>
<td><strong>REFERENCES</strong></td>
<td>112</td>
</tr>
</tbody>
</table>
ACKNOWLEDGEMENTS

The Pediatric Nephrology curriculum team appreciates the valuable contributions and feedback from all members of the supervisory committee during the construction of this manual. This work could not have been accomplished without their support. We would also like to acknowledge that the CanMEDS framework is a copyright of the Royal College of Physicians and Surgeons of Canada, and many of the descriptions and pediatric nephrology competencies have been acquired from their resources.
INTRODUCTION

The Saudi Pediatric Nephrology Fellowship program is one of the oldest Pediatric sub-specialty training programs in Saudi Arabia and in the Arab world. It was established in January 2004. We currently accept 2 fellows per training center at a time. Currently, 8 training centers are accredited by the Saudi Commission for Health Specialties distributed across the 3 major cities of our Kingdom. Our goal is to produce well-trained and proficient pediatric nephrologists. This is achieved by combining broad clinical exposure in pediatric nephrology and related disciplines with tailored research experience and attentive instruction and learning opportunities.

In this updated curriculum, we are adopting the CanMEDS framework, as this innovative, competency-based framework describes the core knowledge, skills, and attitude of physicians. This curriculum is intended to provide a broad framework for fellows and faculty to focus on teaching, learning as well as clinical experience and professional development during the training program. Nevertheless, this does not intend to be the sole source of defining what is to be taught and learned during the fellowship training. Fellows are expected to acquire knowledge and skills as well as develop appropriate attitude and behavior throughout their training program and take personal responsibility in learning. They must learn from every patient encounter whether that particular condition or disease is mentioned in this curriculum.
FELLOWSHIP TRAINING PROGRAM STRUCTURE

The Pediatric Fellowship Training Program consists of well-structured, full time, supervised 2 years training. This training includes:

A. Core rotations

- General Clinical Pediatric Nephrology
  - Inpatient
  - Consultation
  - Outpatient
  - Pediatric peritoneal dialysis
  - Neonatal nephrology
- Adult hemodialysis
- Pediatric hemodialysis
- Pediatric renal transplant
- Pediatric urology
- Renal pathology
- Renal imaging

B. Electives

- Elective rotations allow fellows the flexibility to gain a concentrated experience in an area of interest.
- The fellows will have 8 weeks of electives:
  - Four weeks in the 1st year
  - Four weeks in the 2nd year
- Fellows have the right to choose from the above rotations or other specialties related to pediatric nephrology, such as clinical renal genetic disorders, molecular genetics, immunology, laboratory, and clinical research.
REQUIRED ROTATIONS FOR EACH YEAR

The rotations are based on a block system rather than months. Each block consists of four weeks.

<table>
<thead>
<tr>
<th>BLOCK (4 weeks)</th>
<th>F1</th>
<th>F2</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>General pediatric nephrology</td>
<td>General pediatric nephrology</td>
</tr>
<tr>
<td>2</td>
<td>General pediatric nephrology</td>
<td>General pediatric nephrology</td>
</tr>
<tr>
<td>3</td>
<td>General pediatric nephrology</td>
<td>General pediatric nephrology</td>
</tr>
<tr>
<td>4</td>
<td>General pediatric nephrology</td>
<td>General pediatric nephrology</td>
</tr>
<tr>
<td>5</td>
<td>General pediatric nephrology</td>
<td>General pediatric nephrology</td>
</tr>
<tr>
<td>6</td>
<td>General pediatric nephrology</td>
<td>General pediatric nephrology</td>
</tr>
<tr>
<td>7</td>
<td>General pediatric nephrology</td>
<td>Adult hemodialysis</td>
</tr>
<tr>
<td>8</td>
<td>Pediatric hemodialysis</td>
<td>Clinical research</td>
</tr>
<tr>
<td>9</td>
<td>Pediatric renal transplantation</td>
<td>Elective</td>
</tr>
<tr>
<td>10</td>
<td>Pediatric renal transplantation</td>
<td>Elective</td>
</tr>
<tr>
<td>11</td>
<td>Renal pathology</td>
<td>Pediatric renal transplantation</td>
</tr>
<tr>
<td>12</td>
<td>Renal imaging</td>
<td>Pediatric Urology</td>
</tr>
<tr>
<td>13</td>
<td>Vacation</td>
<td>Vacation</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>ROTATIONS</th>
<th>BLOCKS</th>
</tr>
</thead>
<tbody>
<tr>
<td>General pediatric nephrology</td>
<td>13</td>
</tr>
<tr>
<td>Pediatric hemodialysis</td>
<td>1</td>
</tr>
<tr>
<td>Renal radiology</td>
<td>1</td>
</tr>
<tr>
<td>Renal pathology</td>
<td>1</td>
</tr>
<tr>
<td>Pediatric renal transplantation</td>
<td>3</td>
</tr>
<tr>
<td>Pediatric urology</td>
<td>1</td>
</tr>
<tr>
<td>Clinical/basic research</td>
<td>1</td>
</tr>
<tr>
<td>Adult hemodialysis</td>
<td>1</td>
</tr>
<tr>
<td>Elective</td>
<td>2</td>
</tr>
<tr>
<td>Vacation</td>
<td>2</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>26</strong></td>
</tr>
</tbody>
</table>
Rationale
The Saudi Fellowship Training Program in Pediatric Nephrology is intended to assure balanced clinical competence, preparing graduates in 2 years to deliver excellent general care to children with kidney diseases.

Overall Goal
The aim of the Pediatric Nephrology Fellowship Program is to provide the fellow with expertise gained by knowledge, skills, and attitudes to manage children with suspected or established renal diseases. The program outlined here provides enough instruction for the fellow to develop appropriate competence in the field of pediatric nephrology in the period suggested.

Learning Outcomes
Successful fellows will acquire a broad-based understanding of the principles, knowledge, skills, and attitudes of Pediatric Nephrology. By the end of their training, the fellow should have the ability to practice Pediatric Nephrology as follows:

<table>
<thead>
<tr>
<th>Trainee Role</th>
<th>Goals and objectives</th>
</tr>
</thead>
</table>
| Medical Expert | To have the expertise in these Specific Program Contents:  
1) Glomerular diseases  
2) Hemolytic uremic syndrome  
3) Hypertension  
4) Acute renal failure and intensive care unit nephrology  
5) Chronic renal failure  
6) Acid-base disorders  
7) Fluid and electrolyte disorders  
8) Cystic and inherited diseases of the kidney  
9) Tubulointerstitial disease and urinary tract infection  
10) Disorders of divalent cations and mineral metabolism  
11) Renal function testing  
12) Pharmacology of drugs in renal disease  
13) Pediatric peritoneal dialysis and pediatric hemodialysis  
14) Pediatric renal transplant |
| Communicator | 1) To be able to synthesize relevant information from the patient or family, and document the patient’s condition and progress accurately (in writing), with emphasis on the relevant issues.  
2) To be able to communicate clearly and effectively with patients and families with respect to their medical condition(s) and treatment plan. |
## OUTCOMES AND COMPETENCIES

<table>
<thead>
<tr>
<th>Trainee Role</th>
<th>Goals and objectives</th>
</tr>
</thead>
<tbody>
<tr>
<td>3)</td>
<td>To communicate effectively with health care professionals. To produce letters to referring physicians that are written promptly, and are complete, accurate, and informative.</td>
</tr>
<tr>
<td>4)</td>
<td>To act as a consulting fellow to the medical house staff regarding nephrology patients.</td>
</tr>
<tr>
<td>5)</td>
<td>To maintain up-to-date patient lists with relevant information for continuity of care, and provide proper sign over to colleagues.</td>
</tr>
<tr>
<td>6)</td>
<td>To communicate with secretaries regarding scheduling of outpatient clinics and other responsibilities.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Collaborator</th>
<th>Goals and objectives</th>
</tr>
</thead>
<tbody>
<tr>
<td>1)</td>
<td>To be able to interact effectively with other healthcare professionals, in particular the attending staff, other trainees, nursing staff, dieticians, social workers, pharmacists, etc.</td>
</tr>
<tr>
<td>2)</td>
<td>To be able to contribute effectively and demonstrate the ability to accept and carry out decisions taken by a multidisciplinary team, consisting of other nephrologists, nursing staff, dieticians, social workers, pharmacists, psychiatrists, etc.</td>
</tr>
<tr>
<td>3)</td>
<td>To be able to identify and recognize the need and benefit of consulting other physicians and healthcare professionals, including surgeons and/or radiologists when access to dialysis is being planned, and surgeons when transplantation is being contemplated.</td>
</tr>
<tr>
<td>4)</td>
<td>To participate constructively in joint rounds with transplant surgery team members, making sure that relevant “medical” issues are not overlooked.</td>
</tr>
<tr>
<td>5)</td>
<td>To assure that nephrology patients are prepared for the operating room, that the surgeons are aware of the plans, and that the nurses and house staff are aware of the appropriate protocols.</td>
</tr>
<tr>
<td>6)</td>
<td>To be able to delegate specific tasks when appropriate.</td>
</tr>
<tr>
<td>7)</td>
<td>When completing a research project, to meet, communicate and follow-up in a timely fashion on the recommendations made by research collaborators and personnel.</td>
</tr>
</tbody>
</table>
### OUTCOMES AND COMPETENCIES

<table>
<thead>
<tr>
<th>Trainee Role</th>
<th>Goals and objectives</th>
</tr>
</thead>
</table>
| **Manager**  | 1) To learn how to effectively manage all nephrology services, including consultation, dialysis, continuous ambulatory peritoneal dialysis (CAPD), or transplant service.  
2) To participate in administrative duties, e.g. acquire knowledge of the role of the medical dialysis director.  
3) To be able to work efficiently and effectively, i.e. to manage his/her particular service, outpatient clinic, other academic activities, and personal life, simultaneously.  
4) To round daily on service patients, both independently and with the staff nephrologists.  
5) To provide orders, including acute dialysis orders, to the hemodialysis unit in a timely fashion. To distinguish conditions requiring urgent versus non-urgent attention. To respond to emergencies in a timely fashion.  
6) To establish a plan for timely lab review and decision-making when necessary.  
7) To make him/herself known to the nurses and to carry the bellhop so nurses can call the resident in case of emergency or other issues.  
8) To use limited hemodialysis nursing resources in a sensible manner with respect to treatment benefits.  
9) To be on call for the Emergency Room for inquiries regarding nephrology patients.  
10) To be able to use information technology (e.g. lab and pharmacy databases) to optimize patient care.  
11) To be able to use healthcare resources cost-effectively, including the utilization of scarce resources.  
12) To participate in critical appraisal of his/her practice, e.g. audit, or quality assurance process. |
| **Health Advocate** | 1) To be able to counsel patients and families effectively, about nutrition, exercise, compliance with medications, smoking cessation, blood pressure control, risk factors to optimize preservation of renal function, other risk factors to reduce cardiac risk, and other issues.  
2) To be able to refer patients appropriately to available resources that promotes preventive medicine.  
3) To be aware of lifestyle and quality of life issues related to modalities of renal replacement therapy and be able to guide patient decisions accordingly.  
4) To help inform house officers and physicians from other departments about the importance of the risk factor modification in renal disease.  
5) In the case of inherited renal diseases (adult polycystic kidney disease in particular), to ensure that patients are informed and that appropriate screening measures are taken for other family members, when indicated.  
6) To be able to counsel patients about the risk of transmission to off springs and the risk/benefits of early detection in children.  
7) To suggest family planning where appropriate.  
8) To recognize impending dialysis access failure and take pro-active measures to correct. |
### Trainee Role

<table>
<thead>
<tr>
<th>Scholar</th>
<th>Professional</th>
</tr>
</thead>
<tbody>
<tr>
<td>1) To be able to find/retrieve and critically appraise sources of medical information.</td>
<td>1) To be able to apply knowledge of the professional codes and norms of behavior that governs the behavior of physicians in clinical practice (act in a responsible fashion).</td>
</tr>
<tr>
<td>2) To demonstrate active participation in scholarly activities in the Department on an ongoing basis.</td>
<td>2) To relate to patients in an empathic manner while maintaining the boundaries of a professional relationship.</td>
</tr>
<tr>
<td>3) To be able to teach medical students, residents and other health-care professionals, both in a formal setting (e.g. presentation at a conference), and informally, or at the &quot;bedside&quot;.</td>
<td>3) To notify staff and secretaries in a timely fashion ahead of planned absences, when appropriate, to arrange for back-up coverage during absence.</td>
</tr>
<tr>
<td>4) To be able to contribute to the development of new knowledge, through the completion or participation in a research project.</td>
<td>4) To be able to apply knowledge of the legal codes and norms of behavior that governs the behavior of physicians in clinical practice.</td>
</tr>
<tr>
<td>5) To recognize his/her own limitations and seek advice when appropriate.</td>
<td>5) To recognize his/her own limitations and seek advice when appropriate.</td>
</tr>
<tr>
<td>6) To be able to recognize and resolve ethical issues as they arise in clinical practice, e.g. consent, confidentiality, advanced directives, management of incompetent patients, end-of-life care, and bioethical issues related to cadaveric and live kidney donation, etc.</td>
<td>6) To be able to recognize and resolve ethical issues as they arise in clinical practice, e.g. consent, confidentiality, advanced directives, management of incompetent patients, end-of-life care, and bioethical issues related to cadaveric and live kidney donation, etc.</td>
</tr>
<tr>
<td>7) To be able to recognize the cultural/ethnic, gender, and socioeconomic diversity of the population.</td>
<td>7) To be able to recognize the cultural/ethnic, gender, and socioeconomic diversity of the population.</td>
</tr>
<tr>
<td>8) To be able to recognize and deal with unprofessional behavior in clinical practice.</td>
<td>8) To be able to recognize and deal with unprofessional behavior in clinical practice.</td>
</tr>
</tbody>
</table>
ELABORATION OF GENERAL CLINICAL PEDIATRIC NEPHROLOGY

SPECIFIC TRAINING OBJECTIVES

A. Glomerular Diseases

Program Content

- Trainees should acquire a general understanding of the following areas:
  - Structure and function of the normal glomerulus and how alteration of these leads to the cardinal features of glomerular injury (proteinuria and reduced glomerular filtration rate [GFR]).
  - Principal immunologic mechanisms causing human glomerular diseases and the features that distinguish them by immunofluorescence and electron microscopy.
  - 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:
  - The causes, clinical decision-making, and treatment of common and uncommon causes of hematuria and proteinuria.
  - Etiology and clinical findings of glomerular syndromes, including nephrosis, nephritis, and rapidly progressive glomerulonephritis (RPGN) 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:
  - Nephrotic syndrome: epidemiology, manifestations, pathology, pathophysiology, treatment and complications; Infantile nephrotic syndrome; Primary nephrotic syndrome; Minimal lesion nephrotic syndrome, focal and 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.
  - Membranoproliferative glomerulonephritis, including types I, II, and III, and the clinical and pathological features of this disorder in association with hepatitis C.
  - 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.
  - IgA nephropathy, especially its clinical course, natural history, and prognostic markers.
  - Post-infectious glomerulopathies, including bacterial, viral, parasitic, rickettsial, and fungal infections, and their epidemiology, clinical course, and response to therapy, especially with respect to post streptococcal 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:

- Necrotizing and crescentic glomerulonephritis
  - Anti-glomerular basement membrane disease
  - Immune complex diseases, including lupus nephritis, post-infectious glomerulonephritis, and Henoch-Schonleinpurpura
  - Pauci-immune glomerulonephritis and small vessel vasculitis

- Renal manifestations of other nephritis associated with systemic diseases: Henoch-Schonleinpurpura, systemic lupus erythematosus, antiphospholipid disease, Wegener’s granulomatosis, necrotizing vasculitis/polyarteritis, and diabetes mellitus.

- Hereditary glomerular diseases:
  - Alport syndrome
  - Familial nephritis and idiopathic hematuria
  - Nail-patella syndrome
  - Fabry disease

### Patient Care Experience

Trainees should be familiar with and have experience in:

- Diagnosis and management of patients with isolated proteinuria, hematuria, nephrotic syndrome, and acute glomerulonephritis.

- Serological evaluation of glomerulonephritis, including the diagnostic value and limitations of antiglomerular basement membrane (anti-GBM), antineutrophil cytoplasmic antibody (ANCA), antinuclear and antimicrobial antibodies, hypocomplementemia, and cryoglobulinemia.

- Indications for and complications of renal biopsy, as well as the morphological and immunohistological features of the major glomerular diseases.

- Treatment of patients with nephrotic syndrome and acute glomerulonephritis, both renal-limited and secondary to systemic diseases, including the medications, complications, and value of various immunosuppressive protocols.

### B. Hemolytic Uremic Syndrome

#### Program Content

Trainees should acquire a general understanding of the following areas:

- Structure and function of normal vessels and how alteration of these leads to the cardinal features of vascular injury (anemia, thrombocytopenia, and reduced GFR).
Principal immunologic mechanisms causing human vascular diseases and the features that distinguish them by immunofluorescence and electron microscopy.

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 vascular injury.

- Trainees should be familiar with and develop an in-depth knowledge of:
  - Classification, Epidemiology, Infection-induced Secondary (HUS) Shiga toxin-producing *E. coli* (STEC) streptococcus pneumoniae, epidemiology, pathogenesis, clinical manifestations, management outcome HIV infection, H1N1, non-infectious secondary causes, diagnosis, differential, evaluation, and treatment
  - Primary HUS: complement-mediated HUS, epidemiology, pathogenesis, clinical manifestations, management, and outcome

- Trainees should develop an in-depth knowledge of:
  - Infection-induced hemolytic-uremic syndrome:
    - Epidemiology
    - Clinical manifestations
    - Diarrhea
    - Other manifestations
    - Diagnosis
    - *E. coli* O157:H7
    - *E. coli* O104:H4
    - Treatment
    - Microbiology
    - Pathogenesis
    - Infectious dose
    - Attachment events
    - Shiga toxins
    - Virulence Plasmid
    - Transmission
    - Foodborne
    - Beef
    - Other foods
    - Person-to-person
    - Animal contact
    - Prevention
  - Infection-induced secondary hemolytic-uremic syndrome
    - Classification
    - Microbiology
    - Enterohemorrhagic *E. coli*
    - Shigella
    - Epidemiology
    - Clinical and laboratory manifestations
- Microangiopathic hemolytic anemia
- Thrombocytopenia
- Acute kidney injury (AKI)
- Other organ involvement
- Pathology
- Evaluation
- Evidence of Shiga toxin-producing E. coli infection (STEC) infection
- Diagnosis
- Differential diagnosis
  - Primary hemolytic-uremic syndrome (HUS): complement-mediated
    - Definitions
      - Microangiopathic hemolytic anemia (MAHA)
      - Thrombotic microangiopathy (TMA)
      - Overview of primary TMA syndromes
      - Systemic disorders associated with MAHA and thrombocytopenia
      - Initial evaluation (all patients)
      - Verification of MAHA and thrombocytopenia
      - Exclusion of systemic disorders
      - Evaluation for primary TMA syndromes
      - Key distinguishing features among the primary TMA syndromes
      - Features of individual primary TMA
      - Laboratory evaluation:
        - All patients
        - Diarrhea/known infectious diarrhea exposure
        - Role of complement testing
        - Role of molecular testing
        - Role of kidney biopsy
      - Immediate management decisions
      - Plasma exchange (Pex)
      - Anti-complement therapy
      - Additional therapies
      - Summary and recommendations
    - Classification, epidemiology
      - Genetic complement disorders
      - Pathogenesis
      - Genetic mutations
      - Factor H mutations
      - Cd46 mutations
      - Factor I mutations
      - C3 mutations
      - Factor B mutations
      - Thrombomodulin mutations
      - Complement antibodies
      - Other genetic causes
      - Clinical manifestations
      - Clinical course and outcome
C. Diabetes Mellitus And Diabetic Nephropathy

Program Content

- Trainees should acquire a general understanding of current concepts of the pathophysiology of diabetic glomerulosclerosis (DGS), including:
  - Epidemiology and course of nephropathy in insulin-dependent diabetes mellitus (IDDM)
  - Pathophysiologic mechanisms and histologic manifestations of diabetic nephropathy (DN)
  - Strategies for prevention of DN
  - Therapy of established DN
  - Modalities of therapy for end-stage renal disease (ESRD) in DN, including hemodialysis and peritoneal dialysis, kidney transplantation, and kidney-pancreas transplantation
• Trainees should develop an in-depth knowledge of:
  o Various mechanisms in which diabetes mellitus (DM) may affect the kidneys and urinary tract
  o Cardinal clinical and histological features, as well as the epidemiology and course of DGS in patients with IDDM and NIDDM
  o Results of clinical trials designed to prevent DN or slow its progression
  o Relative merits of different modalities of therapy for ESRD in diabetic patients, including hemodialysis and peritoneal dialysis, kidney transplantation, and kidney-pancreas transplantation

• Trainees should be familiar with:
  o Definition, interpretation, prognostic value, and clinical use of microalbuminuria
  o Unique medical and surgical problems facing patients with advanced DN as well as their management

Patient Care Experience
• Trainees must have experience in the evaluation and management of patients with progressive insulin-dependent DN. Experience with treatment of blood pressure, fluid-electrolyte disorders, glycemia, and non-renal diabetic complication is needed.
• Trainees must have experience in the evaluation and management of patients with end-stage DN who are receiving hemodialysis and peritoneal dialysis.
• Trainees must have experience with the evaluation of patients with DN for renal transplantation.
• Trainees must have experience in managing patients with DN during and after renal transplantation.

D. Hypertension

Program Content
• Trainees must acquire knowledge and understanding of the following areas during the course of their training:
  o Epidemiology of hypertension
  o Pathogenesis and natural history of primary hypertension
  o Evaluation of the hypertensive patient
  o Non-pharmacologic therapies of hypertension
  o Pharmacology and clinical use of antihypertensive agents
  o Hypertension in renal parenchymal disease during chronic dialysis and after renal transplantation
  o Renovascular hypertension: pathogenesis, causes, clinical features, screening and diagnostic tests, and management
  o Pheochromocytoma: pathophysiology, clinical features, diagnosis, and management
o Primary aldosteronism: pathophysiology, clinical features, diagnosis, and management
o Other forms of secondary hypertension: Cushing’s syndrome, congenital adrenal hyperplasia, coarctation of the aorta, thyroid disease, hyperparathyroidism, acromegaly, sleep apnea, and drugs
o Hypertensive emergencies and urgencies

Patient Care Experience

- Trainees should be familiar with and have experience in the following areas in both the outpatient and inpatient setting:
  - Trainees must be able to assess 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.
  - Trainees must be able to define goals of treatment, be familiar with the nonpharmacological modalities as well as the use and side effects of antihypertensive agents, and be able to make appropriate therapeutic choices in the context of comorbid conditions.
  - Trainees must be familiar with the management of hypertension in renal parenchymal disease during chronic dialysis and after renal transplantation.
  - Trainees must be able to identify symptoms and signs suggestive of secondary causes of hypertension and be familiar with various screening and diagnostic tests as well as the management of these disorders.
  - Trainees must become familiar with the management of various hypertensive emergencies and urgencies

E. Acute Kidney Injury And Intensive Care Unit Nephrology

Program Content

- Trainees must acquire knowledge and understanding of the following areas during the course of their training:
  - Normal regulation of renal and glomerular hemodynamics
  - Differential diagnosis of acute kidney injury (AKI)
    - Pathophysiology of prerenal azotemia
    - Pathophysiology of intrinsic renal failure, including acute glomerular diseases, acute tubular necrosis, and acute interstitial disease
    - Pathophysiology of obstructive renal failure
  - Mechanisms of AKI in the postoperative patient
  - Mechanisms of AKI in patients with hepatobiliary disease
  - Causes of AKI in patients with cancer and immunosuppression
  - Causes of AKI in patients with sepsis
  - Metabolic consequences of AKI:
    - Hormonal
    - Nutritional
Electrolyte
– Acid-base
– Volume
o Evaluation and management of AKI:
  – Radiological techniques in AKI
  – Biochemical evaluation of AKI
  – Role of the renal biopsy in AKI
  – Nondialytic therapy
  – Dialytic therapies:
    ▷ Role of hemodialysis
    ▷ Role of peritoneal dialysis
    ▷ Role of continuous therapy
o Hemodynamic monitoring of the critically ill patient
o Management of electrolyte/acid-base disturbances in the critically ill patient
o Fluid management of the critically ill patient
o Use of vasoactive drugs in the critically ill patient
o Role of extracorporeal therapy in the management of drug toxicity

Patient Care Experience
• Trainees must have experience in the evaluation and management of AKI.
• Trainees must have experience in the evaluation and management of fluid-electrolyte and acid-base disturbances in critically ill patients.
• Trainees must have experience in the evaluation of hemodynamic and the proper use of fluids and vasoactive drugs in critically ill patients.
• Trainees should have experience in the use of various dialytic techniques, including hemodialysis, peritoneal dialysis, and continuous venovenous hemodiafiltration.
• Trainees should have experience in the use of extracorporeal therapy to remove specific toxins.
• Trainees should have experience in central line placement.

F. Chronic Kidney Disease

Program Content
• Trainees must acquire knowledge and understanding of the following areas during the course of their training:
  o Various etiologies of chronic kidney disease (CKD)
  o 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 pre renal processes
    – Diagnosis of obstructive processes
    – Diagnosis of systemic processes that led to CKD, specifically:
- Diabetes mellitus
- Hypertension
- Ischemic renal disease

- 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
- Pre-dialysis management of CKD with particular regard to diet, anemia, metabolic bone diseases, and drug dose adjustments
- Role of anemia in the management of patients with CKD, including management of the anemia of chronic renal failure with the use of iron, erythropoietin, and other appropriate agents.
- Indications for initiation of ESRD therapy and placement of ESRD access in patients with CKD
- Appropriate use of drugs, including dose modification, for patients with progressive CKD
- Interpretation of radiographic tests, including intravenous pyelography, computed tomography, ultrasound, and radionuclide scan, in patients with CKD.

**Patient Care Experience**

- Trainees must have experience in the management of patients with CKD.
- Trainees must 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.
- Trainees must be competent to interpret voiding cystourethrogram, radiopharmaceutical studies, renal arteriography, and renal ultrasound in the diagnosis of patients with CKD.
- Trainees must be competent to perform and must have performed a sufficient number of percutaneous renal biopsies.
- Trainees must have interpreted an appropriate number of renal biopsies so that they are comfortable in reviewing histologic features and assigning appropriate diagnoses.

**G. Acid-Base Disorders**

**Program Content**

- Trainees must acquire knowledge and understanding of the following areas during the course of their training:
  - Acid-base chemistry and buffering
  - Determinants of arterial carbon dioxide tension and carbon dioxide balance
GENERAL CLINICAL PEDIATRIC NEPHROLOGY

- 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
- Clinical evaluation of acid-base disorders
- Renal tubular acidosis: pathogenesis, clinical features, causes, diagnosis, and management
- Uremic acidosis: acid-base homeostasis in ESRD
- Other types of metabolic acidosis: pathogenesis, clinical features, causes, diagnosis, and management
- Metabolic alkalosis: pathogenesis, clinical features, causes, diagnosis, and management
- Respiratory acidosis: pathogenesis, clinical features, causes, diagnosis, and management
- Respiratory alkalosis: pathogenesis, clinical features, causes, diagnosis, and management
- Mixed acid-base disturbances

Patient Care Experience
- Trainees should be familiar with and have experience in the following areas in both the outpatient and inpatient setting:
  - Trainees must assess the accuracy of the acid-base parameters and interpret serum and urine acid-base data, including the anion gap.
  - Trainees must determine 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.
  - Trainees must have experience in managing renal tubular acidosis, uremic acidosis, and acid-base homeostasis in ESRD.
  - Trainees must have experience managing all other types of metabolic acidosis.
  - Trainees must have experience in the management of respiratory acidosis and alkalosis.
  - Trainees must have experience in the management of mixed acid-base disorders.

Fluid And Electrolyte Disorders

Program Content
- Trainees must acquire knowledge and understanding of the following areas during the course of their training:
  - Physiology of sodium balance, including sensors of extracellular volume, effector systems, tubular sodium transport processes, and the regulation of renal sodium excretion
  - Hypovolemia: pathophysiology, causes, clinical features, diagnosis, and management
o Edematous disorders: pathophysiology, causes, clinical features, diagnosis, and management
o Clinical use and complications of diuretics
o Physiology of water balance, including tonicity sensors, effector systems, the countercurrent mechanism for urine concentration, the cellular physiology of collecting duct water reabsorption and the regulation of water excretion by the kidney
o Hyponatremia: pathophysiology, causes, clinical features, diagnosis, and management
o Hypernatremia: pathophysiology, causes, clinical features, diagnosis, and management
o Evaluation and management of polyuric patients
o 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
o Hypokalemia: pathophysiology, causes, clinical features, diagnosis, and management
o Hyperkalemia: pathophysiology, causes, clinical features, diagnosis, and management
o Disorders of sodium, water, and potassium balance in ESRD

Patient Care Experience

- Trainees should be familiar with and have experience in the following areas in both outpatient and inpatient setting:
  - Trainees must be able to assess the validity and relevance of serum and urine electrolyte measurements for patient management.
  - Trainees must be able to assess volume status (including the interpretation of central venous pressure) as well as recognize and manage hypovolemic and edematous disorders.
  - Trainees must be familiar with the use and complications of diuretic therapy.
  - Trainees must be able to evaluate and manage hyponatremia in the acute and chronic setting.
  - Trainees must be able to evaluate and manage hypernatremia in the acute and chronic setting.
  - Trainees must be able to evaluate and manage the polyuric patient.
  - Trainees must be able to evaluate and manage the patient with hypokalemia or hyperkalemia. They must be familiar with the acute as well as the long-term management of these disorders.
  - Trainees must be able to evaluate and manage disorders of sodium, water, and potassium in patients with ESRD.
I. Cystic And Inherited Diseases Of The Kidney

- Cystic inherited tubular disorders, epidemiology, mode of inheritance, manifestations, diagnosis, management, and complications:
  - Specific disorders:
    - Autosomal recessive polycystic kidney disease
    - Autosomal dominant polycystic kidney disease
    - Glomerulocystic disease
    - Multicystic renal dysplasia
    - Acquired cystic kidney disease
    - Solitary cysts
    - Medullary cystic disease
    - Medullary sponge disease
  - Multiple malformation syndrome
  - Tubular disorders:
    - Glucosuria
    - Phosphate wasting syndrome
    - Bicarbonate wasting syndrome
    - Renal tubular acidosis
    - Fanconi syndrome and cystinosis
    - Disorders of sodium handling
    - Disorders of potassium handling
    - Diabetes insipidus
    - Disorders of vitamin D metabolism

J. Tubulointerstitial Disease And Urinary Tract Infection

Program Content

- Trainees should acquire a general understanding of:
  - Structure and function of the normal renal tubules and interstitium
  - Pathophysiological mechanisms of acute and chronic interstitial diseases:
    - Immunologically mediated interstitial nephritides
    - Interstitial scarring as a consequence of primary glomerular and vascular diseases
    - Reflux nephropathy
    - Obstructive nephropathy
  - Pathophysiology of interstitial disease:
    - Immunopathogenetic and non-immune mechanisms
    - Relationship to glomerular function
    - Association with major tubular defects, including diabetes insipidus, acidification, and potassium excretion
    - Effects of acute and chronic urinary obstruction
  - Diagnostic procedures:
    - Assessment of tubular defects
    - Evaluation of obstruction
– Definition of acute and chronic interstitial nephritis
  o Pathogenesis and treatment of bacterial urinary tract infections:
    – Major pathogenetic species, routes, and course of infection
    – Appropriate antibiotic choices
    – Appropriate workup of the patient with multiple or resistance infections

**Patient Care Experience**

- Trainees should develop an in-depth knowledge of:
  o Clinical features, causes, course, and treatment of acute allergic interstitial nephritis
  o Clinical features, predisposing factors, complications, bacteriological profile, and treatment of acute pyelonephritis
  o Management of patients with symptomatic and asymptomatic bacteriuria, including familiarity with:
    – Major pathogenic species, routes, and course of infection
    – Appropriate antibiotic choices
    – Appropriate workup and treatment of patients with recurrent or resistant infections
  o 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:
  o Pathological features of acute and chronic interstitial nephritides
  o Clinical laboratory tests to evaluate aspects of tubular function, concentrating ability, urine acidification, potassium handling, and various reabsorptive functions

K. **Disorders Of Divalent Cation And Mineral Metabolism**

**Program Content**

- Trainees must acquire knowledge and understanding of the following areas during the course of their training:
  o Calcium and phosphorus balance in humans
  o Renal handling of calcium, magnesium, and phosphorus
  o Physiology of calciotropic hormones, specifically parathyroid hormone, vitamin D, calcitonin, and parathyroid hormone-related peptide
  o An integrated view of calcitropic hormone regulation in normal situations and in the context of acute and chronic renal failure
  o Bone physiology
  o Methods to diagnose and treat different types of renal osteodystrophy, interpretation of bone biopsies, and experience in the interpretation of bone biopsies in chronic renal disease
Pathogenesis and treatment of calcium nephrolithiasis, urate nephrolithiasis, oxalate nephrolithiasis infected stones, and cystine stones

Surgical procedures necessary for the treatment of stone disease

Patient Care Experience

- 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:
  - Different types of renal osteodystrophy
  - Hyper and hypocalcemia, hyper-and hypophosphatemia and hypo-and hypermagnesemia
  - Various forms of nephrolithiasis (significant exposure)
  - Interpretation of bone biopsies

L. Renal Function Testing

Program Content

- Trainees are encouraged to develop knowledge and expertise in the following areas, including indications, contraindications, and complications, interpretation of results, cost effectiveness, and application to patient care:
  - Urinalysis, including dipstick and sediment
  - Measurement of renal plasma flow and GFR, including interpretation of serum creatinine concentration and calculation of its clearance rate
  - Measurement of renal concentrating and diluting capacity
  - Measurement of microalbuminuria
  - Measurement of proteinuria using semi-quantitative and quantitative methods
  - Assessment of urinary acidification
  - Assessment of renal sodium and potassium handling
  - Renal radiology:
    - Urography
    - Ultrasonography
    - Radionuclide scans
    - Computed tomography
    - Magnetic resonance imaging
    - Renal circulation imaging (angiography)
Patient Care Experience

- Trainees must be given sufficient direct experience to develop expertise in their performance and interpretation of:
  - Urinalysis
  - Accurate and timed complete collection of urine for renal function testing, proteinuria, and microalbuminuria
  - Fractional excretion of electrolytes
  - Renal function clearance studies

M. Pharmacology Of Drugs In Renal Disease

Program Content

- Trainees must acquire knowledge and understanding of the following areas during the course of their training:
  - Principles of drug pharmacokinetics
  - Renal handling of drugs and chemicals
  - Mechanisms of drug metabolism
  - Drug prescribing in disease states and during dialysis
  - Relevant drug-drug interactions
  - Mechanisms of drug nephrotoxicity
  - Management of drug-induced renal diseases
  - Therapeutic drug monitoring
  - Renal transplant immunosuppression

Patient Care Experience

- Trainees should also be familiar with, and preferably have experience in, the following areas, in both an outpatient and inpatient setting:
  - Trainees must diagnose and manage patients with different drug-induced renal syndromes.
  - Trainees should be able to prescribe for and adjust drug dosage in patients with renal dysfunction.
  - Trainees should understand indications of therapeutic drug monitoring.
  - Trainees should be able to access drug and poison information.
  - Trainees should be familiar with common overdoses, poisoning and the need for extracorporeal therapy.
  - Trainees should prescribe and manage immunosuppression for renal transplantation

N. Communicator

- Communication with patients and families.
  - Target Performance: to establish exceptional rapport, put patients/family at ease, provide clear explanations, and excellent listening skills.
• Written communication with referring physician.
  o Target Performance: to develop and write letters which are prompt, concise, comprehensive, accurate, and informative.
• Verbal communication with referring physician
  o Target Performance: to display exemplary communication with primary doctor while demonstrating respect, responsibility, and clinical competence.
• Communication with nephrology team
  o Target Performance: to develop concise, comprehensive, informative notes.
  o Display exemplary communication with other physicians demonstrating respect and responsibility.

O. Collaborator

• Describe the roles and responsibilities of other members of the health care team
  o Target Performance: to display a superior understanding of the roles and responsibilities of other health care team members and to understand how they are best able to contribute to patient care collaboratively.
• Works effectively with inter-professional team to assess, plan, provide, and integrate care
  o Target Performance: to work as an active team member whose leadership qualities others recognize, has the ability to achieve best results in difficult situations without antagonizing others.
• Works well with other health care team members to prevent, negotiate, and resolve inter-professional conflict
  o Target Performance: to anticipate situations where conflicts may arise, take steps to avoid them, listen effectively to other health care team members’ concerns, negotiate effectively, and show leadership in addressing them.

P. Manager

• Time management
  o Target Performance: to use time efficiently to optimize professional performance and learning.
• Clinical priority setting
  o Target Performance: to consistently and expertly set priorities among multiple patient care demands.
• Team management
  o Target Performance: to provide house staff with superb support, backup and feedback.
• Resource management
  o Target Performance: to consistently and expertly set priorities among multiple patient care demands.
• Quality assurance
  o Target Performance: to initiate quality assurance projects.
Q. **Health Advocate**

- **Individual health**
  - **Target Performance:** to consistently take a proactive and preventive approach to patient care and effectively lobby on a patient’s behalf.

- **Hospital setting**
  - **Target Performance:** to display exemplary performance in the role as an advocate for local patients with renal disease.

- **Population health**
  - **Target Performance:** to display exemplary performance in the role of advocate and to decrease the burden of illness from renal disease within the Saudi population.

R. **Scholar**

- **Personal education strategy**
  - **Performance Target:** to show well-developed self-assessment and self-directed learning skills.

- **Evidence based medicine**
  - **Performance Target:** to be a superb critical thinker who regularly integrates his/her critical appraisal structured approach to patient care.

- **Contribution to teaching of others (patients, house staff, other members of the health care team)**
  - **Performance Target:** to display enthusiasm in teaching to help create a good learning environment.

- **Contribution to rounds and other formal learning events**
  - **Performance Target:** to develop superior quality presentations - quality equivalent to faculty member- excellent use of literature.
S. Professional

- Honesty, integrity, compassion
  - Target Performance: to consistently demonstrate integrity, honesty, compassion, and respect for diversity
- Professional obligations
  - Target Performance: to show an in-depth understanding of the medical, legal, and professional obligations of a Nephrologist
- Professional behavior
  - Target Performance: to consistently meet deadlines, be punctual, monitor patients, and provide follow up.
- Ethical behavior
  - Target Performance: to display an in-depth understanding of the principles of ethics and consistently apply these in clinical situations, as well as to be able to impart ethical teaching to team.
- Awareness of own limitations
  - Target Performance: to consistently be aware of own limitations, consistently seek assistance or feedback to compensate for limitations, and to accept advice graciously.
OUTPATIENT CLINIC ROTATION

OUTPATIENT CLINIC ROTATION - SPECIFIC OBJECTIVES

A. Medical Expert

Goals
- Trainees will learn the skills of outpatient management to allow timely and efficient achievement of patient outcomes and recognize when there is a need for urgent inpatient management.
- Trainees will refine consultant skills in the context of outpatient internal medicine patient care.
- Trainees will develop dictation skills.
- Trainees will develop independence in the management of common multi-system illnesses.
- Trainees will have the opportunity to interact with patients and their illnesses in a long-term relationship.
- Trainees will become familiar with the approach to the diagnosis and management of a wide variety of problems.
- Trainees will be able to assess the priority and urgency of patient issues, and manage their own appointment schedule to accommodate them.
- Trainees will be able to prioritize patient care issues and plan follow-up appropriately.
- Trainees will recognize when a patient requires urgent care due to rapidly progressive presentations.

B. Manager

Goals
- Trainees will learn the skills of arranging care both within and outside the office setting to allow timely and efficient achievement of patient outcomes.
- Trainees will be able to assess the priority and urgency of patient issues, and manage their own appointment schedule to accommodate them.
- Trainees will be able to prioritize patient care issues and plan follow-up appropriately.
- Trainees will recognize when a patient requires specialized care that can only be provided in the context of a transplant program.
C. Professional

Goals
- Trainees will recognize and act on the particular professional duties of the ambulatory experience.
- Trainees will be punctual and reliable in attending the ambulatory experience.
- Trainees will complete tasks they begin, including documentation, following up on tests and other aspects of patient care.
- Trainees will demonstrate professional attitudes in interactions with patients, families, office staff, and other healthcare professionals both in the office and between visits.

D. Health Advocate

Goals
- Trainees will consistently act to advance the care of their ambulatory patients within the health care system.
- Trainees will link patients consistently to needed programs and services.
- Trainees will demonstrate understanding of government funding of therapy and consistently act to ensure their patients’ access therapies through these programs as needed.
- Trainees will consistently identify barriers (e.g. financial, social, and psychological) to patients’ care and develop plans to overcome them.
- Trainees will promote disease prevention with patients and facilitate the institution of preventative measures.

E. Scholar

Goals
- Trainees will identify their learning needs and address them to develop a comprehensive understanding of the content area.
- Trainees will develop a personal learning plan covering the core learning objectives of the rotation.
- Trainees will be aware of resources that will allow them to maintain their knowledge of the field on an ongoing basis.

F. Communicator

Goals
- Trainees will consistently communicate clearly, empathically, and effectively with patients, families, and other care providers.
- Trainees will demonstrate effective tools for gathering historical information from patients and their families.
- Trainees will routinely elicit patients’ concerns and views in the course of care.
• Trainees will provide patients with essential information related to diagnosis, prognosis, and treatment in a clear and understandable manner that encourages patient autonomy and participation in decisions for care.
• Trainees will clearly and accurately document patient encounters (including disclosure of side effects or risks of treatment), phone conversations, and other communications with patients.
• Trainees will clearly communicate the relevant issues of a patient to a transplant program when there is a need for advice or transfer of care.

G. Collaborator

Goals
• Trainees will work with other providers to improve the care of patients.
• Trainees will seek and incorporate the advice of other practitioners in the care of their patients.
• Trainees will work closely with patients and families to promote cooperation and adherence to treatment recommendations.
A. Chronic Kidney Disease (CKD) Pre-Dialysis Care

Medical Expert
Goal: To gain experience in the current standards of care in CKD.

Communicator And Collaborator
Goal: To gain clinical experience in working with multidisciplinary team.

Manager And Health Advocate
Goal: To gain experience in dealing with CKD issues:
- Prevention of progression
- Nutrition
- Anemia
- Modality selection
- Access
- Mineral metabolism
- Hypertension

Scholar
Goal: To examine the literature and participate in clinical rounds and journal clubs on current guidelines and clinical practice.

Professional
Goal: To carry out duties in a professional manner.

B. Peritoneal Dialysis Specific Training Objectives

Medical Expert
Goals:
- Anatomy and Physiology of Peritoneal Dialysis (PD): The nephrology trainee should be able to:
  - Describe the gross anatomy of the peritoneal membrane, including its vascular supply and lymphatic drainage, as well as the microscopic anatomy and relative disposition of the mesothelium, interstitium, and peritoneal capillaries.
  - Understand the basic principles underlying peritoneal transport, including knowledge of the relative tissue resistances to peritoneal transport and an awareness of the three pore theory and the distributed model of peritoneal transport.
Discuss the three components of peritoneal transport (i.e., diffusion, ultrafiltration, and fluid absorption), the factors that influence them, and how they might be modified to alter clearance and fluid removal, including a basic knowledge of how these transport functions are measured, and how they might be assessed clinically [e.g., mass transport area coefficient, peritoneal equilibration test (PET)].

Understand the PET, how it is carried out, potential problems associated with its performance, interpretation of its results (D/P values for urea, creatinine, and sodium; D/D 0 values for glucose; and net ultrafiltration), and the implications of high and low transport status, and the associated risks for the patient.

Describe the constituents of commercially available solutions for PD and how these might be altered to influence peritoneal transport (e.g., dialysate sodium level, alternative osmotic agents), and have an awareness of the concept of "sodium sieving" at the peritoneal membrane.

Understand the relationship between body surface area and peritoneal surface area as the rationale for standardizing peritoneal dwell volumes by body surface area.

**Peritoneal Dialysis Modalities, their Indications, and Associated Technology:**

The nephrology trainee should be able to:

- Understand both medical and social issues, and have knowledge of the principles of antibiotic prescription, modality selection, and dialysis prescription, and also an awareness of guidelines for vaccination.

- Describe the differences, advantages, and disadvantages of the various PD modalities [CAPD and automated peritoneal dialysis (APD) with/without day dwells], and the potential indications for these modalities, including their advantages and disadvantages with reference to clearances, ultrafiltration, cost, and effect on lifestyle, and have a knowledge of the principles underlying tidal PD, its advantages and disadvantages in terms of clearance, discomfort on drainage, cost, etc., and indications for its use.

- Understand the assessment of peritoneal transport properties by the PET and how the results influence PD modality selection (CAPD versus APD, long versus short day dwells, etc.

- Understand the technology and equipment associated with delivery of different modalities of PD, and have a knowledge of dialysis solution composition and volume of solution bags available (2 L, 2.5 L, 3 L, 5 L, etc.); transfer sets (straight-line versus V-set versus double-bag systems); adaptor/extension tubing; PD catheters, and the advantages and disadvantages of single-cuff versus double-cuff models, standard versus Swan neck catheters, and straight versus coiled versus otherwise modified catheter tips; the types of cyclers and night exchange devices available and their potential advantages and disadvantages, and the assist devices available to help in making connections between tubing and solution bags, and between tubing and catheter.
**Clearances on Peritoneal Dialysis: The nephrology trainee should understand:**

- The indices used to assess adequacy of clearances on PD (KT/V urea and normalized creatinine clearance) and how both the peritoneal and residual renal components of these are measured in PD patients, and have an awareness of potential errors in the measurement of these indices, the reasons for discrepancy between them, and an appreciation of the methods used and problems associated with normalizing these indices to body size.

- The concepts of target clearances for PD patients, their recommended values, and the underlying rationale and associated controversies (i.e. relative contributions of residual renal function and PD to total clearance); the results of major studies (e.g., the CANUSA Study) investigating the association between clearances and patient outcomes; the differences between intermittent and continuous clearance, in particular with reference to the greater efficiency of the latter in removing solute; and the hypotheses to appreciate the difference between them (i.e., peak concentration hypothesis, importance of urea rebound).

- The factors determining clearance in CAPD and how they might be altered to increase delivered clearances (i.e. increasing dwell volumes, increasing frequency of exchanges, increasing ultra-filtration); the relative advantages and disadvantages of these factors in clinical and economic terms, and how they should be applied in the context of the patient's social and clinical circumstances.

- The factors determining clearance in APD regimens and be aware of how these factors might be altered to increase delivered clearances (e.g., addition of day dwells, alteration of cycler dwell volumes, number of cycles), and appreciate the relative advantages and disadvantages of altering these factors in clinical and economic terms, and their effect on patient lifestyle.

- The importance of residual renal function in PD patients, with particular reference to its better preservation on PD relative to hemodialysis, and to its strong power for predicting clinical outcomes in PD patients, and possible explanations for these findings.

- How commercially available computer programs can be used to calculate PD clearance and model PD prescriptions, and the advantages and disadvantages of such modeling.

- The clearance indications for initiations of PD and how they might be applied and the concept of "incremental" versus "maximal" or "full-dose" PD.

**Ultrafiltration and Management of Fluid Overload: The nephrology trainee should:**

- Understand how the basic principles underlying peritoneal transport apply to fluid removal by PD, with particular reference to factors affecting ultra-filtration and peritoneal fluid absorption (including lymphatic flow), and how these might be altered in clinical practice; have an in-depth knowledge of the effect of the osmotic agent used (i.e. glucose or polyglucose) on the quantity of ultra-filtration achieved.
Know the current standardized approaches for evaluation of peritoneal fluid removal (i.e., PET) and factors that might affect the accuracy of this test.

Have an understanding of the concepts of "target" or "dry" weight and clinical fluid overload in PD patients, and know the differential diagnosis for fluid overload, the appropriate diagnostic approaches, and the therapeutic options available.

Understand the difference between fluid overload due to ultrafiltration failure and that due to other causes (i.e., noncompliance, mechanical problems, inappropriate choice of solutions, excess salt, and fluid intake).

Have an in-depth understanding of the evaluation of actual ultrafiltration failure, including knowledge of its classification and the physiology underlying the various causes, as well as the diagnostic approach and therapeutic options available for each.

Be aware of the natural history of peritoneal membrane function with time on PD and its potential effect on ultra-filtration.

- **Peritonitis And Exit-Site Infection:** The nephrology trainee should be aware of:
  - The criteria for the diagnosis of exit-site infection, tunnel infection, and peritonitis in PD patients.
  - Potential routes by which peritonitis is acquired, their relative importance, the common etiologic organisms (including *Staphylococcus epidermidis*, *Staphylococcus aureus*, *Enterococcus pseudomonas*, other gram-negative organisms, fungi, and mycobacteria), and the associated risk factors for these infections, and their significance in terms of patient outcome.
  - The importance of dialysis set tubing configuration (also known as "connectology") (e.g., straight-line systems, V-sets, double bags) as a determinant of peritonitis rate; this should include an appreciation of the effect alterations in the systems have had in reducing peritonitis rates and the mechanisms that may be responsible for this ("flush before fill," etc.).
  - Common etiologic organisms for exit-site infections and the associated risk factors for them, with particular reference to *Staphylococcus aureus* and the role of nasal carriage of this organism and its treatment with anti-infective agents; the common strategies for exit-site management and the implications of exit-site infection for clinical outcome in terms of peritonitis, catheter loss, etc.
  - The management of exit-site infection, with both local and systemic measures, and recommendations made on this topic by the International Society for Peritoneal Dialysis (ISPD).
The management of peritonitis and knowledge of the typical antibiotic sensitivities of common etiologic organisms, dosing schedules for commonly used antibiotics, intraperitoneally, orally, and intravenously where relevant, and their associated side effects, and ISPD recommendations for treatment of peritonitis; and have an understanding of indications for catheter removal and subsequent reinsertion, and an awareness of the importance of detecting peritonitis secondary to intra-abdominal pathology (e.g., diverticulitis).

The complications of peritonitis, including increased dialysate protein losses, nutritional compromise, loss of ultra-filtration capacity, damage to the peritoneal membrane, etc.

**Mechanical Complications: The nephrology trainee should know:**

- The catheter-related mechanical complications associated with PD (malpositioned catheter, entrapped catheter, catheter-associated leaks, etc.) and have a detailed knowledge of the management of a nonfunctioning catheter (role of radiologic evaluation, laxatives, anticoagulant and fibrinolytic agents, catheter manipulation, laparoscopy, etc.), and an understanding of the clinical presentations for these catheter-related complications, the diagnostic evaluation (office and radiological), and the therapeutic options (both nonsurgical and surgical) to correct them.

- The mechanical complications associated with PD that are anatomic in nature [i.e., peritoneal leaks (subcutaneous, peritoneal-pleural, or hydrothorax) and hernias] and have a knowledge of the differential diagnosis of genital swelling in these patients, and an understanding of the clinical presentation for all these disorders and their diagnostic evaluation, office and radiological, and therapeutic options, both nonsurgical and surgical.

**Management of Nutritional Status:** The nephrology trainee should:

- Be aware of the indices commonly used in clinical practice to assess nutritional status [normalized protein equivalent of nitrogen. appearance. (nPNA), serum albumin, subjective global assessment, lean body mass by creatinine excretion, anthropometric measurements (e.g., skin fold thickness)], and have a knowledge of how these indices are measured and what problems may be associated with their measurement and use.

- Be aware of the predictive power of indices of nutritional status for predicting outcomes including death, hospitalization, and technique failure in PD patients.
• Know the appropriate dietary targets for PD patients, with particular reference to protein intake, caloric intake, and vitamin and other mineral requirements, and have a knowledge of how total energy intake (dietary intake plus peritoneal glucose absorption) can be estimated and be aware of how dietary protein intake can be assessed using nutritional records or measured nitrogen excretion; have known knowledge of some of the formulas used to estimate nPNA and potential problems with them, including issue of appropriate normalization.

• Understand the various etiologies of malnutrition in PD patients, with special reference to issues such as inadequate clearances, acidosis, comorbidity, inflammation, dialysate protein losses, growth hormone resistance, dialysate glucose absorption, dialysate-induced visceral compression, etc.

• Be aware of the factors influencing serum albumin in PD patients, with particular reference to peritoneal transport status, dialysate protein losses, and indices of inflammation (e.g., C-reactive protein).

• Be aware of potential strategies for treatment of malnutrition, with particular reference to correction of inadequate clearances, treatment of comorbidity, correction of acidosis, the role of oral nutritional supplements, enteral supplements via nasogastric tube or gastrostomy, intraperitoneal amino acids, and anabolic agents (e.g., anabolic steroids, recombinant growth hormone).

• Peritoneal Dialysis Solutions and Biocompatibility: The nephrology trainee should:
  - Be able to describe the basic composition of PD solution and the intended role of the individual components during dialysis.
  - Understand the biology of the peritoneal mesothelium and the first-line defense mechanisms against infection during PD.
  - Understand the unphysiologic nature of currently available PD solutions (low pH, hypertonicity) and their potentially harmful effects on PD defense mechanisms and the mesothelium.
  - Understand the issues related to the use of lactate as a buffer in PD patients and the potential issues associated with its replacement by bicarbonate as a buffer.
  - Have an awareness of newly available PD solutions, such as intraperitoneal amino acids and polyglucose preparations, and the indication for their use.
  - Be able to describe some of the potential toxicities associated with the use of glucose as an osmotic agent, with particular reference to the potential deleterious effects of glycosylation and of hypertonic solutions on the peritoneum, and of the potential adverse effects associated with glucose degradation products and other derivatives produced during solution manufacturing.
  - Understand the potential advantages and disadvantages of altering the concentrations of sodium and calcium in PD solution.
Hematologic, Electrolytic, and Metabolic Complications of Peritoneal Dialysis:
The nephrology trainee should be aware of:

- The causes of anemia in PD patients (erythropoietin deficiency, iron deficiency, infection, inflammation, etc.) and its significance as a predictor of adverse clinical outcomes.
- The management of anemia in PD patients, with particular reference to indications for the use of erythropoietin, recommended targets for hemoglobin/hematocrit, indices used to assess iron status (ferritin, transferrin saturation, etc.); and iron deficiency (oral and parenteral iron), the associated risks, and how they should be managed.
- The causes of hypernatremia, hyponatremia, hyperkalemia, hypokalemia, acidosis, and alkalosis in the PD patient and how they should be managed.
- The management of hyperglycemia in CAPD and APD patients with attention to the role of diet, PD solution tonicity, oral hypoglycemic agents, and insulin; this should also include knowledge of the advantages and disadvantages of intraperitoneal insulin and how a switch from subcutaneous to intraperitoneal dosing should be managed.
- Divalent ion metabolism, including the advantages and disadvantages of low versus high calcium formulations of PD solutions, choice of phosphate binders, indications for use of vitamin D, and monitoring of clinical indices (alkaline phosphatase, parathyroid hormone assays).
- The different types of renal bone disease, including renal osteodystrophy, a dynamic bone disease, and rickets; indications for bone biopsy and parathyroidectomy, and management of PD patients’ post-parathyroidectomy.
- The prevalence of abnormalities in serum lipids and lipid metabolism in PD patients, their possible etiology, significance, and how they might be managed, with particular reference to knowledge of the risks and benefits associated with commonly used lipid-lowering drugs.

Acute Peritoneal Dialysis: The nephrology trainee should:

- Know the indications/contraindications, as well as the advantages and disadvantages of acute PD compared to other forms of acute dialysis (i.e. hemodialysis and other continuous renal replacement therapies) in the management of acute renal failure, toxic/metabolic, electrolyte, or volume problems in critically ill patients.
- Be familiar with the technique for acute PD catheter placement - to be actually able to insert a catheter is a desirable skill and will be essential in some settings but not necessary at all in others, and so this is left to the discretion of individual training programs.
- Know how to prescribe acute PD in management of AKI and toxic/metabolic, electrolyte, and volume problems in critically ill patients.
- Know how to monitor patients on acute PD (i.e. fluid balance, electrolytes, glucose, etc.).
**Cardiovascular Disease in PD: The nephrology trainee should understand:**

- The high prevalence and incidence of cardiovascular disease in the dialysis population and how it is generally a significant predictor of clinical outcome.
- The possible risk factors for cardiovascular disease in the dialysis population, with particular reference to the importance of classic (hypertension, hyperlipidemia) and renal failure-related (anemia, malnutrition, inflammation, etc.) risk factors.
- Management strategies to modify risk factors favorably in PD patients, with particular reference to management of hypertension, hyperglycemia, and hyperlipidemia.
- Medical and surgical treatment strategies for cardiovascular disease and have an up-to-date knowledge of the potential risks and benefits in the treatment of left ventricular hypertrophy, hyperlipidemia, hypertension, and congestive heart failure, and how these might operate in the renal failure population.

**Transplantation in Peritoneal Dialysis Patients: The nephrology trainee should be aware of:**

- The importance of transplantation as a treatment option in PD patients.
- Eligibility criteria for transplantation in these patients, with particular reference to appropriate medical assessment, including diagnosis and management of relevant comorbid medical conditions such as cardiovascular disease and infection.
- The interaction between PD and transplantation, with particular reference to immediate pre- and postoperative patient management, the risks of delayed graft function in PD compared to hemodialysis patients, and the management of post-transplant exit-site infections and peritonitis.

**The Economics of Peritoneal Dialysis: The nephrology trainee should be aware of:**

- How to assess the costs of the various PD modalities in a given setting, and the costs associated with medical caregivers (physicians, nurses, etc.), solutions, tubing, cyclers and assist devices, hospitalization rates, training, etc., and how costs are influenced by alterations in PD prescription and how they compare with the costs for hemodialysis in the same setting.
- The funding mechanisms for provision of PD in the jurisdiction(s) in which the trainee intends to practice, how this compares with funding for hemodialysis in the same setting, and how all this might potentially influence modality selection, prescription of PD, and patient outcome.
The approximate costs and funding mechanisms for other treatments PD patients might require, such as erythropoietin, other commonly used medications, and nutritional supplements.

**Communicator And Collaborator**

Goals:
- To gain clinical experience in working with a multidisciplinary team.
- To assess patients in-training

**Manager And Health Advocate**

Goals:
- To gain experience in dealing with routine PD clinical issues:
  - Access
  - Infection
  - Mechanical
  - Adequacy
  - Nutrition

**Scholar**

Goals:
- To offer an opportunity for renal trainees to conduct clinical research in PD.
- The resident will develop a plan for self-improvement.

**Professional**

Goals:
- To be exposed to current guidelines and clinical practice (clinical rounds, journal clubs, etc.).
- The residents will carry out duties in a professional manner.
HEMODIALYSIS AND RELATED COMPLICATIONS

Program Content

- Types, advantages, disadvantages, complications, and management of acute and chronic hemodialysis access
- Available water treatment and dialysis delivery machines for hemodialysis
- Currently available hemodialyzers and their advantages and disadvantages, with emphasis on differences in membrane composition, biocompatibility, and solute and water flux
- Importance of and correct method of determining the dialysis prescription for hemodialysis and of monitoring the actual delivered dose of dialysis
- Most common complications of hemodialysis, including hypotension, cramps, arrhythmias, hemolysis, and air embolism
- Available techniques, advantages, and possible drawbacks of dialyzer reprocessing
- Continuous dialytic therapies, including continuous arteriovenous hemodiafiltration and continuous venovenous hemodiafiltration
- Nutritional considerations and management of ESRD patients
- Evaluation and management of complications of ESRD, including anemia, renal osteodystrophy, calcium and phosphorus metabolism, cardiac disease, hypertension, hyperlipidemia, and acquired cystic disease
- Appropriate use of drugs, including dose modifications for dialysis patients.

Patient Care Experience

- Trainees must manage patients with acute renal failure requiring dialysis treatment including intermittent hemodialysis, continuous peritoneal dialysis, and extracorporeal continuous renal replacement therapies.
- Trainees must manage patients with chronic renal failure on maintenance hemodialysis 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. The trainee will round with the attending nephrologist who manages that shift of patients at least weekly during which treatment decisions made by the trainee will be reviewed and feedback provided.
TRANSPORT SPECIFIC TRAINING OBJECTIVES

A. Medical Expert

Goals:

- Trainees will be able to manage common medical problems that occur in recipients of renal transplants.
- Trainees will be able to perform a fluent history and physical examination of a renal transplant patient.
- Trainees will be able to generate a focused diagnosis and management plan for new referrals and follow-up visits.
- Trainees will be aware of the pharmacology, mechanisms of action, dosing, monitoring and side effect profile of the following medications: cyclosporine, tacrolimus, mycophenolate, sirolimus, azathioprine, and prednisone.
- Trainees will be able to institute appropriate changes in a patient’s immunosuppression regimen based on clinical events and/or side effects.
- Trainees will be able to recognize and manage common opportunistic and non-opportunistic infections in renal transplant patients, such as pneumonia, urinary tract infections, cellulitis, and CMV infection.
- Trainees will be able to recognize and/or manage common non-renal medical issues post-transplant, including hypertension, hyperlipidemia, new-onset diabetes after transplant; osteoporosis and chronic kidney disease-metabolic bone disease; and anemia.
- Trainees will know the indications for renal transplant biopsy.
- Trainees will be aware of appropriate cancer screening in renal transplant patients.
- Trainees will be able to manage chronic kidney disease in a renal transplant recipient, as well as ensure timely referral to appropriate pre-dialysis care and timely initiation of renal replacement therapy in a patient with a failed graft.
- Trainees will be able to perform a pre-transplant assessment including selection of appropriate tests, and counseling of patients regarding the risks and benefits of transplantation.
## Program Content

### Immunology/Immunogenetics:
- Normal immune response
- Immune response to allograft, including mechanisms responsible for acute and chronic cellular and humoral rejection
- Inflammatory response to allograft
- Immunogenetics and tissue typing, crossmatching, and surveillance for panel reactive antibodies and donor specific antibodies:
  - Differences between complement-dependent cytotoxicity (CDC), complement-dependent cytotoxicity-antihuman globulin (CDC-AHG) and flow cytometry techniques
  - Virtual crossmatching
  - Difference between PRA and DSA
  - Difference between PRA and crossmatch

### Transplant Pharmacology:
- Basic principles of pharmacology, the mechanisms of action and side effects of immunosuppressant agents, including glucocorticoids, azathioprine, mycophenolate, mofetil, cyclosporine, tacrolimus, sirolimus, and monoclonal and polyclonal antibodies.
- Basic principles of pharmacology of non-immunosuppressive 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
- Methods of kidney allocation
- Effect of different allocation algorithms on organ distribution

### Infectious diseases in transplantation/pre- and post-transplantation
- Common infections post-transplant (pneumonia and urinary tract infections)
- Opportunistic infections (CMV, EBV, varicella and others)
- Viral hepatitis (B, C)
- HIV

### Metabolic complications and cardiovascular disease following transplantation:
- Hypertension
- Hyperlipidemia
- Diabetes mellitus
- Bone disease
Patient care experience

- Pre-transplant: education, counseling, and evaluation of donor and recipient
- Immediate post-operative management: evaluation and management of effective circulating volume, falling urine output and primary non-function of the transplanted kidney
- Early post-transplant management: establishment of adequate immunosuppression; diagnosis and therapy of rejection, infection, thrombotic microangiopathy, and urological and vascular complications; and diagnosis and management of drug interactions and toxicities
- 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 novo post-transplant glomerulonephritis, post-transplant polycythemia, a vascular necrosis, dyslipidemias, glucose intolerance, liver function abnormalities, lympho-proliferative diseases, and cancers affecting the skin and other organs

B. Communicator

Goals:

- To be able to clearly explain to patients and families the risks and benefits of transplantation, the outcomes of the different types of transplants and how the results of transplantation compare to dialysis.
- To be able to explain to families the structure of the waiting list for transplantation, the concept of sensitization, and the meaning of a positive crossmatch.
- To be able communicate with other members of the transplant team, such as transplant coordinators, nurses, transplant surgeons, and other consultants.
- To establish positive therapeutic relationships with the patient and their family that are characterized by understanding, trust, respect, empathy, and confidentiality.
- To gather information not only about the disease but also about the patient's beliefs, concerns, and expectations regarding the illness.
• To recognize that being a good communicator is an essential function of a physician, and understand that effective patient-physician communication can foster patient satisfaction and compliance as well as influence the manifestations and outcome of a patient’s illness.

• To be able to deliver information to the patient and family in a humane manner and in such a way that it is understandable, encourages discussion, and promotes patient’s participation in decision-making to the degree that they wish. In particular, the fellows must demonstrate the ability to discuss problems related to transplant failure, the role of the advanced directive, and the management of death from renal failure.

• To be able to synthesize relevant information from the patient or family, and document the patient’s condition and progress accurately (in writing), with emphasis on the relevant issues.

• To maintain up-to-date patient lists with relevant information for continuity of care, and to provide proper sign-over to colleagues.

• To communicate effectively with health care professionals. To produce letters to referring physicians that are written promptly, and are complete, accurate, and informative.

• To demonstrate effective consultation skills, including the ability to establish good relationships with peers and other health professionals, to effectively provide and receive information related to patient care, and to prepare documentation that is timely and accurate (written or verbal).

• To understand and demonstrate the importance of communication among peers and other health professionals involved in the care of individual patients such that the roles of these professionals are delineated and consistent messages are delivered to patients and their families.

• To communicate with secretaries in regard to scheduling of outpatient clinics and other responsibilities.

• Demonstrate skills in working with others who present significant communication challenges such as anger or confusion, or an ethno-cultural background different from the physician’s own.

C. Collaborator

Goals:

• To be able to interact effectively with other healthcare professionals, in particular the attending staff, other trainees, nursing, clinical nutrition, social work, pharmacy, physiotherapy, hospital management, biomedical technicians, transplant surgeons, etc.

• To develop a care plan (including investigation, treatment and continuing care) for a patient with complications following kidney transplantation, in collaboration with the members of the interdisciplinary team.

• To participate in inter-professional team meetings, contributing expertise while demonstrating the ability to accept, consider, and respect the opinions of other team members.
• To effectively communicate with the members of an interdisciplinary team in the resolution of conflicts, provision of feedback, and where appropriate, to be able to assume a leadership role.
• To be able to identify and recognize the need and benefit of consulting other physicians and healthcare professionals, including surgeons and/or radiologists when access to dialysis and/or transplantation is being planned, and to participate constructively in joint rounds with transplant surgery team members, making sure that relevant "medical" issues are not overlooked.
• To assure that transplant candidates are prepared for the operating room, that the surgeons are aware of the plans, and that the nurses and house staff are aware of the appropriate protocols.
• To be able to delegate specific tasks when appropriate.
• When completing a research project, to meet, communicate and follow-up in a timely fashion on the recommendations by research collaborators and personnel.

D. **Manager**

**Goals:**

• To learn how to effectively manage the kidney transplant service. To participate in administrative duties, e.g. acquire knowledge of the role of the transplant nephrology staff.
• To demonstrate the ability to use time effectively to balance the requirements for patient care on the particular service, outpatient clinic, other academic activities, and personal life.
• To round daily on service patients, both independently and with the staff transplant nephrologists.
• To provide orders, including immune-suppression for acute rejection or post-transplant management in a timely fashion. To distinguish conditions requiring urgent versus non-urgent attention. To respond to emergencies in a timely fashion.
• To establish a plan for timely laboratory review and decision-making when necessary.
• To make him/herself known to the nurses and to carry the bellboy so that the nurses can call the resident in case of emergency or other issues.
• To be on call for the Emergency Room for inquiries regarding kidney transplant patients.
• To be able to use information technology (e.g. lab and pharmacy databases) to optimize patient care.
• To make clinical decisions and judgments based on sound evidence for the benefit of individual patients and the population with renal disease balancing his/her advocacy role for the individual with societal needs in the monitoring and allocating of finite resources (including renal transplant organs).
• To participate in critical appraisal of his/her practice, e.g. audit, or quality assurance process.
To understand the role of the kidney transplant expert as a manager within the health care system; directing the clinical aspects of assessment prior to transplantation, acute management following kidney transplantation, and long-term follow up programs including the planning, budgeting and, evaluation of these patient care programs.

E. Health Advocate

Goals:

- To be able to counsel patients and families effectively, about nutrition, exercise, compliance with medications, smoking cessation, blood pressure control, risk factors to optimize preservation of allograft function, other risk factors to reduce cardiac risk, etc. To be able to refer patients appropriately to available resources promoting preventive medicine.
- To identify current “at risk” groups within their practice population, apply available knowledge about prevention to these groups (i.e. high immune risk patients, patients at risk for recurrent disease in graft) and contribute “group data” for a better understanding of health problems within the population (i.e. Saudi center for organ transplantation (SCOT)).
- To help inform house officers and physicians from other departments about the importance of the risk factor modification in recipients of kidney transplantation.
- In the case of inherited renal diseases (autosomal recessive polycystic kidney disease, autosomal dominant polycystic kidney disease congenital HUS, etc.), to ensure that patients are informed and that appropriate screening measures are undertaken for other family members, when indicated. To be able to counsel patients about the risk of transmission to offspring and the risk/benefits of early detection in children. To suggest family planning where appropriate.
- To recognize the role of the kidney transplantation expert in advocating to decrease the burden of illness (at a community or societal level) from complications of kidney transplantation through the Saudi Society of Nephrology, and SCOT.
- To promote kidney transplantation as the optimal treatment for ESRD.
- To describe how public policy is developed; identifying current policies that affect health, either positively or negatively (i.e. substance abuse, access to dialysis) and citing examples of how policy has been changed because of actions by physicians.
- To describe the key issues under debate regarding changes in the Saudi health care system indicating how these changes might affect societal health outcomes pertinent to kidney transplantation (i.e. organ sharing across provinces, access to kidney transplantation).
F. Scholar

Goal:
- To demonstrate a commitment to life-long learning and the ability to develop, implement and monitor a personal strategy of continuing education using the skills of self-assessment (ability to identify gaps in knowledge and expertise) and self-directed learning (ability to formulate a plan to fill the gap).
- To demonstrate the effective use of information technology in the provision of clinical care and continued learning.
- To demonstrate an understanding of the principles of learning and apply that understanding in his/her own learning as well as in his/her teaching of others (students, residents, colleagues, other professionals, and patients) both in a formal setting (e.g. presentation at a conference), informally, or at the "bedside".
- To demonstrate active participation in scholarly activities in the Department on an ongoing basis.

G. Professional

Goals:
- Discipline - Based Objectives:
  - To display attitudes commonly accepted as essential to professionalism including the ability to deliver high quality care with integrity, honesty, compassion, and sensitivity toward cultural and gender issues.
  - To use appropriate strategies to maintain and advance professional competence.
  - To continually evaluate one's abilities, knowledge, and skills and know one's limitations of professional competence.
  - To notify staff and secretaries in a timely fashion ahead of planned absences and when appropriate, to arrange for back-up coverage during absence.
  - To be able to recognize the cultural/ethnic, gender, and socioeconomic diversity of the population.
- Personal/Professional Boundary Objectives:
  - To adopt specific strategies to heighten personal and professional awareness and explore and resolve interpersonal difficulties in professional relationships.
  - To consciously strive to balance personal and professional roles and responsibilities and to demonstrate ways of attempting to resolve conflicts and role strain.
  - To recognize his/her own limitations and seek advice when appropriate.
- Objectives Related to Ethics and Professional Bodies:
  - To know and understand the professional, legal, and ethical codes to which physicians are bound.
  - To know, understand and be able to apply the bioethical principles involved with the donation and allocation of living as well as deceased donor organs.
Program content

- Embryonic development of the kidney.
- Normal function and basic physiology of the developing kidney, including knowledge of:
  - Renal circulation
  - Glomerular filtration
  - Transport of solutes by the developing kidney
  - Concentration and diluting mechanism
  - Renal acidification mechanisms
  - Renal hormones during development
- Clinical situations during fetal neonatal period:
  - Causes of delayed voiding
  - Recognition of postnatal hypovolemia
  - Renal vein and artery thrombosis; causes and management
  - Neonatal edema: causes, diagnosis and management
  - Evaluation of renal function in the neonatal period
  - Acute renal failure, causes, diagnosis and management
  - Neonatal hypertension: pathogenesis, diagnosis and management
  - Birth asphyxia and its effect on renal function
  - Evaluation and management of urinary tract abnormalities
  - Management of urinary tract infection
A. Medical Expert

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

Key and Enabling Competencies: levels must be able to:

- Function effectively as pediatric fellows with increasing levels of responsibility according to their year of training. All CanMEDS roles must be integrated to provide optimal, ethical, and patient-centered medical care.
  - Perform a consultation, including the presentation of well-documented assessments and recommendations in written and/or verbal form in response to a request from another health care professional.
  - Identify and appropriately respond to relevant ethical issues arising in patient care.
  - Demonstrate the ability to prioritize professional duties when faced with multiple patients and problems.
  - Demonstrate compassionate and patient-centered care.
  - Recognize and respond to ethical dimensions in medical decision-making.
  - Demonstrate medical expertise in situations other than patient care, such as providing expert legal testimony or advising governmental agencies.

- Establish and maintain clinical knowledge, skills, and attitudes appropriate to urology
  - Apply knowledge of the clinical, socio-behavioral, and fundamental biomedical sciences relevant to urology.
  - Demonstrate knowledge of the mechanism of action and physiological effects of therapeutic technologies relevant to urology.
  - Describe the CanMEDS framework of competencies relevant to urology.
  - Apply lifelong learning skills of the scholar role to implement a personal program to keep up-to-date, and enhance areas of professional competence.
  - Contribute to the enhancement of quality care and patient safety in their practice, integrating the best available evidence and practices.

- Perform a complete and appropriate assessment of a patient
  - Identify and explore issues to be addressed in a patient encounter effectively, including the patient’s context and preferences.
  - Elicit a history that is relevant, concise, and accurate to context and preferences for the purposes of prevention and health promotion, diagnosis, and/or management.
Perform a focused physical examination that is relevant and accurate for the purposes of prevention and health promotion, diagnosis, and/or management.

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

Demonstrate effective clinical problem solving skills and judgment to address patient problems, including interpreting available data and integrating information to generate differential diagnoses and management plans.

- Use preventive and therapeutic interventions effectively
  - Implement a management plan in collaboration with a patient and his/her family.
  - Demonstrate appropriate and timely application of preventive and therapeutic interventions relevant to urology.
  - Ensure appropriate informed consent is obtained for therapies.
  - Ensure patients receive appropriate end-of-life care.

- Appropriately use and interpret diagnostic tests relevant to urology
  - Demonstrate effective, appropriate, and timely performance of diagnostic procedures relevant to their practice.
RADIOLOGY

A. Medical Expert

Goals:

- **Knowledge**
  - To recognize basic radiological anatomy and variants thereof.
  - To understand the basic physical principles behind radiological techniques.
  - To learn the indications as well as absolute and relative contra-indications of various contrast media.
  - To recognize the appropriate indications and contra-indications of various radiological techniques.
  - To recognize radiological emergencies and common pathologies, and understand their management.
  - To list the most important differential diagnostic possibilities for imaging findings.

- **Level Skills**
  - To identify and manage contrast reactions.
  - To appropriately perform and prescribe radiological examinations.
  - To recognize and describe imaging techniques and findings.
  - To generate an accurate and informative radiological report.
  - To perform basic imaging related non-interventional procedures.
  - To perform basic imaging post-processing and analysis.

B. Communicator

- To demonstrate effective communication skills when dealing with patients, their families, staff, and referring clinical services.
- To communicate critical findings directly to the referring physician in a timely fashion.
- To document pertinent conversations with the clinician in the report.
- To generate well-organized reports, accurately conveying the relevant findings, diagnosis, and recommendations.
- To communicate effectively with patients and families with empathy.
- To recognize the physical and psychological needs of the patients and their families undergoing radiological investigations and/or treatment including the needs of culture, race, and gender.
- To develop effective oral skills, including individual consultation and the conduction of case presentations, radiology conferences, and scholarly work.
C. **Collaborator**

Goals:
- To demonstrate good consulting skills when interacting with other physicians and health team members.
- To interact appropriately with the Radiology Department and hospital staff, demonstrating a team approach to patient care.
- To work effectively as part of a multi-disciplinary team in daily patient management.
- To actively participate in multi-disciplinary team meetings.
- To work with clinical colleagues on research or quality improvement projects.

D. **Manager**

Goals:
- To manage time effectively in order to ensure productiveness and timeliness of service provision.
- To consider available imaging resources when planning care, using them effectively and efficiently.
- To prioritize radiological studies based on urgency and clinical needs.
- To manage night duty responsibilities efficiently and effectively.

E. **Health Advocate**

Goals:
- To provide a safe environment for patients and staff.
- To minimize risk to patients undergoing radiological studies.
- To apply the ALARA, principle ALARA is an acronym for As Low As Reasonably. Achievable. This is a radiation safety principle for minimizing radiation doses and releases of radioactive.
- To recognize quality improvement opportunities within the imaging environment.
- To apply quality improvement methods for the enhancement of patient and staff safety.
- To apply appropriate advanced radiation reduction strategies in patient care.
- To participate in imaging-related community or healthcare facility awareness efforts.
F. Scholar

Goals:
- To set personal learning goals and objectives during rotations.
- To focus on basic introductory texts relevant to each rotation.
- To know how to search for scientific information in the medical literature.
- To teach medical students, technologists, and peers.
- To contribute to teaching files.

G. Professional

Goals:
- To adhere to relevant Islamic principles, medical ethics and medical-legal requirements.
- To act as a role model and mentor for junior staff.
- To deliver highest quality care with integrity, honesty, and compassion.
- To exhibit appropriate personal and interpersonal professional behavior.
- To assess one’s own performance, strengths, limitations and weaknesses.
- To maintain patient and family confidentiality.
- To demonstrate a sense of accountability.
- To demonstrate a commitment to his/her patients, profession and society, and to his/her own personal development.
LEARNING AND TEACHING OPPORTUNITIES

Teaching and learning is structured and organized with more responsibility for self-directed learning. Every week, 4-6 hours of formal training time will be reserved. The core Education Program (CEP) includes teaching and learning activities relative to universal topics and core specialty topics.

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 suggested time 1.5 hours. 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 question (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) SIRS; Disseminated intravascular coagulation (DIC)
- Antibiotic stewardship
- Blood transfusion

Module: Cancer
- Principles of management of cancer: chemotherapy; radiotherapy, surgery, and immunotherapy
- Side effects of chemotherapy and radiation therapy, oncologic emergencies

Module: Acute Care
- Pre-operative assessment
- Post-operative 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

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

<table>
<thead>
<tr>
<th>Topics</th>
<th>Learning Outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acute kidney injury (AKI) in the newborn</td>
<td>1. Identify normal neonatal renal function. 2. Recognize the incidence of AKI in the newborn. 3. Recognize the pathophysiology and etiology of AKI in the newborn. 4. Describe the clinical presentation associated with AKI in the newborn. 5. Determine the diagnosis of suspected AKI in the newborn. 6. Develop initial approach and management. 7. Understand possible prognoses for AKI in the newborn.</td>
</tr>
<tr>
<td>Renal Replacement Therapy (RRT) in pediatric acute kidney failure</td>
<td>1. Recognize the indications and the timing of RRT in pediatric AKI. 2. Determine the suitable modality choice for pediatric AKI cases. 3. Understand the process of RRT and learn how to write the prescription for the procedure. 4. Determine RRT discontinuation for pediatric AKI cases. 5. Recognize the outcomes of RRT in pediatric AKI cases.</td>
</tr>
<tr>
<td>Clinical presentation and evaluation of chronic kidney disease (CKD)</td>
<td>1. Recognize the definition and diagnosis of CKD in children. 2. Recognize the classifications of CKD in children. 3. Identify the different clinical presentations of CKD. 4. Design the evaluation of CKD in children. 5. Monitor and analyze the follow up evaluation of (CKD) in children.</td>
</tr>
<tr>
<td>Epidemiology, etiology, and course of CKD</td>
<td>1. Identify the etiology and epidemiology of CKD in children. 2. Recognize the natural history and prognosis of CKD in children. 3. Identify the complications of CKD in children.</td>
</tr>
</tbody>
</table>
## CORE SPECIALTY TOPICS

<table>
<thead>
<tr>
<th>Topics</th>
<th>Learning Outcomes</th>
</tr>
</thead>
</table>
| **Pathogenesis, evaluation and diagnosis of growth impairment in children with (CKD)** | 1. Recognize the definition of growth impairment in children with CKD.  
2. Recognize the risk factors that contribute to impaired growth in children.  
3. Recognize the procedures for the diagnosis of growth impairment in children with CKD.  
4. Conduct further evaluation to identify the underlying risk factors. |
| **Management of CKD**                                                   | 1. Understand the definitions of The Kidney Disease Improving Global Outcomes (KDIGO) in children with CKD.  
2. Recognize the general principles of management for children with CKD.  
3. Identify the reversible kidney dysfunction in children with CKD.  
4. Recognize potential measures for slowing CKD progression.  
5. Identify the management methods for different CKD complications.  
6. Identify and discuss ESRD and its sequences. |
| **Prevention and management of growth failure in children with CKD**    | 1. Identify and provide supportive measures for children with growth failure and CKD.  
2. Discuss and formulate the different management options including renal replacement therapy for children with growth failure and CKD.  
3. Discuss and offer recombinant human growth hormone therapy (rhCH) for children with growth failure and CKD.  
4. Discuss the mechanism of action for growth hormone treatment in children with CKD and post renal transplantation.  
5. Determine the efficacy of growth hormone therapy in children with CKD.  
6. Design and discuss the initiation of rhGH therapy in children with CKD.  
7. Monitor the response to rhGH therapy and the adverse effects in children with CKD. |
| **Chronic kidney disease-mineral and bone disorder (CKD-MBD)**          | 1. Establish the diagnosis of pediatric CKD-MBD.  
2. Formulate a management plan for CKD-MBD.  
3. Recognize the complications of (CKD-MBD). |
| **Cystinosis**                                                         | 1. Recognize the pathogenesis of cystinosis.  
2. Identify infantile cystinosis.  
3. Identify intermediate and adult cystinosis.  
4. Recognize the management of cystinosis. |
| **Primary hyperoxaluria**                                              | 5. Identify the different types of hyperoxaluria.  
6. Recognize the diagnosis and management plans for the different types of hyperoxaluria. |
<table>
<thead>
<tr>
<th>Topics</th>
<th>Learning Outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>8. Recognize the pathology, pathogenesis, and etiology of renal hypoplasia.</td>
</tr>
<tr>
<td></td>
<td>9. Learn the clinical presentation of renal hypoplasia.</td>
</tr>
<tr>
<td></td>
<td>10. Recognize the course of renal function in patients with renal hypoplasia.</td>
</tr>
<tr>
<td></td>
<td>11. Develop a management plan for renal hypoplasia.</td>
</tr>
<tr>
<td>Cystic Kidney Disease</td>
<td>Understand and differentiate the pathogenesis, clinical manifestation, diagnosis, treatment, and prognosis for the following conditions:</td>
</tr>
<tr>
<td></td>
<td>a. Autosomal dominant polycystic kidney disease.</td>
</tr>
<tr>
<td></td>
<td>b. Autosomal recessive polycystic kidney disease.</td>
</tr>
<tr>
<td></td>
<td>c. Nephronophthisis.</td>
</tr>
<tr>
<td></td>
<td>d. Multicystic dysplastic kidney disease.</td>
</tr>
<tr>
<td></td>
<td>e. Autosomal dominant interstitial kidney disease (medullary cystic kidney disease).</td>
</tr>
<tr>
<td>Alport Syndrome</td>
<td>1. Understand the genetics, pathogenesis, and pathology of hereditary nephritis (Alport syndrome).</td>
</tr>
<tr>
<td></td>
<td>2. Recognize the clinical manifestations, diagnosis, and treatment of hereditary nephritis (Alport syndrome).</td>
</tr>
<tr>
<td>Metabolic acidosis</td>
<td>1. Analyze and understand acid-base balance mechanisms.</td>
</tr>
<tr>
<td></td>
<td>2. Recognize diagnostic tools for children with metabolic acidosis.</td>
</tr>
<tr>
<td></td>
<td>3. Identify the clinical evaluation and diagnosis for children with metabolic acidosis.</td>
</tr>
<tr>
<td></td>
<td>4. Recognize and Design treatment plans for children with metabolic acidosis.</td>
</tr>
<tr>
<td>Renal tubular acidosis (RTA)</td>
<td>1. Recognize the four different types of RTA.</td>
</tr>
<tr>
<td></td>
<td>2. Discuss the management plan of each type.</td>
</tr>
<tr>
<td>Potassium balance and disorders</td>
<td>1. Recognize normal potassium balance and levels.</td>
</tr>
<tr>
<td></td>
<td>2. Discuss the causes, and evaluation of hyperkalemia in children.</td>
</tr>
<tr>
<td></td>
<td>3. Recognize the pathophysiology of hyperkalemia in children.</td>
</tr>
<tr>
<td></td>
<td>4. Recognize and identity the clinical manifestations of hyperkalemia.</td>
</tr>
<tr>
<td></td>
<td>5. Discuss the management plan for hyperkalemia in children.</td>
</tr>
<tr>
<td></td>
<td>6. Discuss the causes and the evaluation of hypokalemia in children.</td>
</tr>
<tr>
<td></td>
<td>7. Elicit a management plan for hypokalemia in children.</td>
</tr>
<tr>
<td>Clinical assessment and diagnosis of hypovolemia (dehydration)</td>
<td>1. Understand the pathophysiological sequences of dehydration.</td>
</tr>
<tr>
<td></td>
<td>3. Recognize the importance of laboratory testing for hypovolemia in children.</td>
</tr>
<tr>
<td></td>
<td>4. Design management plans for a dehydrated child.</td>
</tr>
<tr>
<td>Topics</td>
<td>Learning Outcomes</td>
</tr>
<tr>
<td>-----------------------------</td>
<td>--------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
</tbody>
</table>
| Water and sodium balance    | 1. Establish the general principles of water balance and its disorders (hypovolemia and edema), and sodium balance with its disorders (hyponatremia and hypernatremia).  
2. Recognize and identify the epidemiology, pathophysiology, etiology, and clinical manifestations of hypernatremia and hyponatremia in children.  
3. Understand and identify the evaluation of hypernatremia and hyponatremia children.  
4. Design a treatment plan for hypernatremia as well as hyponatremia in children.  
5. Recognize the pathophysiology and etiology of the syndrome of inappropriate antidiuretic hormone secretion (SIADH) and its therapeutic options. |
| Diabetes Insipidus (DI)     | 1. Recognize and identify the causes and clinical manifestations of central DI.  
2. Recognize and identify the causes and clinical manifestations of nephrogenic DI.  
3. Design management plans for both central and nephrogenic DI. |
| Bartter syndrome            | 1. Understand the pathogenesis of Bartter disease.  
2. Determine the clinical and laboratory presentation of this condition.  
3. Discuss the management plan for Bartter syndrome.  
4. Differentiate this condition from Gitelman syndrome. |
| Evaluation of proteinuria in children | 1. Identify the pathophysiology and classification of proteinuria in children.  
2. Understand and practice the measurement of urinary protein.  
3. Establish an approach in the child with proteinuria. |
| Nephrotic syndrome          | 1. Determine the etiology, clinical manifestations, and diagnosis of nephrotic syndrome in children.  
2. Design evaluation and management plans for edema in children.  
3. Elicit a management approach for childhood nephrotic syndrome.  
4. Recognize the complications of nephrotic syndrome in children.  
5. Formulate a management approach for steroid-resistant idiopathic nephrotic syndrome in children. |
<table>
<thead>
<tr>
<th>Topics</th>
<th>Learning Outcomes</th>
</tr>
</thead>
</table>
| **Congenital and infantile nephrotic syndrome** | 1. Identify the etiology of congenital and infantile nephrotic syndrome.  
2. Recognize the congenital nephrotic syndrome (CNS) of the Finnish type (CNF) and diffuse mesangial sclerosis.  
3. Recognize diffuse mesangial sclerosis with Drash syndrome.  
4. Recognize other disorders that can cause congenital or infantile nephrotic syndrome.  
5. Establish the diagnosis of congenital and infantile nephrotic syndrome.  
6. Elicit a management plan for congenital and infantile nephrotic syndrome. |
| **Evaluation of Hematuria in Children**     | 1. Identify and detect microscopic hematuria and gross hematuria in children.  
2. Recognize the etiology of microscopic hematuria and gross hematuria in children.  
3. Establish the evaluation of microscopic hematuria and gross hematuria in children. |
| **Acute nephritis**                         | 1. Differentiate high-risk acute nephritis from low-risk acute nephritis.  
2. Determine the etiology and the different clinical presentation of acute nephritis.  
3. Discuss management plans for acute nephritis in children. |
| **Rapidly progressive glomerulonephritis (RPGN)** | 1. Understand the clinical presentation of RPGN.  
2. Recognize the possible causes of RPGN.  
3. Discuss the management plan for RPGN.  
4. Learn the prognosis for RPGN. |
| **Hemolytic-uremic syndrome (HUS)**         | 1. Learn the clinical manifestations and diagnosis of Shiga toxin-producing *E. coli* (STEC) HUS in children.  
2. Elicit an overview of hemolytic uremic syndrome in children  
3. Discuss the treatment and prognosis of STEC HUS in children.  
4. Recognize the clinical presentation and diagnosis of complement mediated HUS.  
5. Discuss the treatment and prognosis of complement mediated HUS in children. |
| **Nephrolithiasis in children**             | 1. Recognize the acute management of nephrolithiasis in children.  
2. Discuss the clinical features and diagnosis of nephrolithiasis in children.  
3. Learn the epidemiology of and risk factors for nephrolithiasis in children.  
4. Discuss nephrocalcinosis in neonates.  
5. Discuss the prevention of recurrent nephrolithiasis in children. |
<table>
<thead>
<tr>
<th>Topics</th>
<th>Learning Outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hypertension in children</td>
<td>1. Understand the definition and diagnosis of hypertension in children and adolescents.</td>
</tr>
<tr>
<td></td>
<td>2. Recognize the epidemiology, risk factors, and etiology of hypertension in children and adolescents.</td>
</tr>
<tr>
<td></td>
<td>3. Determine the etiology, clinical features, and diagnosis of neonatal hypertension.</td>
</tr>
<tr>
<td></td>
<td>4. Discuss the evaluation and diagnosis of hypertension in infants between one month and one year of age.</td>
</tr>
<tr>
<td></td>
<td>5. Discuss the management plan of hypertension in infants, children, and adolescents.</td>
</tr>
<tr>
<td></td>
<td>6. Understand the genetic factors in the pathogenesis of primary (essential) hypertension.</td>
</tr>
<tr>
<td></td>
<td>7. Learn about ambulatory blood pressure monitoring in children.</td>
</tr>
<tr>
<td></td>
<td>9. Recognize congenital adrenal hyperplasia due to 11-beta-hydroxylase deficiency.</td>
</tr>
<tr>
<td>General principles of renal</td>
<td>1. Recognize the epidemiology and advantages of renal transplantation in children.</td>
</tr>
<tr>
<td>transplantation</td>
<td>2. Discuss preemptive transplantation in children.</td>
</tr>
<tr>
<td></td>
<td>3. Identify contraindications to renal transplantation in children.</td>
</tr>
<tr>
<td></td>
<td>4. Discuss donor choices.</td>
</tr>
<tr>
<td></td>
<td>5. Design pre-transplant evaluation procedures.</td>
</tr>
<tr>
<td>Immunosuppression in renal</td>
<td>1. Understand how to initiate an immunosuppressive induction therapy.</td>
</tr>
<tr>
<td>transplantation</td>
<td>2. Discuss the options of maintenance immunosuppressive therapy.</td>
</tr>
<tr>
<td></td>
<td>3. Design how to initiate anti-rejection therapy.</td>
</tr>
<tr>
<td></td>
<td>4. Recognize the adverse effects of immunosuppressive medications.</td>
</tr>
<tr>
<td></td>
<td>2. Design management plans for these complications.</td>
</tr>
<tr>
<td></td>
<td>3. Discuss outcomes of renal transplantation in children.</td>
</tr>
<tr>
<td>Urinary tract infections</td>
<td>1. Discuss urinary tract infections in children: Epidemiology and risk factors.</td>
</tr>
<tr>
<td></td>
<td>2. Discuss urinary tract infections in infants older than one month and young children: Acute management, imaging, and prognosis.</td>
</tr>
<tr>
<td></td>
<td>3. Discuss urinary tract infections in neonates</td>
</tr>
<tr>
<td>Urologic disorders in neonates</td>
<td>1. Recognize a diagnostic approach to antenatal hydronephrosis</td>
</tr>
<tr>
<td></td>
<td>2. Layout a postnatal management plan for antenatal hydronephrosis</td>
</tr>
<tr>
<td></td>
<td>3. Discuss clinical manifestations and initial management of infants with bladder exstrophy.</td>
</tr>
<tr>
<td>Topics</td>
<td>Learning Outcomes</td>
</tr>
<tr>
<td>--------------------------------------</td>
<td>--------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
</tbody>
</table>
| Urologic disorders in children       | 1. Recognize the clinical presentation, diagnosis, and course of primary vesico-ureteral reflux.  
2. Elicit a management plan for vesico-ureteral reflux.  
3. Discuss the other causes of obstructive uropathy in children: diagnostic approach and management. |
| Bladder Dysfunction                   | 1. Recognize the etiology and different clinical presentations of bladder dysfunction in children.  
2. Discuss evaluation and diagnosis of bladder dysfunction in children  
3. Layout a management plan for the different types of bladder dysfunction. |
| Transplant ethics                     | 1. Recognize the fair distribution policy of organs.  
2. Understand that all patients have equal access criteria for distribution policy.  
3. Discuss the current organ distribution policy.  
4. Design strategies to increase organ donation in order to prevent buying and selling of organs.  
5. Discuss religious issues involved in organ donation.  
6. Layout a priority list for conditions of receiving organs first. |
| Compliance                            | 1. Recognize the patient fears and concerns.  
2. Open lines of communication with the patient.  
3. Recognize non-specific patient related factors that affect patient compliance.  
4. Determine examples of specific factors that affect patient compliance.  
5. Recognize specific factors affecting compliance to lifestyle recommendations.  
| Autonomy                              | 1. Understand the importance of patient autonomy and his/her rights in medical decision-making.  
2. Elicit examples of different situations where paternalism or autonomy is applied.  
3. Understand the framework in which autonomy is applied. |
| Justice                               | 1. Understand the meaning of patient justice.  
2. Discuss the patient’s rights regarding medical services.  
3. Discuss the fair distribution of benefits, risks, and costs. |
| Adolescent decision making            | 1. Understand the country’s laws regarding the definition of minors.  
2. Recognize the different procedures by which minors can achieve legal adulthood before reaching the legal age of majority.  
3. Understand emergency care for children without requiring consent from their parent(s) or legal guardian(s).  
4. How to approach refusal of consent by the child or by his/her parents. |
| Mental capacity                       | 1. Recognize the difference between capacity and competency.  
2. Determine factors associated with impaired capacity.  
3. Discuss high-risk groups for impaired capacity.  
4. Understand when and how to assess capacity.  
5. Design a plan of how to proceed inpatients lacking capacity. |
## Topics

<table>
<thead>
<tr>
<th>Death and dying</th>
<th>Learning Outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1. Discuss the different approaches in a patient’s perception of end-of-life.</td>
</tr>
<tr>
<td></td>
<td>2. Recognize the different directive measures that may help to make dying more peaceful.</td>
</tr>
<tr>
<td></td>
<td>3. Discuss the best approach for the child and his parents regarding death in terminal cases</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Chronic disability and quality of life</th>
<th>Learning Outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1. Understand the definition of health-related quality-of-life (HRQL). Measuring HRQL</td>
</tr>
<tr>
<td></td>
<td>2. Discuss disability assessment and its tools.</td>
</tr>
<tr>
<td></td>
<td>3. Design planning tools for future clinical cases.</td>
</tr>
</tbody>
</table>
### TOPICS

<table>
<thead>
<tr>
<th></th>
<th>COMMENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Taking a detailed history and conduct a physical examination to determine possibility of renal disease</td>
</tr>
<tr>
<td>2.</td>
<td>Recognizing when to refer to nephrologists or urologists</td>
</tr>
<tr>
<td>3.</td>
<td>Preparing the patient for kidney biopsy, dialysis, and transplantation as well as immediate care after these procedures</td>
</tr>
<tr>
<td>4.</td>
<td>Interpreting the biochemical and radiological investigation related to the renal system, including renal biopsy</td>
</tr>
<tr>
<td>5.</td>
<td>Overview of the management of CKD in children and indications for initiation of dialysis in CKD, including review of pediatric CKD-MBD and prevention and management of growth failure in children with CKD</td>
</tr>
<tr>
<td>6.</td>
<td>Urgent-peritoneal dialysis and chronic peritoneal dialysis in children</td>
</tr>
<tr>
<td>7.</td>
<td>Hemodialysis for children with CKD</td>
</tr>
<tr>
<td>8.</td>
<td>Overview of RRT for children with CKD</td>
</tr>
<tr>
<td>9.</td>
<td>Pediatric AKI: Indications, timing, and choice of modality for RRT</td>
</tr>
<tr>
<td>10.</td>
<td>General principles of renal transplantation in children</td>
</tr>
<tr>
<td>11.</td>
<td>Outcomes of renal transplantation in children</td>
</tr>
<tr>
<td>12.</td>
<td>Approach to electrolyte disturbances</td>
</tr>
<tr>
<td>13.</td>
<td>Immunosuppressive therapy in transplant</td>
</tr>
<tr>
<td>14.</td>
<td>Plasmapheresis</td>
</tr>
<tr>
<td>15.</td>
<td>Nephronophthisis and genetics of cystic disease</td>
</tr>
<tr>
<td>16.</td>
<td>Vasculitis</td>
</tr>
<tr>
<td>17.</td>
<td>Renal malignancy</td>
</tr>
<tr>
<td>18.</td>
<td>AKI</td>
</tr>
<tr>
<td>19.</td>
<td>Immunology of renal transplant</td>
</tr>
<tr>
<td>20.</td>
<td>Peritoneal dialysis with its different indications</td>
</tr>
<tr>
<td>21.</td>
<td>Emergency in pediatric nephrology</td>
</tr>
<tr>
<td>22.</td>
<td>Review of syndromes commonly associated with renal disease.</td>
</tr>
</tbody>
</table>
CLINICAL RESEARCH

Rationale: The Saudi Council of Health and Specialties currently requires that research activities be performed during residency. The benefits of these activities include the promotion of a scientific environment, advancement of new knowledge, and ultimately may represent a strategy for increasing the possibilities of entering subspecialty training. The barriers to achieve these goals include lack of basic research knowledge, limited time assigned, and lack of mentoring.

Objectives: The main overall objective is to be able to publish at least one paper per fellow in a Medical Journal during the two years of training.

Methods: In order to achieve this objective the following steps are required:

- Training in basic clinical research design
- Training in basic statistical methodology
- Selection of the type of study
- Development of a research proposal
- Submission to a research committee at the KSMC Children’s Hospital for review
- Data collection
- Data analysis
- Paper writing
- Submission for review for publication to a journal
- Publication

<table>
<thead>
<tr>
<th>Methods</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Training on basic clinical research design</td>
<td>Saudi Commission for Health Specialties (2014) - Introduction to Clinical Research for Residents will be used as general reference material.</td>
</tr>
<tr>
<td>Training on basic statistical methodology</td>
<td>Maybe be obtained from the above source</td>
</tr>
<tr>
<td>Selection of type of study</td>
<td>Due to the time constraints only a retrospective cohort, case-control or cross sectional study will be considered for this project</td>
</tr>
<tr>
<td>Development of a research proposal</td>
<td>A specific format will be completed</td>
</tr>
<tr>
<td>Submission to research committee for review</td>
<td>This will be achieved through the advisor’s assistance</td>
</tr>
<tr>
<td>Data collection</td>
<td>A schedule among team members should be set up to obtain data on a timely basis</td>
</tr>
<tr>
<td>Data analysis</td>
<td>Proper statistical assistance will be obtained as needed</td>
</tr>
<tr>
<td>Paper writing</td>
<td>This will be achieved with the advisor’s assistance</td>
</tr>
<tr>
<td>Submission for review-publication to a journal</td>
<td>Proper selection of the journal with the highest interest for a specific type of study performed should be selected</td>
</tr>
</tbody>
</table>
ASSESSMENT

Description: Evaluation and assessment of fellows throughout the program are undertaken in accordance with the Commission’s training and examination rules and regulations. This includes the following:

A. Annual Assessment

Continuous Appraisal
This assessment is conducted toward the end of each training rotation throughout the academic year and at the end of each academic year as a continuous means of both formative and summative evaluation.

B. Continuous formative evaluation

To fulfill the CanMEDS competencies based on the end-of-rotation evaluation, the fellow’s performance will be evaluated jointly by relevant staff members who will assess the following competencies:

1) Performance of the trainee during daily work.
2) Performance and participation in academic activities (see the “Evaluation of the presenter by staff supervisor” form below).
3) Performance in 10 to 20 minutes of directly observed trainee–patient interaction. Trainers are encouraged to perform at least one assessment per clinical rotation, preferably near the end of the rotation. Trainers should provide timely and specific feedback to the trainee following each assessment of trainee–patient encounters (i.e., monthly evaluation, rotational Mini-CEX*, CBDs, **DOPS, *** and MSF****) (Appendix).
4) Trainee’s performance of diagnostic and therapeutic procedural skills. Timely and specific feedback from the trainer to the trainee is mandatory following each procedure (direct observation of procedural skills).
5) The CanMEDS-based competencies end-of-rotation evaluation form must be completed (preferably in electronic format), with the signatures by the attending consultants, within two weeks of the end of each rotation. The program director discusses evaluations with fellows as necessary. The evaluation form is submitted to the SCFHS Regional Training Supervisory Committee within four weeks of the end of the rotation.
6) Academic and clinical assignments should be documented on an electronic tracking system (e-Logbook, when applicable) on an annual basis. Evaluations are based on accomplishment of the minimum requirements for the procedures and clinical skills, as determined by the program.

*Clinical evaluation exercises
**Case-based discussions
***Direct observation of practical skills
****Multisource feedback
C. **Summative continuous evaluation**

A summative continuous evaluation report is prepared for each fellow at the end of each academic year and may also involve clinical or oral examinations, an objective structured practical examination, or an objective structured clinical examination.

**End-of-first-year examination:**
The end-of-year examination will be limited to F1 fellows. The number of examination items, eligibility, and passing score are established in accordance with the Commission’s training and examination rules and regulations. Examination details and a blueprint are published on the Commission website, www.scfhs.org.sa

D. **Final In-training Evaluation Report (FITER)/Comprehensive Competency Report (CCR)**

In addition to the local supervising committee’s approval of the completion of the clinical requirements (via the fellow’s logbook), the program directors prepare a FITER for each fellow at the end of the final year of fellowship (F2). This could also involve clinical or oral examinations or completion of other academic assignments.

E. **Final Pediatric Nephrology Saudi Fellowship Examination**

The final Saudi Fellowship examination consists of two parts:

1. **Written Examination**
   This examination assesses the trainee’s theoretical knowledge base (including recent advances) and problem-solving capabilities in the Pediatric Nephrology specialty; it is delivered in MCQ format and is held at least once per year. The number of examination items, eligibility, and passing score are established in accordance with the Commission’s training, and examination rules and regulations. Examination details and a blueprint are published on the Commission’s website, www.scfhs.org.sa

2. **Oral Structure Clinical Examination (OSCE)**
   This examination assesses a broad range of high-level clinical skills, including data gathering, patient management, communication, and counseling. The examination is held at least once per year, as an objective structured clinical examination (OSCE) in the form of patient management problems (PMPs). Eligibility and the passing score are established in accordance with the Commission's training and examination rules and regulations. Examination details and a blueprint are published on the Commission website, www.scfhs.org.sa

F. **Certification**

A certificate acknowledging training completion will only be issued to the fellow upon successful fulfillment of all program requirements. Candidates passing all components of the final specialty examination are awarded the “Saudi Fellowship of Pediatric Nephrology” certificate.
The following tools will form the “backbone” of assessment. They can be supplemented by other tools.

**A. Mini-Clinical Evaluation Exercise (CEX)**

Fellow performance in counseling patients and families before any procedure such as kidney biopsy and renal replacement therapy is assessed longitudinally using a faculty-administered format during rotations.

Evaluator: ___________________________ Date: ______________

Fellow Year:  
- □ F1  
- □ F2

**Patient Problem/Diagnosis:**

<table>
<thead>
<tr>
<th>Overall</th>
<th>UNSATISFACTORY</th>
<th>SATISFACTORY</th>
<th>OUTSTANDING</th>
</tr>
</thead>
<tbody>
<tr>
<td>Score</td>
<td>1 2 3</td>
<td>4 5 6</td>
<td>7 8 9</td>
</tr>
<tr>
<td>1</td>
<td>Medical Interviewing Skills</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Physical Examination Skills</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Professionalism</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Clinical Judgment</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Counseling Skills</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Organization/Efficiency</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Overall Clinical Competence</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Mini-CEX Time:**

Observing: _____________ Min  Providing Feedback: _____________ Min

**Evaluator Satisfaction with Mini-CEX:**  LOW 1 2 3 4 5 6 7 8 9  HIGH

**Fellow Satisfaction with Mini-CEX:**  LOW 1 2 3 4 5 6 7 8 9  HIGH

**Comments:**

____________________________________________________________________
____________________________________________________________________
____________________________________________________________________

Fellow Signature:  
Evaluator Signature:  
B. **The Logbook**

The purposes of the logbook are to:
- Monitor trainees’ performance on a continual basis.
- Document and record the cases seen and managed by the trainees.
- Maintain a record of procedures and technical interventions performed.
- Enable the trainee and supervisor to determine the learning gaps.
- Provide a basis of feedback to the trainee.

<table>
<thead>
<tr>
<th></th>
<th>Year 1</th>
<th>Year 2</th>
<th>Minimum number of cases expected over 2 years</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1. Acute Kidney Injury</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>How many cases of acute kidney injury have you been involved with?</td>
<td></td>
<td>17</td>
<td></td>
</tr>
<tr>
<td>How many were treated at some stage with:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Peritoneal dialysis?</td>
<td></td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>Hemodialysis?</td>
<td></td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>Plasma exchange?</td>
<td></td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Continuous hemodialysis/filtration?</td>
<td></td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Are you involved in supervising a kidney injury service in an intensive care unit?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Have you been involved in treating neonates with renal failure?</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Year 1</th>
<th>Year 2</th>
<th>Minimum number of cases expected over 2 years</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>2. Chronic Kidney Disease / Dialysis</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chronic Kidney Disease</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>On average, how many different children in chronic renal failure (GFR &lt; 30 mL/min/1.73 m²) do you see per year?</td>
<td></td>
<td>15</td>
<td></td>
</tr>
<tr>
<td>Have you been involved in discussions: Regarding the implications of newly diagnosed end-stage renal failure?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Advising on dialysis options?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Advising on transplant options?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Peritoneal Dialysis</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>How many patients on chronic peritoneal dialysis have you been involved in managing?</td>
<td></td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>Have you seen a PD machine being set up?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hemodialysis</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>How many patients on chronic hemodialysis have you been involved in managing?</td>
<td></td>
<td>7</td>
<td></td>
</tr>
<tr>
<td>Are you involved in dealing with acute problems arising during a dialysis session?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Have you seen a hemodialysis machine being set up?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Year 1</td>
<td>Year 2</td>
<td>Minimum number of cases expected</td>
<td></td>
</tr>
<tr>
<td>-------</td>
<td>--------</td>
<td>---------------------------------</td>
<td></td>
</tr>
<tr>
<td><strong>Transplant</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Have you been involved in preparation of children for transplant (transplant work-up)?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Are you involved in discussions regarding selection of children for the transplant list?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Have you seen a transplant operation?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>How many transplants have you been involved in your training?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>On how many occasions have you looked after the patient for the first 12 h post-transplant?</td>
<td>8</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Clinical Nephrology Cases Log**

<table>
<thead>
<tr>
<th>Management Provided</th>
<th>Level of Trainee’s Participation</th>
<th>Final Diagnosis and Discharge Condition</th>
<th>Trainer’s Signature/Date</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>F1</td>
<td>F2</td>
<td></td>
</tr>
</tbody>
</table>

**Clinical Nephrology Academic Activities Log**

<table>
<thead>
<tr>
<th>Activity Type</th>
<th>Title of the Meeting</th>
<th>Trainer’s Signature and Date</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
I. Procedure logs
Fellows must successfully perform 5 native kidney biopsies, 2 transplant kidney biopsies, and 5 dialysis catheter placements and must have sufficient experience with continuous renal replacement therapy.

### PROCEDURE: RENAL ULTRASOUND

<table>
<thead>
<tr>
<th>Patient’s Diagnosis</th>
<th>Level of Trainees Participation</th>
<th>Indication for Procedures</th>
<th>Trainer’s Signature/Date</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>F1</td>
<td>F2</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### RENAL TRANSPLANTATION LOG -1

<table>
<thead>
<tr>
<th>Patient’s Name</th>
<th>Original Renal Disease</th>
<th>Pre-transplant Evaluation Skills</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### RENAL TRANSPLANTATION LOG-2

<table>
<thead>
<tr>
<th>Day zero skills</th>
<th>Postoperative Skills</th>
<th>Level of Trainees Participation</th>
<th>Trainer’s Signature/Date</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>F1</td>
<td>F2</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


### Renal Transplant Outpatient Clinic - 1

<table>
<thead>
<tr>
<th>Patient’s Name</th>
<th>Date of Transplantation</th>
<th>Original Renal Disease</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Renal Transplant Outpatient Clinic - 2

<table>
<thead>
<tr>
<th>Problem/Cause of Visit</th>
<th>Management Provided</th>
<th>Level of Trainees Participation</th>
<th>Trainer’s Signature/Date</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>F1</td>
<td>F2</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Procedure: Such as Catheterization, Setting Up Dialysis, Communication Sessions, Suprapubic Aspiration

<table>
<thead>
<tr>
<th>Patient’s Diagnosis</th>
<th>Level of Trainees Participation</th>
<th>Indication and Name of Procedure</th>
<th>Trainer’s Signature/Date</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>F1</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>F2</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### CHRONIC HEMODIALYSIS LOG

<table>
<thead>
<tr>
<th>Initial Prescription</th>
<th>Ongoing Management</th>
<th>Level of Trainees Participation</th>
<th>Trainer’s Signature/Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>No</td>
<td>From</td>
<td>To</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>F1</th>
<th>F2</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### HEMODIALYSIS COMPLICATIONS LOG -1

<table>
<thead>
<tr>
<th>Patient’s Name</th>
<th>Patient’s Hospital ID</th>
<th>Diagnosis</th>
</tr>
</thead>
</table>

<p>| |</p>
<table>
<thead>
<tr>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>

### HEMODIALYSIS COMPLICATIONS LOG-2

<table>
<thead>
<tr>
<th>Problem</th>
<th>Management</th>
<th>Level of Trainees Participation</th>
<th>Trainer’s Signature/Date</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>F1</td>
<td>F2</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>F1</th>
<th>F2</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>Patient’s Name</td>
<td>Patient’s Hospital ID</td>
</tr>
<tr>
<td>----------------</td>
<td>-----------------------</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Indication for Dialysis</th>
<th>Procedure Done</th>
<th>Level of Trainees Participation</th>
<th>Trainer’s Signature/Date</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>F1</td>
<td>F2</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Patient’s Name</th>
<th>Patient’s Hospital ID</th>
<th>Diagnosis</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
## Tools for Assessment

### Acute Peritoneal Dialysis Log 2

<table>
<thead>
<tr>
<th>Indication for Dialysis</th>
<th>Level of Trainees Participation</th>
<th>Trainer’s Signature/Date</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>F1</td>
<td>F2</td>
</tr>
</tbody>
</table>

### Chronic Peritoneal Dialysis Log 1

<table>
<thead>
<tr>
<th>Patient’s Name</th>
<th>Patient’s Hospital ID</th>
<th>Diagnosis</th>
</tr>
</thead>
</table>

### Chronic Peritoneal Dialysis Log 2

<table>
<thead>
<tr>
<th>Initial Prescription</th>
<th>Ongoing Management</th>
<th>Level of Trainees Participation</th>
<th>Trainer’s Signature/Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>No</td>
<td>From</td>
<td>To</td>
</tr>
</tbody>
</table>

---

Section: Acute Peritoneal Dialysis Log 2

Section: Chronic Peritoneal Dialysis Log 1

Section: Chronic Peritoneal Dialysis Log 2
C. **Conference presentation and evaluation**

- Fellows present at approximately 6 conferences yearly, mentored by faculty.
- Attendees evaluate these conferences for presentation, content and indicate whether the information is likely to change practice.

D. **360 degree/Peer evaluations**

Comprehensive evaluations are administered twice during each training year. The following milestones inform faculty and the Clinical Competency Committee whether trainees are advancing toward, and finally achieving, “competency for unsupervised practice”. They permit specific identification of deficiencies and demonstration of amendment and improvement.

Milestones are goal behaviors that specialty and subspecialty trainees should achieve at defined times during their progression through training. Milestones standardize and clarify expectations for faculty and trainees. The Clinical Competency Committee, composed of key clinical faculty, will report on each trainee's progress in achieving the milestones at least semiannually.
Saudi Fellowship in Pediatric Nephrology Examination Performance may be used, as well as analysis of the patterns and rates of progression toward milestone achievement for Pediatric Nephrology. Our program has incorporated milestones into competency assessment for 2 years. We use quantitative objective milestones when possible. Our milestones (see the Table) and the rationale for selecting them are as follows:

- Milestones should be nephrology focused. As nephrology fellows have already been deemed “ready for unsupervised practice” in pediatrics. Therefore, nephrology milestones should be nephrology focused. As examples, they should include management of CKD, ESRD preparation, dialysis therapy initiation, and maintenance, and care of transplant donors and recipients.
- Milestones should be quantitative and objective, when possible, to avoid evaluator bias. Although milestone achievement can be assessed by use of entrustable professional activities, “satisfactory development” should be determined based on quantitative and objective assessment. This reduces the effect of rater bias by individual evaluators and the Clinical Competency Committee.
- Some milestones must be nephrology procedure focused. Definitive procedures include acute and chronic renal replacement therapy, CRRT, kidney biopsy, temporary dialysis access placement, and microscopic urinalysis. Milestones must document and consider threshold numbers for competence in these procedures.
- More is not necessarily better. A large number of detailed milestones are not necessarily superior. Faculty time constraints and number of evaluators also are limiting. Smaller numbers of milestones facilitate validation and monitoring.
- Outcome measures must be defined to determine milestone validity.
- Tools to assess milestones should be defined. Our program uses a number of tools to assess competency and document milestone achievement.
## E. Patient Care Milestones

### 1. Gathers and synthesizes essential and accurate information to define each patient’s clinical problem(s). (PC1)

<table>
<thead>
<tr>
<th>Critical Deficiencies</th>
<th>Appropriate for beginning fellow</th>
<th>Appropriate for mid-level fellow</th>
<th>Ready for unsupervised practice</th>
<th>Aspirational</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Incorrectly assesses volume status</td>
<td>• Demonstrates basic assessment of volume status</td>
<td>• Correctly assesses volume status for many patients</td>
<td>• Consistently and accurately assesses and responds to changes in volume status</td>
<td></td>
</tr>
</tbody>
</table>

### 2. Develops and achieves comprehensive management plan for patients with kidney disease (PC2)

<table>
<thead>
<tr>
<th>Critical Deficiencies</th>
<th>Appropriate for beginning fellow</th>
<th>Appropriate for mid-level fellow</th>
<th>Ready for unsupervised practice</th>
<th>Aspirational</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Does not develop appropriate or accurate care plans</td>
<td>• Inconsistently develops an appropriate care plan</td>
<td>• Consistently develops an appropriate care plan</td>
<td>• Appropriately modifies care plans based on patient’s clinical course, additional data, and patient preferences</td>
<td>• Role models and teaches complex and patient-centered care</td>
</tr>
<tr>
<td>• Does not seek additional guidance when needed</td>
<td>• Inconsistently seeks additional guidance when needed</td>
<td>• Seeks additional guidance and/or consultation as appropriate</td>
<td>• Recognizes disease presentations that deviate from common patterns and require complex decision-making</td>
<td>• Develops customized, prioritized care plans for the most complex patients, incorporating diagnostic uncertainty and cost effectiveness principles</td>
</tr>
</tbody>
</table>
### Patient Care Milestone: AKI in the ICU

<table>
<thead>
<tr>
<th>Critical Deficiencies</th>
<th>Appropriate for beginning fellow</th>
<th>Appropriate for mid-level fellow</th>
<th>Ready for unsupervised practice</th>
<th>Aspirational</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Fails to recognize AKI</td>
<td>• Orders basic diagnostic tests appropriately</td>
<td>• Is able to assemble a complex differential diagnosis and prescribe dialysis appropriately</td>
<td>• Provides appropriate medical and dialysis support</td>
<td></td>
</tr>
<tr>
<td>• Fails to recognize the need for or delays the start of urgent RRT</td>
<td>• Only aware of routine dialysis scheduling for complex patients with AKI consistently</td>
<td>• Recognizes incipient recovery of renal function</td>
<td>• Identifies unusual causes of AKI and recognizes opportunities to prevent AKI</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Modifies dialysis prescription appropriately based on changes in patient status</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Manages complications of RRT</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Recognizes appropriate timing of discontinuation of dialysis</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Includes emerging treatment options</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Anticipates and avoids</td>
<td></td>
</tr>
</tbody>
</table>

### Patient Care Milestone: Hospital Nephrology

<table>
<thead>
<tr>
<th>Critical Deficiencies</th>
<th>Appropriate for beginning fellow</th>
<th>Appropriate for mid-level fellow</th>
<th>Ready for unsupervised practice</th>
<th>Aspirational</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Does not react to situations that require urgent or emergent care</td>
<td>• Responds appropriately to urgent patient problems identified by others</td>
<td>• Recognizes situations requiring urgent or emergent care</td>
<td>• Anticipates patient situations which may deteriorate, and works to prevent crisis situations</td>
<td></td>
</tr>
<tr>
<td>• Understands the relevant pathophysiology and basic science for nephrologic conditions</td>
<td>• Understands the relevant pathophysiology and basic science for nephrologic conditions</td>
<td>• Demonstrates sufficient knowledge of socio-behavioral sciences including but not limited to health care economics and medical ethics as well as the basic science related to nephrologic conditions</td>
<td>• Demonstrates sufficient knowledge to diagnose and treat nephrologic conditions and prioritize the care of multiple patients</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Demonstrates the ability to develop, evaluate, and recognize complications of treatment plan.</td>
<td></td>
</tr>
</tbody>
</table>
## Patient care milestone: Kidney Transplantation

<table>
<thead>
<tr>
<th>Critical Deficiencies</th>
<th>Appropriate for beginning fellow</th>
<th>Appropriate for mid-level fellow</th>
<th>Ready for unsupervised practice</th>
<th>Aspirational</th>
</tr>
</thead>
<tbody>
<tr>
<td>Does not recognize allograft dysfunction (acute or chronic)</td>
<td>Inconsistently recognizes episodes of allograft dysfunction (acute and chronic) and identifies appropriate management</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Does not recognize potential complications or drug interactions of immunosuppressive drugs</td>
<td>Inconsistently recognizes common complications and frequent drug interactions of immunosuppressive medications and demonstrates appropriate management</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Usually demonstrates appropriate evaluation and management of common and straightforward episodes of allograft dysfunction (acute and chronic)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Anticipates and manages complex complications and subtle drug interactions of immunosuppressive medications</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Knows the science underlying allograft dysfunction (acute and chronic) and independently generates a differential diagnosis and appropriate treatment plan for common and straightforward episodes of allograft dysfunction</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Explains and educates others on the science underlying allograft dysfunction and drug interactions of immunosuppressive medications</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

## Patient Care Milestone: Chronic Dialysis Rotation

<table>
<thead>
<tr>
<th>Critical Deficiencies</th>
<th>Appropriate for beginning fellow</th>
<th>Appropriate for mid-level fellow</th>
<th>Ready for unsupervised practice</th>
<th>Aspirational</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fails to recognize abnormalities deriving from ESRD and consider therapeutic interventions</td>
<td>Able to identify some lab data necessary to manage anemia, disorders of mineral metabolism and bone disease and other ESRD issues</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Generally able to manage basic problems of anemia, mineral bone disease and other ESRD issues</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Able to manage even complex issues in anemia, mineral bone disease and other ESRD issues</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Able to teach others about anemia and mineral bone disease management in patients with ESRD</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
4. Demonstrates skill in performing and interpreting invasive and non-invasive procedures. (PC4)

<table>
<thead>
<tr>
<th>Not Yet Assessable</th>
<th>Critical Deficiencies</th>
<th>Appropriate for beginning fellow</th>
<th>Appropriate for mid-level fellow</th>
<th>Ready for unsupervised practice</th>
<th>Aspirational</th>
</tr>
</thead>
</table>

**PROCEDURE 1: Kidney Biopsy**

<table>
<thead>
<tr>
<th>Critical Deficiencies</th>
<th>Appropriate for beginning fellow</th>
<th>Appropriate for mid-level fellow</th>
<th>Ready for unsupervised practice</th>
<th>Aspirational</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Is unable to articulate the indications and contraindications for percutaneous renal biopsy</td>
<td>• Is able to apply knowledge about the indications and contraindications for percutaneous renal biopsy to an individual patient</td>
<td>• Consistently applies knowledge about the indications and contraindications for percutaneous renal biopsy to an individual patient</td>
<td>• Models knowledge about the indications and contraindications for percutaneous renal biopsy to an individual patient</td>
<td>• Is able to teach about the indications and contraindications for percutaneous renal biopsy</td>
</tr>
<tr>
<td>• Is unable to articulate the information that needs to be communicated to obtain consent for percutaneous renal biopsy</td>
<td>• Is able to obtain consent for percutaneous renal biopsy with prompting</td>
<td>• Is able to obtain consent for percutaneous renal biopsy with supervision</td>
<td>• Consistently demonstrates ability to obtain consent for percutaneous renal biopsy independently</td>
<td>• Models obtaining consent for renal biopsy</td>
</tr>
<tr>
<td>• Is able to image the kidney and locate the optimal site for the percutaneous renal biopsy with supervision</td>
<td>• Is able to image the kidney and locate the optimal site for the percutaneous renal biopsy with supervision</td>
<td>• Is able to image the kidney and locate the optimal site for the percutaneous renal biopsy without prompting</td>
<td>• Is able to explain the rationale for pre-biopsy preparations and precautions, post-biopsy care, and discharge modifications to other learners</td>
<td>• Is able to explain the rationale for pre-biopsy preparations and precautions, post-biopsy care, and discharge modifications to other learners</td>
</tr>
<tr>
<td>• Is not able to articulate steps required for percutaneous renal biopsy of native and/or transplanted kidney</td>
<td>• Is able to perform steps for percutaneous renal biopsy for native and/or transplanted kidney in simulation</td>
<td>• Is able to perform each step for percutaneous renal biopsy for native and/or transplanted kidney without prompting but with supervision</td>
<td>• Is able to perform each step for percutaneous renal biopsy for native and/or transplanted kidney independently</td>
<td>• Models and is able to teach the approaches to percutaneous renal biopsy for native and/or transplanted kidneys</td>
</tr>
</tbody>
</table>
### PROCEDURE 1: Kidney Biopsy

<table>
<thead>
<tr>
<th>Critical Deficiencies</th>
<th>Appropriate for beginning fellow</th>
<th>Appropriate for mid-level fellow</th>
<th>Ready for unsupervised practice</th>
<th>Aspirational</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Is unable to articulate post biopsy orders and discharge modifications that are required in a patient who has undergone percutaneous renal biopsy</td>
<td>• Demonstrates the ability to place appropriate post biopsy orders and discharge modifications required in a patient who has undergone percutaneous renal biopsy with prompting</td>
<td>• Demonstrates the ability to place post biopsy orders and discharge modifications required in a patient who has undergone percutaneous renal biopsy and address complications with supervision</td>
<td>• Demonstrates the ability to place post biopsy orders and discharge modifications and to address complications that may occur in a patient who has undergone percutaneous renal biopsy independently</td>
<td>• Models the care of patients post renal biopsy</td>
</tr>
<tr>
<td>• Understands the need and rationale for adequate tissue sampling, preservation, staining and histological testing of renal biopsy tissue</td>
<td>• Is able to assess the tissue for adequate sampling with supervision</td>
<td>• Is able to assess the tissue for adequate sampling independently</td>
<td>• Is able to assess tissue for adequate sampling and explain to other learners the method and rationale for doing so</td>
<td></td>
</tr>
</tbody>
</table>
## PROCEDURE 2: Temporary Hemodialysis Access Placement

<table>
<thead>
<tr>
<th>Critical Deficiencies</th>
<th>Appropriate for beginning fellow</th>
<th>Appropriate for mid-level fellow</th>
<th>Ready for unsupervised practice</th>
<th>Aspirational</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Is not able to articulate the indications or contraindications and need for consent for temporary hemodialysis access placement</td>
<td>• Is able to assess the patient for indications or contraindications and obtain consent for temporary hemodialysis access placement</td>
<td>• Demonstrates a knowledge of the complete assessment of the patient's need for, optimal location for, and consent for temporary hemodialysis access</td>
<td>• Demonstrates a thorough assessment of the patient's need for, optimal location for, and consent for temporary hemodialysis access</td>
<td>• Is able to teach assessment of the patient's need for, optimal location for, and consent for temporary hemodialysis access</td>
</tr>
<tr>
<td>• Fails to assess the appropriate physical location of the temporary hemodialysis access</td>
<td>• Demonstrates assessment of appropriate physical location and ability to place temporary hemodialysis access with assistance</td>
<td>• Is able to assess the patient and place temporary hemodialysis access with supervision</td>
<td>• Is able to assess the patient and place temporary hemodialysis access independently</td>
<td>• Is able to teach others to place a temporary hemodialysis access</td>
</tr>
<tr>
<td>• Displays a poor or only limited knowledge of the complications that may occur with temporary hemodialysis access placement</td>
<td>• Displays a basic understanding of the complications and functional problems that may occur with temporary hemodialysis access</td>
<td>• Understands the complications and functional problems that may occur with temporary hemodialysis access and is able to address these with supervision</td>
<td>• Is able to manage the complications and functional problems that occur with temporary hemodialysis access independently</td>
<td>• Fails to assess the appropriate physical location of the temporary hemodialysis access</td>
</tr>
</tbody>
</table>
### PROCEDURE 3: Hemodialysis

<table>
<thead>
<tr>
<th>Critical Deficiencies</th>
<th>Appropriate for beginning fellow</th>
<th>Appropriate for mid-level fellow</th>
<th>Ready for unsupervised practice</th>
<th>Aspirational</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Is not able to articulate - or only erratically or incompletely - the indications and contraindications for hemodialysis</td>
<td>- Demonstrates understanding of the indications and contraindications for hemodialysis</td>
<td>- Consistently demonstrates understanding of the indications and contraindications for hemodialysis and applies these to assessment of each patient</td>
<td>- Consistently demonstrates understanding of the indications and contraindications for hemodialysis and is able to apply these independently to assessment of each patient</td>
<td>- Is able to teach the indications and contraindications for acute/chronic hemodialysis</td>
</tr>
<tr>
<td>- Is not able to complete simple hemodialysis orders for uncomplicated patients with supervision</td>
<td>- Is able to complete individualized hemodialysis orders for moderately ill patients with supervision and obtain appropriate consent</td>
<td>- Is able to complete individualized hemodialysis orders for moderately ill patients with supervision and obtain appropriate consent</td>
<td>- Is able to complete individualized hemodialysis orders for complex and critically ill patients independently including consent</td>
<td>- Models the ability to provide individualized hemodialysis and modifies the prescription to achieve optimum adequacy of hemodialysis</td>
</tr>
<tr>
<td>- Does not demonstrate an ability to obtain consent for acute and/or chronic hemodialysis</td>
<td>- Has basic knowledge of adequacy of hemodialysis and its impact upon the hemodialysis patient</td>
<td>- Is able to assess adequacy of hemodialysis and modify the hemodialysis prescription with supervision</td>
<td>- Is able to assess adequacy of hemodialysis and modify the hemodialysis prescription independently</td>
<td>- Is able to anticipate complications that may occur with hemodialysis and address issues early for prevention or treatment</td>
</tr>
<tr>
<td>- Does not identify complications of hemodialysis or does so only sporadically</td>
<td>- Is able to identify complications that may occur with routine hemodialysis</td>
<td>- Is able to identify complications that may occur with complex and/or critically ill hemodialysis patients with supervision</td>
<td>- Consistently identifies complications that may occur with hemodialysis and demonstrates the ability to address these for the patient</td>
<td>- Is able to teach how to identify complications of hemodialysis and place systems into place to minimize these complications</td>
</tr>
<tr>
<td>- Sporadically and/or incompletely assesses temporary and/or chronic vascular access function</td>
<td>- Is able to assess temporary and/or chronic vascular access function with assistance</td>
<td>- Is able to assess temporary and/or chronic vascular access function</td>
<td>- Has a thorough working understanding of the assessment and interventions required for effective function of vascular access</td>
<td>- Is able to teach the assessment and interventions required for effective function of vascular access</td>
</tr>
</tbody>
</table>
### PROCEDURE 3: Hemodialysis

<table>
<thead>
<tr>
<th>Critical Deficiencies</th>
<th>Appropriate for beginning fellow</th>
<th>Appropriate for mid-level fellow</th>
<th>Ready for unsupervised practice</th>
<th>Aspirational</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Displays limited understanding and ability to assess the dialyzer properties, water systems, and hemodialysis properties and function</td>
<td>• Has a basic understanding of dialyzer properties, water systems, and hemodialysis properties and functions</td>
<td>• Demonstrates greater understanding and critical assessment of the dialyzer properties, water systems and hemodialysis mechanism</td>
<td>• Has a thorough understanding and ability to critically assess dialyzer properties, water systems, and hemodialysis mechanisms</td>
<td>• Is able to critically assess dialyzer properties, water systems, and hemodialysis mechanisms and work with the medical director and his team to run a functional dialysis unit</td>
</tr>
<tr>
<td>• Demonstrates only a limited understanding of the pharmacological, nutritional and other physiologic issues that may occur in hemodialysis patients</td>
<td>• Begins to display a basic understanding of the pharmacological, nutritional and other physiologic issues that may occur in hemodialysis patients</td>
<td>• Becomes familiarized with the pharmacological, nutritional and other physiologic issues that occur in the hemodialysis patient and work with the multidisciplinary care team</td>
<td>• Demonstrates understanding and ability to integrate pharmacological, nutritional and other physiological processes into patient care and work effectively with the multidisciplinary care team</td>
<td>• Models an effective working relationship and with a multidisciplinary health care team</td>
</tr>
</tbody>
</table>
**PROCEDURE 4: Continuous Renal Replacement Therapy (CRRT)**

<table>
<thead>
<tr>
<th>Critical Deficiencies</th>
<th>Appropriate for beginning fellow</th>
<th>Appropriate for mid-level fellow</th>
<th>Ready for unsupervised practice</th>
<th>Aspirational</th>
</tr>
</thead>
<tbody>
<tr>
<td>Is not able to articulate the indications and contraindications for CRRT</td>
<td>Demonstrates understanding of the indications and contraindications for CRRT</td>
<td>Consistently demonstrates understanding of the indications and contraindications for CRRT and applies these to the assessment of each patient</td>
<td>Consistently demonstrates understanding of the indications and contraindications for CRRT and is able to apply these independently to the assessment of each patient</td>
<td>Is able to teach the indications and contraindications for CRRT</td>
</tr>
<tr>
<td>Is unable to complete simple orders and consent for CRRT</td>
<td>Is able to complete straightforward individualized orders and obtain consent for CRRT with supervision</td>
<td>Is able to complete individualized orders and obtain consent for CRRT for more complex or critically ill patients with supervision</td>
<td>Is able to complete individualized orders and obtain consent for CRRT for moderately and critically ill patients independently</td>
<td>Models the ability to provide individualized CRRT and modifies the prescription to achieve optimum effectiveness of the CRRT modality</td>
</tr>
<tr>
<td>Does not demonstrate an understanding of the effectiveness of CRRT</td>
<td>Displays basic understanding of the effectiveness of CRRT and its impact upon the patient</td>
<td>Is able to assess the effectiveness of CRRT and modify the prescription with supervision</td>
<td>Is able to assess effectiveness of CRRT and modify the prescription independently</td>
<td>Is able to teach the assessment of effectiveness of CRRT and individualized prescriptions</td>
</tr>
<tr>
<td>Fails to identify complications of CRRT</td>
<td>Begins to identify complications that may occur with CRRT</td>
<td>Identifies complications that may occur with CRRT and begins to demonstrate ability to address these in the patient</td>
<td>Consistently identifies complications that may occur with CRRT and demonstrates competence to address these in the patient</td>
<td>Is able to anticipate complications that may occur with CRRT and address issues early for prevention and/or treatment</td>
</tr>
<tr>
<td>Fails to assess or only sporadically assesses vascular access function for CRRT</td>
<td>Begins to demonstrate the ability to assess vascular access function for CRRT</td>
<td>Reliably assesses vascular access function for CRRT</td>
<td>Has a thorough working understanding of the assessment and interventions required for effective function of vascular access for CRRT</td>
<td>Is able to teach the assessment and interventions required for effective function of vascular access</td>
</tr>
</tbody>
</table>
## Procedure 4: Continuous Renal Replacement Therapy (CRRT)

<table>
<thead>
<tr>
<th>Critical Deficiencies</th>
<th>Appropriate for beginning fellow</th>
<th>Appropriate for mid-level fellow</th>
<th>Ready for unsupervised practice</th>
<th>Aspirational</th>
</tr>
</thead>
<tbody>
<tr>
<td>Displays limited understanding and ability to assess the dialyzer properties, water systems, and dialysis mechanisms involved in CRRT</td>
<td>Demonstrates a basic ability to assess the dialyzer properties, water systems, and dialysis mechanisms involved in CRRT</td>
<td>Demonstrates understanding and critical assessment of the unique properties of the CRRT dialyzer, water systems and dialysis mechanisms</td>
<td>Has a thorough understanding and ability to critically assess dialyzer properties, water systems, and CRRT mechanisms</td>
<td>Is able to critically assess dialyzer properties, water systems, and hemodialysis mechanisms and work with the medical director</td>
</tr>
</tbody>
</table>

| Has limited understanding of the pharmacological, nutritional and other physiologic issues that may occur in CRRT patients | Begins to display a basic understanding of the pharmacological, nutritional and other physiologic issues that may occur in CRRT patients | Becomes familiarized with the pharmacological, nutritional and other physiologic issues that are unique to CRRT | Demonstrates understanding and ability to integrate the unique pharmacological, nutritional and other physiological data with the multidisciplinary care team to provide effective CRRT | Models an effective working relationship and with an integrated health care multidisciplinary team |

## Procedure 5: Peritoneal Dialysis

<table>
<thead>
<tr>
<th>Critical Deficiencies</th>
<th>Appropriate for beginning fellow</th>
<th>Appropriate for mid-level fellow</th>
<th>Ready for unsupervised practice</th>
<th>Aspirational</th>
</tr>
</thead>
<tbody>
<tr>
<td>Is not able to articulate the indications and contraindications for chronic peritoneal dialysis</td>
<td>Demonstrates understanding of the physical and environmental indications and contraindications for peritoneal dialysis</td>
<td>Consistently demonstrates understanding of the indications and contraindications for peritoneal dialysis and applies these to assessment of the patient</td>
<td>Is able to apply knowledge about the indications and contraindications for peritoneal dialysis in care of the patient in an independent manner</td>
<td>Is able to teach the indications and contraindications for peritoneal dialysis</td>
</tr>
</tbody>
</table>

| In unable to assess a patient for chronic peritoneal dialysis and obtain consent | Is able to assess an uncomplicated patient for chronic peritoneal dialysis and obtain consent with supervision | Is consistently able to assess complex patients for chronic peritoneal dialysis and obtain consent with supervision | Is able to assess complex patients for chronic peritoneal dialysis and obtain consent independently | Models the ability to assess appropriateness for chronic peritoneal dialysis and obtain consent |
## PROCEDURE 5: Peritoneal Dialysis

<table>
<thead>
<tr>
<th>Critical Deficiencies</th>
<th>Appropriate for beginning fellow</th>
<th>Appropriate for mid-level fellow</th>
<th>Ready for unsupervised practice</th>
<th>Aspirational</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Is unable to complete simple peritoneal dialysis orders for uncomplicated patients with supervision</td>
<td>• Is able to complete routine peritoneal dialysis orders for uncomplicated peritoneal dialysis patients with supervision</td>
<td>• Is able to complete individualized peritoneal dialysis orders for complex peritoneal dialysis patients with supervision</td>
<td>• Is able to complete individualized peritoneal dialysis orders for uncomplicated as well as complex peritoneal dialysis patients independently</td>
<td>• Is able to teach how to provide complete individualized peritoneal dialysis orders in even the most complex patients</td>
</tr>
<tr>
<td>• Fails to demonstrate an understanding of complications that may occur with peritoneal dialysis</td>
<td>• Begins to identify complications that may occur with peritoneal dialysis and the approach to dealing with them</td>
<td>• Identifies complications that may occur with peritoneal dialysis and demonstrates the ability to address these in the patient</td>
<td>• Consistently identifies complications that may occur with peritoneal dialysis and addresses these appropriately in the peritoneal dialysis patient</td>
<td>• Is able to anticipate complications that may occur with peritoneal dialysis and address these issues early for prevention and/or treatment</td>
</tr>
<tr>
<td>• Displays a poor or limited understanding of peritoneal membrane properties and functions relevant to peritoneal dialysis</td>
<td>• Displays basic understanding of peritoneal membrane properties and functions relevant to peritoneal dialysis</td>
<td>• Demonstrates a comprehensive understanding of peritoneal membrane properties and functions relevant to peritoneal dialysis, adequacy of peritoneal dialysis and is able to perform testing of these parameters with supervision</td>
<td>• Demonstrates a comprehensive understanding of peritoneal membrane properties and functions relevant to peritoneal dialysis, adequacy of peritoneal dialysis and is able to perform testing of these parameters independently</td>
<td>• Has a comprehensive understanding of peritoneal membrane properties and functions, the testing strategies of these parameters</td>
</tr>
<tr>
<td>• Is not able to assess peritoneal catheter and tunnel function</td>
<td>• Demonstrates understanding of the physical and environmental indications and contraindications for peritoneal dialysis</td>
<td>• Is able reliably to assess peritoneal catheter and tunnel</td>
<td>• Is able reliably to assess peritoneal catheter and tunnel and prescribe appropriate modifications or treatments</td>
<td>• Is able to teach the assessment of peritoneal catheter and tunnel and the approach to therapies for issues</td>
</tr>
</tbody>
</table>
## PROCEDURE 5: Peritoneal Dialysis

<table>
<thead>
<tr>
<th>Critical Deficiencies</th>
<th>Appropriate for beginning fellow</th>
<th>Appropriate for mid-level fellow</th>
<th>Ready for unsupervised practice</th>
<th>Aspirational</th>
</tr>
</thead>
<tbody>
<tr>
<td>Displays a poor or only limited understanding of the pharmacological, nutritional and other physiologic issues that may occur in peritoneal dialysis patients</td>
<td>Demonstrates a basic understanding of the pharmacological, nutritional and other physiologic issues that may occur in peritoneal dialysis patients</td>
<td>Demonstrates understanding of the pharmacological, nutritional and other physiologic issues that occur in the peritoneal dialysis patient and works with the multidisciplinary care team to address them</td>
<td>Has critical understanding of the pharmacological, nutritional and other physiologic issues that occur in the peritoneal dialysis patient and works effectively with the multidisciplinary care team to address them</td>
<td>Is able to run a peritoneal dialysis program and models an effective working relationship with a multidisciplinary team</td>
</tr>
</tbody>
</table>

## PROCEDURE 6: Urine analysis

<table>
<thead>
<tr>
<th>Critical Deficiencies</th>
<th>Appropriate for beginning fellow</th>
<th>Appropriate for mid-level fellow</th>
<th>Ready for unsupervised practice</th>
<th>Aspirational</th>
</tr>
</thead>
<tbody>
<tr>
<td>Is unable to articulate the indications for performing a urine analysis</td>
<td>Demonstrates the ability to obtain urine when appropriate indications for performing a urine analysis occur</td>
<td>Consistently obtains urine when appropriate indications for performing a urine analysis occur</td>
<td>Consistently obtains a properly handled urine specimen when appropriate indications for performing a urine analysis occur</td>
<td>Is able to teach how to obtain a properly handled urine specimen when appropriate indications for performing a urine analysis occur</td>
</tr>
<tr>
<td>Is unable to demonstrate the ability to obtain a proper urinary specimen under varying conditions</td>
<td>Is able to obtain a proper urinary specimen when prompted</td>
<td>Consistently obtains a proper urinary specimen under varying conditions</td>
<td>Is able to prepare the urinary specimen for dipstick and sediment analysis independently</td>
<td>Is able to teach others how to prepare the specimen for dipstick and sediment analysis</td>
</tr>
<tr>
<td>Is not able to demonstrate how to centrifuge the urine specimen with appropriate parameters</td>
<td>Demonstrates the ability to centrifuge the urine specimen with appropriate parameters</td>
<td>Consistently prepares the specimen for dipstick and sediment analysis appropriately with some supervision</td>
<td>Consistently prepares the specimen for dipstick and sediment analysis appropriately and independently</td>
<td>Models the proper application of urinary dipstick and urine sediment analysis</td>
</tr>
<tr>
<td>Is not able to assess the urine with the dipstick analysis tool under supervision</td>
<td>Demonstrates the ability to assess the urine with the dipstick analysis tool</td>
<td>Consistently uses the dipstick analysis tool appropriately with supervision</td>
<td>Consistently uses the dipstick properly for the purpose of urine analysis independently</td>
<td>Is able to teach others the interpretation of the dipstick and the confounding reactions that may occur</td>
</tr>
</tbody>
</table>
## PROCEDURE 6: Urine analysis

<table>
<thead>
<tr>
<th>Critical Deficiencies</th>
<th>Appropriate for beginning fellow</th>
<th>Appropriate for mid-level fellow</th>
<th>Ready for unsupervised practice</th>
<th>Aspirational</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Is not able to demonstrate the ability to make a slide of the urinary sediment</td>
<td>• Demonstrates the ability to make a slide of the urinary sediment and to identify elements within the urinary sediment with supervision</td>
<td>• Begins to interpret the dipstick and urinary sediment that are relevant to diagnostic assessment with supervision</td>
<td>• Is able to interpret the dipstick and urinary sediment for diagnosis while taking into account confounding influences independently</td>
<td>• Models the interpretation of the urinary sediment for the purposes of renal diagnosis and is able to articulate the reasons for the interpretation to other learners</td>
</tr>
</tbody>
</table>

## 5. Requests and provides consultative care. (PC5)

<table>
<thead>
<tr>
<th>Not Yet Assessable</th>
<th>Critical Deficiencies</th>
<th>Appropriate for beginning fellow</th>
<th>Appropriate for mid-level fellow</th>
<th>Ready for unsupervised practice</th>
<th>Aspirational</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Unable to identify kidney issues or to answer the team’s question about their patient</td>
<td>• Has only basic knowledge of kidney disorders, with little ability to filter or prioritize information</td>
<td>• Able to easily identify and manage renal disorders and place them in the larger context of patient care</td>
<td>• Able to manage even complex problems, advise the attending physician and help balance patient care priorities</td>
<td>• Becomes viewed as master consultant for ability to identify complex issues and prioritize plans</td>
<td></td>
</tr>
</tbody>
</table>
### 6. Possesses Clinical knowledge (MK1)

**Medical Knowledge: Recognition and initial evaluation of recipients and donors for kidney transplantation**

<table>
<thead>
<tr>
<th>Not Yet Assessable</th>
<th>Critical Deficiencies</th>
<th>Appropriate for beginning fellow</th>
<th>Appropriate for mid-level fellow</th>
<th>Ready for unsupervised practice</th>
<th>Aspirational</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>• Unaware of the existence of criteria for kidney transplant donors and recipients</td>
<td>• Recalls the criteria for the evaluation and selection of kidney transplant donors and recipients</td>
<td>• Demonstrates knowledge of the indications and contraindications of transplantation, and actively participates in the evaluation and selection of transplant donors and recipients</td>
<td>• Incorrectly assesses volume status Independently applies the principles in the evaluation and selection of kidney transplant donors and recipients</td>
<td>• Teaches and assists in developing the criteria for evaluation and selection of kidney transplant donors and recipients</td>
</tr>
</tbody>
</table>

### 7. Knowledge of diagnostic testing and procedures. (MK2)

<table>
<thead>
<tr>
<th>Critical Deficiencies</th>
<th>Appropriate for beginning fellow</th>
<th>Appropriate for mid-level fellow</th>
<th>Ready for unsupervised practice</th>
<th>Aspirational</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Fails to evaluate the appropriate laboratory data including microscopic exam of urine sample</td>
<td>• Usually recognizes abnormal serum chemistries, kidney tests including imaging studies and renal pathology</td>
<td>• Understands indications for and provides a basic interpretation of common nephrologic diagnostic testing, including but not limited to chemistries, ABGs, imaging studies and renal pathology • Understands prior probability and test performance characteristics</td>
<td>• Understands indications for and demonstrates skill in interpreting more advanced diagnostic tests including but not limited to renal biopsy, renal ultrasound, nuclear medicine studies, GFR measurements, and hemodynamic parameters</td>
<td>• Recognizes emerging applications of novel biomarkers, imaging technology, and other relevant testing</td>
</tr>
</tbody>
</table>
# TOOLS FOR ASSESSMENT

## 8. Scholarship. (MK3)

<table>
<thead>
<tr>
<th>Critical Deficiencies</th>
<th>Appropriate for beginning fellow</th>
<th>Appropriate for mid-level fellow</th>
<th>Ready for unsupervised practice</th>
<th>Aspirational</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

## 9. Works effectively within an inter-professional team (e.g., with peers, consultants, nursing, ancillary professionals, and other support personnel). (SBP1)

Kidney Transplant or Ambulatory Dialysis: Works within and with the team

<table>
<thead>
<tr>
<th>Critical Deficiencies</th>
<th>Appropriate for beginning fellow</th>
<th>Appropriate for mid-level fellow</th>
<th>Ready for unsupervised practice</th>
<th>Aspirational</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Does not recognize the contributions of other inter-professional team members</td>
<td>• Demonstrates a beginning understanding of the structure of the team</td>
<td>• Understands the roles and responsibilities of all team members and begins to work collaboratively</td>
<td>• Understands the roles and responsibilities of, and effectively partners with, all members of the team</td>
<td>• Develops, trains, and inspires the team regarding unexpected events or new patient management strategies</td>
</tr>
<tr>
<td>• Frustrates the team with inefficiency and errors</td>
<td>• Demonstrates a beginning understanding of the national or regional governing principles and procedures (e.g., the organ allocation system or the dialysis quality requirements)</td>
<td>• Actively participates in team meetings and collaborative decision-making</td>
<td>• Efficiently coordinates activities of other team members to optimize care</td>
<td>• Viewed by team members as a leader in the delivery of high-quality care</td>
</tr>
<tr>
<td>• Frequently requires reminders from the team to complete physician responsibilities</td>
<td>• Demonstrates an understanding of the importance of communication among team members</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>ROTATION FOR USE</th>
<th>NOT YET ASSESSABLE</th>
<th>CRITICAL DEFICIENCIES</th>
<th>APPROPRIATE FOR BEGINNING FELLOW</th>
<th>APPROPRIATE FOR MID-LEVEL FELLOW</th>
<th>READY FOR UNSUPERVISED PRACTICE</th>
<th>ASPIRATIONAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>General (could apply to any rotation, from Saudi pediatric nephrology fellowship)</td>
<td>• Ignores risks for errors that may affect patient care</td>
<td>• Does not recognize the potential for system error</td>
<td>• Recognizes the potential for error and begins corrections</td>
<td>• Identifies systemic causes of error and navigates them to provide safe patient care</td>
<td>• Advocates for system leadership to formally engage in quality improvement activities</td>
<td></td>
</tr>
<tr>
<td>Acute consult or inpatient rotation specific</td>
<td>• Ignores unit-specific risks for system errors (acute dialysis, ICUs, radiology) and makes no attempt to remedy</td>
<td>• Identifies dialysis nursing processes, ICU routines or complex scheduling problems that adversely affect patient care</td>
<td>• Understands system complexities of dialysis units, ICUs, radiology and others and attempts to coordinate these systems for safe patient care</td>
<td>• Uses knowledge of the complexities of dialysis units, ICUs and radiology to make sufficient adjustment in plans for safe patient care</td>
<td>• Leads and coordinates meetings or sessions with target units to identify and minimize system errors</td>
<td></td>
</tr>
<tr>
<td>Ambulatory Clinic</td>
<td>• Does not recognize the importance of coordinating care through support staff and referring physicians</td>
<td>• Acknowledges the multi-faceted systems that combine for the provision of safe outpatient care</td>
<td>• Understands the systems necessary to facilitate safe outpatient care and attempts to utilize them appropriately</td>
<td>• Navigates the systems, efficiently coordinates nursing, physician, and ancillary resources to promote safe patient care</td>
<td>• Develops work groups locally or participates regionally to identify system errors that may adversely affect safe patient care</td>
<td></td>
</tr>
</tbody>
</table>
11. Identifies forces that affect the cost of health care, and advocates for and practices cost-effective care. (SBP3)

<table>
<thead>
<tr>
<th>Not Yet Assessable</th>
<th>Critical Deficiencies</th>
<th>Appropriate for beginning fellow</th>
<th>Appropriate for mid-level fellow</th>
<th>Ready for unsupervised practice</th>
<th>Aspirational</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>ROTATION FOR USE</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>--------------</td>
</tr>
<tr>
<td>• General</td>
<td>• Unable to access resources within the system</td>
<td>• Exhibits a crude understanding of payment systems</td>
<td>• Demonstrates a clear understanding of the payment systems</td>
<td>• Applies a clear understanding of private and public payment systems</td>
<td>• Seeks to apply the understanding of the various payment systems outside the community at large</td>
</tr>
<tr>
<td></td>
<td>• Does not recognize the importance of timely documentation and implications for billing</td>
<td>• Understands how and attempts to access resources</td>
<td>• Accountable on fiscal matters</td>
<td></td>
<td>--------------</td>
</tr>
<tr>
<td>• Acute consult or inpatient rotation specific</td>
<td>• Unable to access resources within the system</td>
<td>• Utilizes resources appropriately documentation nearly always up to date, understands billing</td>
<td>• Utilizes resources judiciously and appropriately</td>
<td>• Is fully accountable to patients, colleagues and the institution on all fiscal matters</td>
<td>• Participates in regulatory policy determinations at the regional or national level</td>
</tr>
<tr>
<td></td>
<td>• Lacks accountability to patients, colleagues or the institution for fiscal matters</td>
<td>• Attempts timely documentation and realizes the implications for billing</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Ambulatory Clinic</td>
<td>• Lacks knowledge of current payment systems</td>
<td>• Understands and complies with regulatory and 3rd party requirements.</td>
<td>• Documentation nearly always up to date, understands billing.</td>
<td>• Clear and billable documentation at all times.</td>
<td></td>
</tr>
</tbody>
</table>
## 12. Transitions patients effectively within and across health delivery systems. (SBP4)

<table>
<thead>
<tr>
<th>Not Yet Assessable</th>
<th>Critical Deficiencies</th>
<th>Appropriate for beginning fellow</th>
<th>Appropriate for mid-level fellow</th>
<th>Ready for unsupervised practice</th>
<th>Aspirational</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>General</strong></td>
<td>• Is unwilling to recognize the importance of effective patient transitions in quality patient care</td>
<td>• Fails to recognize deficits in transitions and hand-offs unless pointed out</td>
<td>• Recognizes deficits in transitions, and often seeks a means to improve</td>
<td>• Supports or develops a well-integrated handoff system and seeks feedback for improvement</td>
<td>• Leads efforts to improve the handover process, mentors others, engaged in scholarly work related to quality handovers</td>
</tr>
<tr>
<td><strong>Acute Consult Or Inpatient Rotation</strong></td>
<td>• Fails to improve inpatient transitions despite multiple attempts at the process</td>
<td>• Is slow to harness the EMR on a daily basis • Delivers marginal quality handovers • Does not communicate effectively during handovers</td>
<td>• Uses EMR to facilitate exchanges and patient care • Freely communicates with source of handover</td>
<td>• Prepares high quality handovers and seeks feedback • Facilitates open communication with party delivering hand-off</td>
<td>• Leads conferences or meetings to improve the handover process, may work in the development of a handover system</td>
</tr>
<tr>
<td><strong>Continuity Ambulatory Clinic</strong></td>
<td>• Makes no effort to check out patients to the cross cover for planned absences</td>
<td>• Is slow to contact and communicate with cross-cover.</td>
<td>• Freely communicates with cross-cover; uses EMR to facilitate exchanges</td>
<td>• Prepares high quality handovers in advance of absences, anticipates cross-cover absences.</td>
<td>• Leads clinic meetings to improve the handover process, develops a new or better handover system</td>
</tr>
</tbody>
</table>
### F. Practice-Based Learning And Improvement

13. Monitors practice with a goal for improvement. (PBLI1)

<table>
<thead>
<tr>
<th>Not Yet Assessable</th>
<th>Critical Deficiencies</th>
<th>Appropriate for beginning fellow</th>
<th>Appropriate for mid-level fellow</th>
<th>Ready for unsupervised practice</th>
<th>Aspirational</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>ROTATION FOR USE</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>General</strong></td>
<td></td>
<td>• Identifies areas in fellow’s own practice and local system that can be changed to improve the processes and outcomes of care</td>
<td>• Identifies learning needs (clinical questions) as they emerge in patient care activities</td>
<td>• Takes a leadership role in the education of all members of the health care team</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Is unwilling to recognize knowledge or performance deficits even when pointed out</td>
<td>• Does not recognize knowledge or practice deficits unless pointed out</td>
<td>• Inconsistently recognizes knowledge or practice deficits with emerging awareness of means to improve</td>
<td>• Accurately assesses deficits and is able to implement a plan for improvement</td>
<td>• Seeks out peer review to obtain an accurate assessment of abilities and is continuously bettering skills</td>
</tr>
<tr>
<td><strong>Inpatient</strong></td>
<td>• Fails to improve AKI differential diagnosis despite multiple exposures to patients with the problem</td>
<td>• Realizes AKI is present but cannot see that post-renal cause (for example) was missed repeatedly. No improvement even after pointed out</td>
<td>• Recognizes deficiencies in differential diagnosis and demonstrates progressive improvement</td>
<td>• Sees a new consult and already assesses the literature to improve knowledge prior to presenting the patient when possible.</td>
<td>• Through peer inquiry and self-reflection has an accurate assessment of knowledge and practice gaps and improves these prior to seeing a patient</td>
</tr>
<tr>
<td><strong>Continuity Ambulatory</strong></td>
<td>• Makes no effort to expand a differential beyond the problem listed for patient presentation</td>
<td>• Is unaware of diagnoses that are missed during patient assessment • Makes little effort to improve identified areas of weakness</td>
<td>• Very concerned about missing diagnoses but inconsistent effort for improvement in skill set</td>
<td>• Reviews patients before clinic and places efforts toward practice improvement before patient presentation</td>
<td>• Through peer inquiry and self-reflection has an accurate assessment of knowledge and practice gaps and improves these prior to seeing a patient</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### 14. Learns and improves via performance audit (PBL2)

<table>
<thead>
<tr>
<th>Not Yet Assessable</th>
<th>Critical Deficiencies</th>
<th>Appropriate for beginning fellow</th>
<th>Appropriate for mid-level fellow</th>
<th>Ready for unsupervised practice</th>
<th>Aspirational</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>ROTATION FOR USE</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• <strong>General</strong></td>
<td><strong>Unwilling to recognize that tracking performance can improve patient care</strong></td>
<td><strong>Unaware that tracking performance data can influence practice or be a way to improve care</strong></td>
<td><strong>Realizes that tracking data can be a valuable tool but is unsure how to use/or inconsistent in using this for change</strong></td>
<td><strong>Able to create a query for assessing performance and leads an effort for change</strong></td>
<td><strong>Actively seeks to continue to assess changes that have been made to continue to better practice patterns</strong></td>
</tr>
<tr>
<td>• <strong>Assessment after QI project completion</strong></td>
<td><strong>Does not believe that collected data could reflect self-practice</strong></td>
<td><strong>Remains naive to QI process and when instructed, has little interest in application to own practice</strong></td>
<td><strong>Has working understanding of QI but needs significant guidance to implement change</strong></td>
<td><strong>Leads a QI effort from recognition of a problem to determining a method of change</strong></td>
<td><strong>Actively continues to monitor self-performance to enhance longevity of change</strong></td>
</tr>
<tr>
<td>• <strong>Dialysis rotation, fellow patient meeting</strong></td>
<td><strong>Does not believe that X (e.g., hypertension control) could reflect their own practice management and blames others for the data</strong></td>
<td><strong>Unable to realize that tracking X (HTN control) could influence practice patterns</strong></td>
<td><strong>Seeks out data that tracks X (HTN control), Guidance needed to implement change in practice</strong></td>
<td><strong>Takes the quarterly QA data and immediately creates a plan to improve change in practice</strong></td>
<td><strong>Continues to maintain assessment of previous changes to continue to improve</strong></td>
</tr>
<tr>
<td>ROTATION FOR USE</td>
<td>Critical Deficiencies</td>
<td>Appropriate for beginning fellow</td>
<td>Appropriate for mid-level fellow</td>
<td>Ready for unsupervised practice</td>
<td>Aspirational</td>
</tr>
<tr>
<td>-----------------</td>
<td>-----------------------</td>
<td>---------------------------------</td>
<td>---------------------------------</td>
<td>---------------------------------</td>
<td>-------------</td>
</tr>
<tr>
<td><strong>General</strong></td>
<td>• Is not interested in feedback and is defensive when feedback is given</td>
<td>• Appears to realize the importance of giving and receiving feedback</td>
<td>• Will seek feedback from supervisors but remains resistant or oblivious to feedback from others</td>
<td>• Comfortable with feedback from others at all levels • Seeks feedback from others</td>
<td>• Always adjusts performance based on feedback</td>
</tr>
<tr>
<td><strong>Hospital</strong></td>
<td>• Does not accept feedback for specific tasks</td>
<td>• Listens to the feedback, makes some attempt to modulate behaviors</td>
<td>• Sincerely attempts to modify practice habits based on feedback, if not always successful</td>
<td>• Appreciates and solicits feedback from professionals at all levels, including dialysis nursing staff, colleagues, and referring physicians</td>
<td>• Mentors junior trainees and others on effective inpatient service routines based on feedback from others</td>
</tr>
<tr>
<td><strong>Continuity Ambulatory Clinic</strong></td>
<td>• Resists feedback from attending physician or ambulatory nursing staff</td>
<td>• Listens and occasionally applies feedback to the outpatient practice</td>
<td>• Uses feedback from physicians to modify style, may still be slow to accept nursing feedback</td>
<td>• Accepts feedback from all sources, and utilizes in the application to outpatient practice</td>
<td>• Leads an outpatient clinical group on soliciting and giving feedback</td>
</tr>
</tbody>
</table>
### 16. Learns and improves at the point of care. (PBLI4)

<table>
<thead>
<tr>
<th>Not Yet Assessable</th>
<th>Critical Deficiencies</th>
<th>Appropriate for beginning fellow</th>
<th>Appropriate for mid-level fellow</th>
<th>Ready for unsupervised practice</th>
<th>Aspirational</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>ROTATION FOR USE</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>General</td>
<td>• Fails to acknowledge uncertainty or inaccuracies</td>
<td>• Develops a limited differential diagnosis and rarely reconsiders an approach to a problem</td>
<td>• Provides a thorough differential diagnosis, but asks for help with management</td>
<td>• Is open minded in the approach to a problem and routinely seeks new information</td>
<td>• Has a systematic approach to track and pursue emerging clinical questions</td>
</tr>
<tr>
<td>Acute consult or inpatient</td>
<td>• Fails to acknowledge limits in knowledge of [acute dialysis, inpatient nephrology problems, vascular access, clinical differential diagnosis]</td>
<td>• Exhibits a limited differential diagnosis of [target area], is reluctant to reconsider approach.</td>
<td>• Translates medical information needs into well-formed clinical questions</td>
<td>• Open minded in the approach to [target area] and routinely seeks new information.</td>
<td>• Mentors and shares a systematic approach to track and pursue emerging clinical questions</td>
</tr>
<tr>
<td>Continuity ambulatory Clinic</td>
<td>• Fails to acknowledge limits in knowledge of outpatient nephrology [or given target area], makes no attempt to expand database</td>
<td>• Exhibits a limited differential diagnosis of [target area]</td>
<td>• Studies and consistently tries to apply it to the situation.</td>
<td>• Familiar with KDOQI and KDIGO</td>
<td>• Mentors junior trainees on how to appraise clinical research reports based on accepted criteria</td>
</tr>
</tbody>
</table>
### G. Professionalism

17. Has professional and respectful interactions with patients, caregivers, and members of the interprofessional team (e.g., peers, consultants, nursing, ancillary professionals, and support personnel). (PROF1)

<table>
<thead>
<tr>
<th></th>
<th>Not Yet Assessable</th>
<th>Critical Deficiencies</th>
<th>Appropriate for beginning fellow</th>
<th>Appropriate for mid-level fellow</th>
<th>Ready for unsupervised practice</th>
<th>Aspirational</th>
</tr>
</thead>
</table>

18. Accepts responsibility and follows through on tasks. (PROF2)

<table>
<thead>
<tr>
<th></th>
<th>Not Yet Assessable</th>
<th>Critical Deficiencies</th>
<th>Appropriate for beginning fellow</th>
<th>Appropriate for mid-level fellow</th>
<th>Ready for unsupervised practice</th>
<th>Aspirational</th>
</tr>
</thead>
</table>

19. Responds to each patient’s unique characteristics and needs. (PROF3)

<table>
<thead>
<tr>
<th></th>
<th>Not Yet Assessable</th>
<th>Critical Deficiencies</th>
<th>Appropriate for beginning fellow</th>
<th>Appropriate for mid-level fellow</th>
<th>Ready for unsupervised practice</th>
<th>Aspirational</th>
</tr>
</thead>
</table>

20. Exhibits integrity and ethical behavior in professional conduct. (PROF4)

<table>
<thead>
<tr>
<th></th>
<th>Not Yet Assessable</th>
<th>Critical Deficiencies</th>
<th>Appropriate for beginning fellow</th>
<th>Appropriate for mid-level fellow</th>
<th>Ready for unsupervised practice</th>
<th>Aspirational</th>
</tr>
</thead>
</table>
H. **Interpersonal And Communication Skills**

<table>
<thead>
<tr>
<th></th>
<th>Not Yet Assessable</th>
<th>Critical Deficiencies</th>
<th>Appropriate for beginning fellow</th>
<th>Appropriate for mid-level fellow</th>
<th>Ready for unsupervised practice</th>
<th>Aspirational</th>
</tr>
</thead>
<tbody>
<tr>
<td>21. Communicates effectively with patients and caregivers. (ICS1)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>22. Communicates effectively in interprofessional teams (e.g., with peers, consultants, nursing, ancillary professionals, and other support personnel). (ICS2)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>23. Appropriate utilization and completion of health records. (ICS3)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
A. Grand Rounds Evaluation

Evaluator Name: __________________________________________________________

Signature: ___________________________ Date ______________________

Speaker's Name: _________________________________________________________

Lecture Title: ____________________________________________________________

Speaker Evaluation

Increase Medical Knowledge and Skills
NA 1 2 3 4 5

Apply Current Practice Guidelines
NA 1 2 3 4 5

Latest Advances in the Field
NA 1 2 3 4 5

Explain Areas of Controversy
NA 1 2 3 4 5

Legend
Very Good: 4. Excellent: 5.

Feedback:
_____________________________________________________________________
_____________________________________________________________________
_____________________________________________________________________
_____________________________________________________________________
_____________________________________________________________________
_____________________________________________________________________
_____________________________________________________________________
### B. Case Presentation Evaluation

Evaluator Name: ____________________________________________

Signature: ___________________ Date: ______________________

Fellow Name: ________________________________ F1 ☐ F2 ☐

Case Presented: ________________________________

#### Trainee Evaluation

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>History and physical Examination</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NA</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Differential Diagnosis</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NA</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Problems lists</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NA</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Identified Treatment Plan</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NA</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Case Presentation Skills</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NA</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Legend**


**Feedback:**

_____________________________________________________________________

_____________________________________________________________________

_____________________________________________________________________

_____________________________________________________________________

_____________________________________________________________________

_____________________________________________________________________
Evaluator Name: __________________________________________________________

Signature: ___________________________ Date: ________________________________

Fellow Name: ____________________________________________________________

F1 □ F2 □

Case Presented: __________________________________________________________

Trainee Evaluation

History and physical Examination
NA 1 2 3 4 5

Differential Diagnosis
NA 1 2 3 4 5

Problems lists Identified
NA 1 2 3 4 5

Treatment Plan
NA 1 2 3 4 5

Case Presentation Skills
NA 1 2 3 4 5

Legend
Very Good: 4. Excellent: 5.

Feedback:

_____________________________________________________________________
_____________________________________________________________________
_____________________________________________________________________

Feedback:
C. Guidelines For Mentoring

Mentor Name: ____________________________________________________________

Signature: __________________________ Date: ______________________________

Fellow Name: ____________________________________________________________

Year: F1 ☐ F2 ☐

Signature: __________________________

Roles of the Mentor with Trainee:

Discuss overall objectives of the Rotation and daily work round:

☐ Met Expectation ☐ Partially Met ☐ Not Met

Comments:
____________________________________________________________________
____________________________________________________________________
____________________________________________________________________

Review Monthly Assessment:

☐ Met Expectation ☐ Partially Met ☐ Not Met

Comments:
____________________________________________________________________
____________________________________________________________________
____________________________________________________________________

Review Mini-CEX:

Number: __________________________ Marks: __________________________

Future Mini-CEX:
____________________________________________________________________
____________________________________________________________________
____________________________________________________________________

Comments:
____________________________________________________________________
____________________________________________________________________
____________________________________________________________________
Review Portfolio and Logbook:

☐ Met Expectation  ☐ Partially Met  ☐ Not Met

Comments:
______________________________________________________________
______________________________________________________________
______________________________________________________________

Trainee Support:

Average Calls: _____________________/Month

Protected Time Activities: _________________________________________

Leave: _________________________________________________________

Comments:
______________________________________________________________
______________________________________________________________
______________________________________________________________

Revisit earlier Concerns or unsolved Issues:

Comments:
______________________________________________________________
______________________________________________________________
______________________________________________________________

Research: ☐ Yes.  ☐ No

Which Steps of conducting Research:

______________________________________________________________
______________________________________________________________
______________________________________________________________

Comments:
______________________________________________________________
______________________________________________________________
______________________________________________________________
Daily Morning Activity:

Scheduled:

______________________________________________________________

Journal Club: ________________________________________________

Clinical Presentation: - ________________________________________

Scheduled: _____________________________________________________

Supervisor: _____________________________________________________

Comments: _____________________________________________________

Referral to Program Director

1. Serious Academic Problems ☐
2. Progressive Deterioration of Academic Performance ☐
3. Potential Mentor or psychological Issues ☐
4. Personal Problems Interfering with Academic Duties ☐
5. Consecutive Absence from three Scheduled Meetings ☐
6. Professional Misconducting ☐

Reasons: _______________________________________________________

________________________________________________________________

What Action Done:

________________________________________________________________

________________________________________________________________

Suggested Solution to These Problems:

________________________________________________________________

________________________________________________________________

Reminder:

________________________________________________________________

________________________________________________________________
D. **Roles of the Fellow:**

1. Submit resume at the start of the relationship.
2. Provide mentor with medium- (1-3 years) and long-term (3-7 years) goal.
3. Take primarily responsibility in maintaining the relationship.
4. Schedule monthly meeting with mentor in a timely manner; does not request for ad hoc meeting except in emergency.
5. Recognize self-learning as an essential element of residency training.
6. Report any major events to the mentor in a timely manner.

E. **Tasks during the Meeting:**

1. Discuss overall clinical experience of the fellow with particular attention to any concerns raised.
2. Review logbook or portfolio with the fellow to determine whether the resident is on target of meeting the training goals.
3. Revisit earlier concerns or unsolved issues, if any.
4. Explore any non-academic factors seriously interfering with training.
5. Document excerpts of the interaction in logbook.

**Frequency and Duration of Engagement:**

The recommended minimum frequency is once every 4 to 6 weeks. Each meeting might take 30 to 60 minutes. It is expected that once assigned, a mentor should continue with the same fellow preferably for the entire duration of the training program or at least for two years.

F. **Recommended Reading**

2. The Journal of the International Pediatric Nephrology Association (IPNA)
3. Up-To-Date information resource.
5. Renal Transplantation (Oxford Specialist Handbooks). Nicholas Torpey and others
REFERENCES

1. American Society of Nephrology: Nephrology Curricular Milestones
3. University of Toronto: Nephrology Training Objectives