Curriculum
For
DM Nephrology (3-year course)

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CURRICULUM FOR COMPETENCY BASED POST GRADUATE TRAINING PROGRAMME FOR DM (NEPHROLOGY) (3-YEARS PROGRAM)

1. GOAL

The program aims at training a Physician in the specialty of Nephrology, encompassing the related knowledge, skills, research methodology and attitudes which will enable him/her to function as an independent clinician/consultant, a teacher, or a research scientist.

The goal of the program is to produce a competent Nephrologist who:

1. Has acquired the competence pertaining to Nephrology that is required to be practiced in the community and at all levels of health care system
2. Has acquired the skills to manage the patient effectively pertaining to nephrology
3. Has acquired skill in effectively communicating with patients and attendants.
4. Has the desired skills to independently manage emergency cases.
5. Is aware of the latest developments in the field of nephrology oriented to principles of research methodology
6. Has acquired skills in educating medical and paramedical professionals.

2. PROGRAM OUTCOMES

Upon completion of the DM Nephrology program, the trainee shall be able to acquire certain subject-specific competencies in the cognitive, psychomotor, and affective domains.

Program Outcomes for DM Nephrology Postgraduate Students

1. Competence to practice the specialty in the community with adequate training in the scientific and clinical aspects of Nephrology.
2. Competence to practice the specialty with care and compassion, thereby delivering the highest standard of Nephrology care to the community.
3. Competency in the academic and research aspects of Nephrology.
4. Possession of current, up-to-date, scientific and evidence-based knowledge pertaining to the specialty of Nephrology.
5. Skills required to undertake independent clinical practice in Nephrology.
6. Attitude of punctuality, reliability, responsibility, accountability, and caring.
7. A good and sound foundation of ethical values in the practice of Nephrology.
8. Competence to be an effective teacher and communicator in Nephrology.
9. Ability to effectively communicate with patients, peers, and the community in the discharge of clinical responsibilities.

Course Outcomes for DM Nephrology Postgraduate Students

1. Demonstrate comprehensive knowledge of applied anatomy and physiology relevant to Nephrology.
2. Demonstrate understanding of various classifications, histopathology concepts, investigations, and their application in the management of renal diseases.
3. Demonstrate understanding of pharmacokinetics and pharmacodynamics of various drugs and their use in renal diseases and transplantation.
4. Demonstrate understanding of the etiopathogenesis and management of glomerular and tubular renal disorders.
5. Demonstrate understanding of the etiopathogenesis and management of hypertension, urinary tract infections, and nephrolithiasis.
6. Demonstrate understanding of the etiopathogenesis and management of pediatric and inherited renal diseases.
7. Demonstrate understanding of the etiopathogenesis, management, and complications of acute kidney injury and chronic kidney disease.
8. Demonstrate the principles and practice of hemodialysis and peritoneal dialysis.
9. Demonstrate the principles and practice of renal transplantation.

10. Demonstrate principles and applications of biostatistics.

11. Demonstrate knowledge of recent advances in the field of Nephrology.

12. Demonstrate principles and practice of interventional nephrology.

Program Education Objectives for DM Nephrology postgraduate students

1. Acquire knowledge and skills in the general and specialist aspects of Nephrology.
2. Provide supervision and implement long-term collaborative management plans for a large number of patients.
3. Provide leadership for Hemodialysis (HD) and Peritoneal Dialysis (PD) units.
4. Teach paramedical staff and supervise junior colleagues effectively.
5. Ensure effective functioning of Nephrology services in collaboration with medical units and ICUs.
6. Develop the ability to plan professional growth that contributes to the holistic development of the specialty, including patient care, teaching/training, and research.

At the end of the course upon successful completion of training on passing the examination the student is expected to have achieved certain subject specific competencies in the cognitive, psychomotor, and affective domain.

1. Cognitive Domain	
S.No.	**Competencies**
1.1	Understand the normal renal anatomy and physiology from fetal life to adulthood.
1.2	Understand the basic principles involved in the pathology of kidney diseases and their assessment as applicable to nephrology practice.
1.3	Be conversant with the etiology, pathophysiology, diagnosis, and management of common kidney diseases in an outpatient, inpatient and emergency settings.
1.4	Recognize the importance of an interdisciplinary approach in the management of various kidney diseases and obtain relevant specialist / ancillary services' consultation where appropriate.
1.5	Possess knowledge of the commonly used radio-imaging techniques like Plain X-ray, Ultrasound, CT and MRI, various contrast radiographies and nuclear imaging techniques
1.6	Acquire and demonstrate the knowledge about various forms of renal replacement therapies like hemodialysis, peritoneal dialysis, and kidney transplantation
1.7	Possess knowledge about various urological procedures/surgeries, including kidney transplantation and organ perfusion.
1.8	Acquire and demonstrate knowledge about all aspects of kidney transplantation including but not limited to its principles, laws, pathophysiology, pharmacology, immunology, histocompatibility, histology, cross-match, diagnosis, and management of graft dysfunction (rejection, infections, etc.).

2. Psychomotor domain	
S.No.	**Competencies**
2.1	Understand the presentation (history and clinical examination), evaluation and management of congenital and acquired renal disorders in neonates, infants, children, and adults.
2.2	Order relevant investigations and competently interpret the results of laboratory studies, including urinalysis and the results of general and renal imaging procedures performed in a patient with kidney and urinary tract disorders.
2.3	Formulate and implement treatment plans, and monitor the effectiveness of their interventions for various renal diseases, including management of acute kidney injury, chronic kidney disease, end-stage renal disease and patients on various forms of renal replacement therapies, including kidney transplantation, in a holistic manner
2.4	Perform competently all medical and invasive procedures including but not limited to (a) percutaneous biopsy of native and transplanted kidneys, (b) placement of temporary vascular access (tunnel and non-tunnel) or peritoneal catheter (both acute and chronic catheter) for renal replacement therapy (RRT), (c) Perform hemodialysis, other blood based therapies, acute and chronic peritoneal dialysis and continuous renal replacement therapy, (d) Urine analysis, native kidney and graft biopsy handling and interpretation, (e) Arterio-Venous Fistula Creation
2.5	Acquire proficiency in prescribed minor and major procedures related to nephrology, dialysis and transplantation, initially with assistance and later independently.
2.6	Should be able to prescribe, formulate and implement the various procedures/therapies in nephrology, including, but not limited to, hemodialysis, peritoneal dialysis, plasmapheresis, CRRT and other blood-based therapies
2.7	Formulate and carry out pre-transplant workup for donor and recipient independently
2.8	Acquire skills to manage a kidney transplant patient during intra- and postoperative period, and should be able to do organ perfusion independently.
2.9	Provide Basic and Advanced Life Support services in emergencies
3. Affective Domain	

S.No.	Competencies
3.1	Demonstrate respect, compassion, and integrity; a responsiveness to the needs of patients and society; and a commitment to excellence.
3.2	Demonstration of skill in listening to patients and families and the ability to effectively educate and counsel patients and their families on diagnostic and treatment decisions, including initiation of renal replacement therapies and prognosis.
3.3	Develop the skills to interact with professional colleagues for the care of the renal patient.
3.4	Demonstrate the ability to lead the consult service through interactions with referring and primary doctors.
3.5	Effectively work with other members of the health care team, including referring physicians from other specialties, nurses, social workers and technicians, and implement a treatment plan.
3.6	Effectively teach nephrology care to medical students, junior post graduate students, nurses and technicians.
3.7	Adopt ethical principles in all aspects of nephrology practice/ research. (Professional honesty and integrity, humility, informed consent, counselling and recognizing patients' rights and privileges).
3.8	Develop desired skills to independently manage emergencies related to renal disease and complications associated with procedures /surgeries as mentioned above.
3.9	Communicate effectively and demonstrate caring and respectful behavior when interacting with patients with renal and urinary tract problems and their families.
3.10	Be conversant with counselling techniques for the family / primary care takers.
3.11	Work with faculty and colleagues to provide patient-focused care.
3.12	Perform necessary patient care documentation in an accurate and timely manner.
3.13	Adhere to ethical standards and maintain professionalism while using social media platforms for teaching, learning, and communicating.

4. DURATION OF THE COURSE

The training shall be of 3-year full time residency patterns. During these years, the candidate shall be a senior resident who will perform clinical, teaching and research activities as prescribed in the curriculum. The candidate shall be given additional administrative responsibilities during these years as per his/her competency.

5. SYLLABUS

System/Section	List of topics
A) Renal Anatomy & Physiology	1. Embryology of the kidney 2. Anatomy of the kidney 3. Podocyte structure and function 4. Renal Circulation and Glomerular hemodynamics 5. Renal Sodium handling 6. Renal Potassium handling 7. Renal handling of calcium, magnesium and phosphorous 8. Renal Acid Base handling 9. Renal handling of Uric acid 10. Urine concentration and dilution 11. Aquaporins 12. Renin angiotensin aldosterone system 13. Hormones and Kidney 14. Nephron endowment and developmental programming of blood pressure and kidney

B) Electrolyte, water and acid balance	1. Disorders of sodium & water balance 2. Disorders of potassium balance 3. Disorders of acid-base balance 4. Disorders of calcium balance 5. Disorders of magnesium balance 6. Disorders of phosphate balance 7. Diuretics 8. Interpretation of electrolyte and acid-base parameters in blood and urine
C) Evaluation of Kidney Diseases	1. Approach to a patient with kidney disease 2. Laboratory assessment of kidney disease - GFR, Urinalysis and proteinuria 3. Diagnostic kidney imaging 4. Kidney biopsy 5. Biomarkers in Acute kidney injury and chronic kidney disease
D) Primary glomerular diseases	1. Inherited disorders of the glomerulus 2. Mechanisms and consequences of proteinuria 3. Mechanisms of immune glomerular injury 4. Infection-related glomerulonephritis 5. Rapidly progressive glomerulonephritis and crescentic glomerulonephritis 6. IgA Nephropathy and Henoch - Schonlein purpura 7. Membranoproliferative glomerulonephritis and C3 glomerulopathies 8. Membranous nephropathy 9. Nephrotic syndrome and podocytopathies- Minimal change disease, Focal segmental glomerulosclerosis 10. Fibrillary glomerulonephritis and Immunotactoid glomerulopathy

E) Secondary glomerular diseases	1.	Systemic lupus erythematosus
	2.	Mixed connective tissue disease and kidney
	3.	Vasculitic diseases of kidneys- small vessel vasculitis, medium vessel, large vessel vasculitides
	4.	Anti-glomerular basement membrane disease and Goodpasture's syndrome
	5.	Hereditary Nephritis, Nail patella syndrome, Fabry's disease
	6.	Glomerular involvement with bacterial infections
	7.	Glomerular involvement with parasitic infections
	8.	Glomerular involvement with viral infections
	9.	Glomerular diseases associated with drugs
	10.	Overview of therapy for glomerular diseases
F) Systemic Diseases of the Kidney	1.	Tropical Nephrology
	2.	Pathogenesis, Clinical manifestations, and natural history of Diabetic nephropathy
	3.	Prevention and treatment of diabetic nephropathy
	4.	Management of a diabetic patient with CKD
	5.	Cardiac failure and kidney
	6.	Liver diseases and kidney
	7.	Sjogren's syndrome and kidney
	8.	Sarcoidosis and kidney
	9.	Rheumatoid arthritis and kidney
	10.	Sickle cell disease and kidney
	11.	Antiphospholipid syndrome and kidney
	12.	Lipoprotein glomerulopathy

G) Pregnancy and kidney disease	1. Renal physiology in normal pregnancy 2. Renal complications in normal pregnancy 3. Pregnancy with pre-existing kidney disease
H) Kidney and Hypertension	1. Role of the kidneys in hypertension 2. Primary hypertension 3. Endocrine causes of hypertension 4. Renovascular hypertension and ischemic nephropathy 5. Antihypertensive therapy 6. Interventional treatments of resistant hypertension 7. Malignant Hypertension and Other Hypertensive Crises
I) Acute Kidney Injury	1. Epidemiology, diagnosis and staging of AKI 2. Pathophysiology of acute kidney injury - Ischemic and nephrotoxic 3. Antibiotic and immunosuppression-related acute kidney injury 4. Nephrotoxicity of NSAIDS, Analgesics and RAAS inhibitors 5. Contrast associated AKI 6. Nephrotoxicity secondary to environmental agents, heavy metals, drug abuse and lithium 7. Acute kidney injury associated with pigmenturia and crystal deposits 8. Acute kidney Injury in the Tropics 9. Evaluation of acute kidney injury 10. Complications of acute kidney injury 11. Prevention and management of acute kidney injury

J) Chronic Kidney Disease	1.	Epidemiology and Demographics of Kidney Disease
	2.	Risk factors and chronic kidney disease
	3.	Adaptation to nephron loss and mechanisms of progression in chronic kidney disease
	4.	Aging and kidney disease
	5.	Pathophysiology of uremia
	6.	Chronic Kidney Disease- Mineral Bone Disorder
	7.	Therapeutic approach to CKD-MBD
	8.	Cardiovascular aspects of CKD
	9.	Hematologic aspects of CKD & Management
	10.	Endocrine aspects of CKD
	11.	Neurologic aspects of CKD
	12.	Dermatologic conditions in CKD
	13.	Nutritional management in kidney diseases
	14.	Stepped care approach to management of CKD
	15.	Drug dosing considerations in patients with kidney disease
	16.	Acquired cystic kidney disease and malignant neoplasms
	17.	Tissue Engineering, Stem cells and cell therapy in Nephrology
	18.	Green Nephrology / Green dialysis
K) Microvascular & Macrovascular diseases of the kidney	1.	Thrombotic microangiopathies- Hemolytic uremic syndrome & Thrombotic Thrombocytopenic purpura
	2.	Atheroembolic Renal Disease
	3.	Radiation Nephropathy
	4.	Macrovascular diseases of the kidney

L) Cystic and Tubular disorders	1. Cystic diseases of the kidney 2. Inherited disorders of the renal tubule 3. Acute tubulointerstitial nephritis 4. Chronic tubulointerstitial nephritis 5. Endemic nephropathies a. Balkan endemic nephropathy and other endemic nephropathies b. Chinese herbal nephropathy c. CKDu
M) Urinary Tract Infections, Urinary Tract Obstruction and Nephrolithiasis	1. Host-pathogen interactions and host defence mechanisms 2. Cystitis and urethritis 3. Infections of the upper urinary tract 4. Renal and perirenal abscesses 5. Complicated urinary tract infections 6. Fungal infections of the urinary tract 7. Urinary tract tuberculosis 8. Urinary tract obstruction 9. Reflux nephropathy 10. Nephrolithiasis 11. Nephrocalcinosis 12. Malformations of the kidney
N) Pediatrics Nephrology	1. Diseases of the kidney and urinary tract in children 2. Fluid, electrolyte and acid base disorders in children 3. Renal replacement therapy in Pediatric ESRD 4. Intervention Nephrology In Pediatric Patient

	O) Dialysis	1. Physiologic principles and urea kinetic modelling, Adequacy of dialysis 2. Hemodialysis apparatus 3. Dialysis water, Water treatment plant 4. Dialyzer reuse 5. Vascular access for dialytic therapies - a. Arteriovenous fistula b. Venous catheters c. Arteriovenous vascular access monitoring and complications d. Venous catheter infections and complications 6. Complications during dialysis 7. Anticoagulation in Hemodialysis 8. Continuous renal replacement therapy 9. Home hemodialysis 10. Hemodiafiltration 11. Plasmapheresis 12. Elimination enhancement of poisons 13. Sorbent technology 14. Bioartificial kidney, Wearable kidney 15. Infections in ESRD patients 16. Physiology of peritoneal dialysis 17. Peritoneal dialysis apparatus 18. Peritoneal dialysis catheter placement and care 19. Adequacy of peritoneal dialysis 20. Volume status and fluid overload in peritoneal dialysis 21. Peritonitis and exit site infections 22. Metabolic complications of peritoneal dialysis 23. Hernias, Leaks and Encapsulating Peritoneal Sclerosis

P) Transplantation	1.	Transplant immunology
	2.	Histocompatibility in kidney transplantation
	3.	Evaluation of the Recipient
	4.	Evaluation of Donor
	5.	Kidney Preservation
	6.	Brain Death and Donation after circulatory death donor criteria and care of deceased
	7.	Donor Nephrectomy
	8.	Surgical techniques of kidney transplantation
	9.	Transplantation and abnormal bladder
	10.	Peri-operative care of patients undergoing transplantation
	11.	Early course of the patient with kidney transplant
	12.	Induction therapies for renal transplant recipient
	13.	Maintenance therapy in renal transplant recipients
	14.	Co-Stimulatory blockade in renal transplantation
	15.	Other forms of immunosuppression
	16.	Approaches to induction of tolerance
	17.	Transplantation in sensitized patients and ABO blood group incompatibility
	18.	Kidney paired donation programs
	19.	Vascular and lymphatic complications after kidney transplantation
	20.	Urological complications after kidney transplantation
	21.	Pathology of kidney transplantation-Rejections
	22.	Chronic allograft failure

		23. Cardiovascular disease in renal transplantation 24. Infections in kidney transplant recipients 25. Liver disease in renal transplant recipients 26. Neurological disease after kidney transplantation 27. Skin involvement after kidney transplantation 28. Malignancies in kidney transplant recipients 29. Pancreas and kidney transplantation for diabetic nephropathy 30. Combine liver and kidney transplantation, multiorgan transplantation 31. Renal transplantation in children 32. The Transplantation Laws and Organ Allocation System 33. Xenotransplantation
	Q) Critical Care Nephrology	1. Principles of Critical Care Nephrology 2. Principles of Renal Physiology 3. Epidemiology of Acute Kidney Injury in Critical Care 4. Exposures and Patient Susceptibility 5. Humoral and Cellular Mechanisms of Kidney Damage 6. Clinical Course of Acute Kidney Injury and Biomarkers 7. Mechanisms of Repair or Progression 8. Renal Histopathology in Acute Kidney Injury

	9. Imaging Techniques in Critical Care Nephrology 10. Clinical Syndromes and Acute Kidney Injury 11. Prevention and Treatment: General Treatment Concepts 12. Fluid and Electrolytes 13. Acid-Base, Metabolism and Nutrition in Critical Illness and Acute Kidney Injury 14. Infectious Diseases and Sepsis 15. Acute Intoxication and Poisoning 16. Acute Kidney Injury and Organ Crosstalk 17. Interaction of the Heart and the Kidney 18. Interaction of the Lung and Kidney 19. The Liver and the Kidney 20. Interaction of the Brain and the Kidney 21. Fluid Balance and Its Management in the Critically Ill 22. General Principles of Acute Renal Replacement Therapy 23. Intermittent Renal Replacement Therapies 24. Continuous Renal Replacement Therapies (CRRT) 25. Peritoneal Dialysis in the Intensive Care Unit 26. Extracorporeal Blood Purification Techniques Beyond Dialysis

	27.	Critical Care Nephrology in Pediatrics
	28.	Kidney Transplantation and Critical Care
	29.	Special Kidney Problems in the Intensive Care Unit
	30.	Principles and Management of Mechanical Ventilation
	1.	Onco-Nephrology: Growth of the Kidney-Cancer Connection
R) Onconephrology	2.	AKI Associated with Malignancies
	3.	Tumor Lysis Syndrome
	4.	Electrolyte and Acid-Base Disorders and Cancer
	5.	Glomerular Disease and Cancer
	6.	Hematologic Diseases and Kidney Disease including monoclonal gammopathies
	7.	Clinical tests for Monoclonal Proteins
	8.	Hematopoietic Stem Cell Transplant-Related Kidney Disease
	9.	Radiation Nephropathy
	10.	Chemotherapy and Kidney injury
	11.	Pharmacokinetics of Chemotherapeutic Agents in Kidney Disease
	12.	CKD as a Complication of Cancer
	13.	Hereditary Renal Cancer Syndromes
	14.	Work-up and Management of Small Renal Masses and neoplasms
	15.	Cancer in Solid Organ Transplantation
	16.	Cancer Screening in ESRD
	17.	Ethics of RRT, Initiation and Withdrawal, in Cancer Patients
	18.	Palliative Care in Patients with Kidney Disease and Cancer

S) Interventional Nephrology	Principles and Practical use of various procedures in interventional nephrology, including but not limited to: 1. Kidney biopsy 2. Pre-operative evaluation for vascular access creation 3. Vascular Access Creation and Its Dysfunction Management 4. Dialysis catheter placement: - Tunnel and Non-tunnel catheter at various access sites 5. Vascular Mapping for AVF creations 6. Various endovascular procedures used for management of vascular access dysfunctions 7. Peritoneal dialysis catheter placements for both acute Peritoneal dialysis (PD) and Continuous ambulatory peritoneal dialysis (CAPD) 8. Interventional procedures for diagnosis and management of peritoneal dialysis catheter dysfunction 9. Approach to nonfunctional, Malfunctioning and infected catheter 10. Thrombolysis and anticoagulation use in access dysfunction 11. Approach to nonfunctioning/dysfunctioning /malfunctioning AVF. 12. Unconventional venous access placement like trans lumbar or transhepatic dialysis catheter placements

	13.	Central venous stenosis: - Clinical approach and management
T) Imaging In Nephrology	1.	Various Nuclear Imaging modalities/Techniques, its principle and practical use in nephrology including but not limited to DTPA Scan, DMSA Scan, PET scan, ACE inhibitor renal scintigraphy, Diuretic renal scintigraphy etc.
	2.	CT Scan:- Principles and Practical use in diagnosis of various renal disorders
	3.	MRI Scan:- Principles and Practical use in diagnosis of various renal disorders
	4.	Ultrasonography :- Principles and Practical use in diagnosis/management of various renal disorders
	5.	Point Of Care Ultra-Sonography (POCUS): - Principles and Practical use in diagnosis of various renal/related disorders
	6.	Urography: - Principles and Practical use in diagnosis of various renal disorders
	7.	MCU/RGU and Various other urological Imaging modalities: - Principles and Practical use in diagnosis of various renal disorders
	8.	Fistulogram and other imaging modalities for the diagnosis of Vascular access Dysfunction:- Principles and Practical use in diagnosis of vascular access dysfunction.

	9. USG Doppler study:- 1. Principles and Practical use in diagnosis of various renal disorders, 2. Its use in the evaluation and management of Vascular access dysfunction 10. Urodynamics Studies: - Principles and Practical use in the diagnosis of various urinary tract dysfunctions
U) Recent Advances in the Nephrology and Allied Sciences	1. Recent advances in the field of Nephrology and allied sciences 2. Recent advances in the field of Kidney transplantation and other renal replacement therapies
V) Uro-nephrology	1. Knowledge of common urological diseases and their management 2. Principles, indications, contraindication of various urological procedures and their practical use in nephrology 3. Cystoscopy: Basic Principle, Techniques and practical use 4. Urodynamics studies, various imaging modalities: - Principles and use in diagnosis of urological disorders 5. Basic principles and Knowledge of various urological surgeries including kidney transplant Surgery 6. Kidney Perfusions during transplantation :- Principles and Techniques 7. Vascular Access Creation Surgeries

	including AVF creations. Principles, Techniques and Practical approach
W) Medical Ethics and Laws related to Nephrology	1. Medical Ethics 2. Laws related to Nephrology, Transplantation and allied Sciences 3. Medical Negligence
X) Genetics in Nephrology	1. Congenital and inherited genetic disorders in nephrology 2. Approach for evaluation of genetical disorders in nephrology 3. Diagnostics modalities/methods for genetic diseases 4. Principles of management 5. Prognostication and rehabilitation
Y) Nephropathology	1. Approach to the Diagnosis of Common Glomerular Disorders 2. Prerequisites for histological diagnosis of glomerular diseases 3. Various techniques used in the histopathology of renal tissue 4. Significance and use of various stains in the diagnosis of glomerular lesions (light microscopy) 5. Immunofluorescence: Principles, techniques and use of various antibodies and special markers for the diagnosis of various glomerular lesions 6. Electron Microscopy :- Principles , Practical use and Approach in kidney diseases

	7.	Approach in special and rare cases
	8.	Approach in graft biopsy including diagnosis of rejections and infection.
Z) Lab Medicine	1.	Various pathological, biochemical, genetic and microbiological tests, their principles, interpretation and practical use for diagnosis of kidney diseases.
	2.	Urine analysis: - principle, techniques, demonstration and interpretation.
	3.	Various immunological, genetics, cross match, tissue typing and immunohistocompatibility testing methods in kidney transplantation.

6. NEPHROLOGY DM ROTATION POSTINGS

S. No.	Posting	Duration
1.	Indoor patient department services	7 months
2	Dialysis (HD, PD) and Interventional Nephrology (procedures)	8 months
3.	Kidney Transplantation	6 months
4.	Critical Care Nephrology	3 months
5.	OPD (outpatient services)	8 months
6.	Periphery (consultations)	3 months
6.	Lab Medicine and allied posting	1 month

7. COMPETENCIES TO BE ACHIEVED IN PSYCHOMOTOR DOMAIN/PRACTICAL SKILL DURING ROTATION POSTINGS

7.1 Indoor services, including emergency and Critical care nephrology/Out patient clinics/Consultations

Upon completion of the course, the postgraduate student should be able to perform /demonstrate his/her skill in the following task.

- The candidate should take good history and demonstrating good examination techniques.
- Arrive at a logical working diagnosis, differential diagnosis after clinical examination and order appropriate investigations keeping in mind their relevance (need based) and thereby provide appropriate care that is ethical, compassionate, responsive and cost effective and in conformance with statutory rules.
- The candidate should work in the department under the guidance of faculty. They should be able to make decision in clinical and investigative aspects of nephrology.
- Attend Nephrology outpatient department including all specialty renal clinics. The candidates must write case sheets for all patients and discuss the patients' problems with the faculty.
- The candidates have to maintain data for Indoor, Outdoor and consultation separately (online and offline mode)
- The candidate has to gain experience in a wide variety of renal diseases.
- Candidate has to take a detailed history, write the work up and management plan of each IPD patient. Trainee should take active participation in day-to-day decision making, ward round teaching, discussion and formulation of treatment plan.
- During his /her training period candidate has to be familiar with the pathogenesis, clinical presentation, differential diagnosis, and management of the following pediatric care entities:
    - Acute kidney injury in children.
    - Must understand the causes of glomerulonephritis in children: post-streptococcal GN, IgA nephropathy, sickle cell nephropathy, familial hematuria syndromes including Alport's Syndrome and benign familial hematuria, Henoch-Schönlein purpura, various congenital diseases/syndromes

- Hypercalciuria, nephrotic syndrome, childhood and adolescent hypertension, vesicoureteral reflux, and other disease states.
- Understand the different problems and management of uremia in children with reference to: Presentation of uremia, modes of dialysis, complications of uremia and dialysis in children
- Use of different renal replacement therapies in children like hemodialysis, peritoneal dialysis, use of CAPD cycler, CRRT, Therapeutic apheresis (plasmapheresis)
- Performance of different procedures in pediatric patients like kidney biopsy (graft/native), placement of vascular access like temporary and tunnel catheter, AV fistula, placement of peritoneal dialysis catheter.
- Understand the principles and management of children in reference to transplantation, including evaluation, immediate post-transplant care, and long-term follow-up.

7.2 Dialysis and Interventional Nephrology

- To be able to write a prescription, conduct and supervise acute and chronic intermittent hemodialysis.
  - Entails knowledge of proper indications, principles and contraindications for hemodialysis,
  - Knowledge of first dialysis precautions and modifications,
  - Writing of dialysis order which includes choosing dialysis filters, tubings, anticoagulation, blood flow, dialysate flow, ultrafiltration, access selection, duration and special modifications/precautions if any,
  - Estimating dry weight and modification during special circumstances (critically ill child, inborn errors of metabolism, post op status, bleeding diathesis etc.)
  - Choosing appropriate dialysate composition and preparations,
  - Knowledge of principles and functioning of hemodialysis apparatus including different dialysis machines,
  - Knowledge of different alarms during hemodialysis with their troubleshooting,

- Understanding and treatment of complications (during and after HD session)
- Modifying dialysis prescription for inadequate clearance in chronic hemodialysis patients to achieve adequacy.
- Use of different modifications of hemodialysis and there indication's like isolated ultrafiltration, SLEDD (sustained low efficiency daily dialysis)
- Should be able to use different dialysis profiles during dyselectrolytemia and volume imbalance like sodium ,potassium and ultrafiltration profiling.
- Knowledge and practical use of urea kinetic modelling, principles and hemodialysis adequacy,
- Candidate should serve as the primary care provider for a cohort of patients receiving chronic outpatient hemodialysis and be able to formulate a plan, initiate and monitor the hemodialysis.
- Evaluation and management of the nutrition of the patient on HD

• Knowledge of the technology involved in home hemodialysis, the prescription of home hemodialysis, medications and access considerations for home hemodialysis. The trainee should have knowledge of the potential challenges with home hemodialysis.

• Trainee should able to independently manage short-term and long-term complications of each mode of dialysis.

• Trainee should be able to plan, create, monitor dialysis access (acute and long- term vascular and peritoneal), should able to manage complication associated with access dysfunction/malfunction.

• He/she must know about arterio-venous fistula (AVF) principles, surveillance, monitoring, complication and management of short- and long-term complications associated with AVF.

• Dialysis water treatment plant management and water delivery systems

- Knowledge of principles and functioning of different components of water treatment plant and delivery system.
- Knowledge of different methods of water treatment used in hemodialysis unit,
- Day to day monitoring, surveillance and troubleshooting's of water treatment plant,
- Knowledge and practical use of different test use to detect impurities in water,
- Knowledge and practical use of different biochemical and microbiological parameters/tests in dialysis water treatment plant.

▪ Different methods of disinfection and sterilization of water treatment plant and delivery system,

▪ Knowledge of different materials/components use in dialysis water distribution system and different methods use in loop disinfections.

• Reuse of dialyzers, their preservation, the artificial membranes used in hemodialysis and their biocompatibility.

• To be able to write a prescription, conduct and supervise acute and chronic peritoneal dialysis entails:

▪ To provide an understanding of the principles and practice of peritoneal dialysis including the indications, contraindications, complications, cost-effectiveness, and application of PD to patientcare.

▪ Writing orders for peritoneal dialysis which includes dialysis prescription (volume of dialysate, frequency of exchanges, and use of different hypertonic solutions, special precautions)

▪ Modifying dialysis prescription in special situations (acidosis, metabolic disorders, dyselectrolytemia) and inadequate clearance in chronic peritoneal dialysis patients,

▪ To provide a comprehensive and longitudinal clinical experience in the care of patients on peritoneal dialysis,

▪ Must know Peritoneal physiology, including the solute clearance and ultrafiltration.

▪ Assessing adequacy of PD and implications of adequacy related to patient morbidity and mortality, transporter status, peritoneal equilibration tests and its interpretations, residual renal function, ISPD / KDOQI standards; dialysis prescriptions and their modifications to achieve adequate dialysis

▪ The short and long-term complications of PD including the pathogenesis and prevention of complications including but not limited to: peritonitis, catheter infections/dysfunction, leaks, hernias, sclerosing peritonitis, nutritional and metabolic issues, hemoperitoneum etc.

▪ Placement and maintenance of appropriate acute and chronic PD catheter

▪ An understanding of the technology of PD including PD solutions, their composition, biocompatibility, side effects and use of automated cyclers (CCPD)

▪ Pharmacology of commonly used medications and their kinetic and dosage alteration with peritoneal dialysis; drug dosage modification during PD

- Understanding of the special nutritional requirements of patients undergoing PD; urea kinetics and protein catabolic rates in PD patients; nutritional management of PD patients
- Quality of life of patients on Dialysis; psychosocial and ethical issues in patients and their families.

- To be able to write a prescription, conduct and supervise continuous renal replacement therapy (CRRT)
- Entails knowledge of proper indications, principles, contraindication, complications and different modes of CRRT,
- Comprehensive knowledge about the functioning of CRRT Machine and its components,
- Writing orders for continuous renal replacement therapy (flow rate of dialysate, choosing ultrafiltration rate, blood flow rate, replacement fluid flow rate, choosing dialysate composition including the use of bicarbonate-based solutions, anticoagulation protocols),
- Understanding and treatment of complications, and modifying dialysis prescription to achieve adequate clearance in patients undergoing continuous renal replacement therapy.
- Trainee should write and implement the prescription of CRRT in a critical ICU patient. He/She should be able to handle day to day running of CRRT therapies and troubleshooting required for the smooth running of the therapy.
- To be able to write a prescription, conduct and supervise plasmapheresis
- Entails knowledge of proper indications, principles, different methods, contraindications, complications of plasmapheresis of plasmapheresis,
- Writing orders (volume of plasma replacement, choosing rate of plasmapheresis, monitoring, anticoagulation, appropriate replacement fluid, choosing filter size)

- Understanding and treatment of complications, and modifying plasmapheresis prescription based on the goal of plasmapheresis
- Understanding different methods of therapeutic apheresis and immunoadsorption columns, their use in different scenarios, including but not limited to the kidney transplant patient
- To be able to perform urine analysis at bedside and in lab
- To perform urinalysis correctly and interpret findings and to know the limitations of interpretation as applied to patient care.

Must be trained in Dialysis catheter insertion (Tunneled and non-tunneled Hemodialysis catheter), insertion of CAPD catheter (Both acute and long-term Peritoneal dialysis catheter), AVF creation and kidney biopsy.

The candidate should acquire the skill to assist in creation of AV-Fistula.

- Knowledge of indications, contraindications, appropriate case selection and complications associated with A-V fistula surgery.

- He/she should be trained in Pre-op vascular mapping, selection of AVF site, pre-operative orders, counselling and taking informed consent.

- Post op identification and management of complications associated with AVF

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- Monitoring and surveillance of AVF in the post op period and explaining hand grip exercises to the patient.

- He /she should be able to prick the AV fistula when it is mature and successful in doing hemodialysis through it.

Candidate should be able to perform /assist/ observe and interpret various interventional and radiological methods needed for diagnosis and management of AVF dysfunction, as well as central venous stenosis. This entails:

- Candidate should be able to assist/observe fistulogram.
- He /she should know the indications/ interpretation of fistulogram and its use in clinical practice.
- Should be able to read /interpret various imaging modalities like CT angiogram/aortogram, MR angiogram, venograms, Doppler study and USG.
- He/She should be able to use these modalities in clinical practice for the management of vascular access dysfunction

Candidate should independently be able to put peritoneal dialysis catheter. The successful placement of a peritoneal dialysis catheter entails

- Knowledge of indications, contraindications, complications and different techniques and types of PD catheters.

- Placement of both acute and long-term peritoneal dialysis catheter with proper techniques and asepsis
- Taking informed consent and patient counseling regarding procedure and associated complications.
- Knowledge of anatomy/physiology/pathology of the peritoneal cavity and abdomen
- Preoperative orders, intraoperative and post operative management of the patient
- Diagnosis and management of catheter dysfunction/malfunction, peritonitis and other catheter-related complications.

Candidate should be able to place a vascular access catheter independently. Satisfactory placement of vascular access entails:

- Knowledge of indications, contraindications, different techniques, complications
- Taking informed consent and patient counselling regarding the procedure and associated complications
- Performance of procedure itself with the use of proper technique and asepsis with or without the use of USG /Doppler,
- Knowledge of vascular anatomy and pathology,
- Placement of different catheters (tunneled/non tunneled) with different techniques (over the guide wire, using peel away sheath etc.) at different sites (Jugular, femoral, trans lumbar etc.).
- Use Ultrasound/Doppler for evaluation, monitoring, diagnosing complications and assistance during procedures
- Diagnosis and management of complications and successful use of a catheter for dialysis

Candidate should acquire the skill to do a Kidney biopsy independently. Satisfactory performance of percutaneous biopsy of native and transplant kidneys entails:

- Knowledge of indications, complications, contraindications and techniques for the procedure,
- Obtaining informed consent and counselling of the patient/family about the procedure

/complications.

- Performance of the procedure itself including minimizing patient discomfort with the use of ultrasonography,
- Interpretation of results of the biopsy and application into clinical practice and
- Diagnosis, monitoring, management of post biopsy complications.

- Use of Ultrasonography in Nephrology practice including Point of Care Ultrasonography (POCUS) entails:

a. *Renal ultrasound*

- Technique: probe selection, positioning, and description of movements
- Organ anatomy: gross and sonographic correlation in long and short axes
- Kidney size and appearance: length, cortical and parenchymal thickness, cortical echogenicity
- Core pathologies: hydronephrosis, stone, cyst, mass, free fluid in hepatorenal and splenorenal recesses
- Less common abnormalities: infections, vascular malformations, congenital abnormalities, and anatomic variants

b. *Renal allograft and urinary bladder ultrasound*

- Technique: probe selection, positioning, and description of movements
- Allograft anatomy: expected differences compared with native kidney (*e.g.*, prominent collecting system), proximity to bladder and pelvic organs
- Allograft core pathologies: hydronephrosis, perinephric collections, basic evaluation of vascular anastomosis, and resistive index

- Urinary bladder anatomy: gross and sonographic correlation in long and short axes
- Bladder volume calculation, urinary retention, Foley catheter malposition, differentiating pelvic ascites from urine, prostatomegaly

c. *Focused cardiac ultrasound*

- Rationale and limitations
- Technique: probe and preset selection, probe positioning to acquire basic cardiac views, namely, parasternal long axis, parasternal short axis, apical 4 and 5 chamber, subxiphoid 4 chamber, and inferior vena cava
- Utility of M-mode and colour Doppler
- Cardiac anatomy: gross and sonographic correlation of the basic views
- Evaluation of 5 Es: ejection (left and right ventricular systolic function including M-mode parameters), effusion (pericardial effusion from different windows, quantification), equality (identification of gross alterations in cardiac chamber size), entrance (estimation of right atrial pressure using inferior vena cava), and exit (evaluation of the aortic root in a hemodynamically unstable patient)
- Pitfalls of isolated inferior vena cava ultrasound

d. *Integrative assessment of fluid volume status*

- Rationale behind using multiorgan POCUS for objective evaluation of fluid status

- Patient studies illustrating the role of integrating findings from focused cardiac ultrasound, lung ultrasound, and limited abdomen to assess fluid status
- Limitations of basic POCUS and introduction to hemodynamic assessment using Doppler ultrasound

e. *Sonographic evaluation of the dialysis access*

- Principles of spectral Doppler, focusing on pulsed wave Doppler, scale adjustment, aliasing, and angle correction
- Anatomy of vascular access: gross and sonographic correlation in long and short axes
- Technique: probe selection, measurement of depth, diameter, volume flow
- Core pathologies: pseudoaneurysm, hematoma, thrombosis, narrowing and turbulent flow; assessment of the maturity of a newly placed access. Detailed assessment of stenosis/vein mapping is beyond the scope of POCUS
- Peritoneal dialysis access: abdominal wall anatomy, sonographic appearance of normal catheter and cuff, tunnel infection, abscess, pericatheter leaks

f. *Ultrasound-guided procedures and others*

- Temporary hemodialysis catheter placement: probe selection, vessel selection, visualization of the needle tip, technique of catheter insertion, confirmation of correct placement by cardiac ultrasound (rapid atrial swirl sign)

- Renal biopsy (native and transplant): probe selection, site selection, visualization of the renal cortex, vasculature, needle tip and surrounding anatomy (*e.g.*, bowel loop interference in the case of allograft), evaluation of postbiopsy hematoma/Doppler signs of active bleeding along the needle track
- Others: brief overview of ocular, soft tissue, musculoskeletal ultrasound pertinent to nephrology including evaluation of papilledema, cellulitis/abscess, deep vein thrombosis, and crystalline arthropathies

- He/She should have knowledge of indications/ principles /interpretations of common urological procedures like cystoscopy, placement of percutaneous nephrotomy/nephrolithotomy, DJ-stenting, uroflowmetry/urodynamic studies, MCU/RGU etc.

- The candidate would maintain a record of all the procedures/ interventions in a log book, which would be certified by the Head of the department. A proficiency certificate from the head of the department regarding the clinical competence and skilful performance of procedures by the candidate will be necessary before he is allowed to appear in the examination.

7.3 Transplantation

Successful training in kidney transplantation entails:

- Knowledge of indications for kidney transplantation, criteria for selection of donors and recipients, understanding of the risks and benefits of renal transplant,
- Candidate must be well aware of transplant laws/guidelines in India and international level. He/She must know the medicolegal aspects of kidney transplantation,
- He/she must have the knowledge about functioning of various government and non-government organizations working for transplantation like National Organ and Tissue Transplant Organization (NOTTO), Regional Organ and Tissue Transplant Organization (ROTTO) and State Organ and Tissue Transplant Organization (SOTTO).
- Candidate will have to work with the transplant coordinator for transplant-related workup up both for live and deceased donor transplantation.
- Candidate should be able to do workup of kidney donors and recipients and prepare the recipient for renal transplantation, manage them postoperatively in the immediate and long-term follow-up,
- They should be able to do organ perfusion and intraoperative monitoring of both donor and recipient.
- He/She should observe the transplant surgery, know the basic principle, surgical steps, surgical anatomy and intra op and immediate post-operative complications,
- They will have to maintain a waiting list for the recipient for live and cadaveric kidney transplant,
- Understand management plans, such as treatment of rejection, adjustment of immunosuppressive medications and diagnostic procedures,
- Formulate and execute a plan to diagnose allograft dysfunction in the immediate and late post-transplant period. Medical management of rejection: use of plasmapheresis and immunomodulating treatment,
- Clinical and laboratory diagnosis of cellular and antibody mediated rejection, use of renal biopsy and immunohistochemistry,
- Performance of graft kidney biopsies and their interpretation. Long-term follow-up of transplant patients: management of hypertension, bone disease,

dyslipidemias, screening for malignancy and infectious diseases.

- Principles of tissue typing and management of living donor transplants with a positive cross match.
- Should be able to know the principles, interpretation, application in practical scenarios of various immunological test, genetic test , cross match , tissue typing and ABO antibody titration methods related to transplantation.
- Learn basic principles of pharmacology and the mechanisms of action of immunosuppressant agents, including glucocorticoids, azathioprine, mycophenolate mofetil, cyclosporine, tacrolimus, sirolimus and monoclonal and polyclonal antibodies. Learn principles of pharmacology of immunosuppressive medications used in transplant and medications used for the prophylaxis of infection and the treatment of concurrent illnesses, with an emphasis on anticipating and managing drug interactions
- Should be able to perform/ manage/observe special transplant situations like ABO incompatible transplant, pediatric kidney transplant, repeat kidney transplant, immunologically high-risk transplant and multiorgan transplantation like combined liver kidney transplant.

7.4 Critical Care Nephrology

- Management of critically ill nephrology patients and patients from other specialities having kidney-related issues (both adult and pediatric),
- It includes management of fluids, electrolytes and acid base abnormalities of patients in ICU,
- Planning, implementation and monitoring of various therapies required for critical patients (including children) admitted in ICU, like SLEDD, CRRT, Plasmapheresis and peritoneal dialysis.
- Principles and management of non-invasive and invasive mechanical ventilation
- Trainee should know the working /functioning, various modes, and settings in different conditions of the mechanical ventilator.
- He/she should be trained in basic life support (BLS) and advanced cardiovascular life support (ACLS). The candidate should participate in institutional-level training program.
    - Management of multiorgan failure patient with an organ support system

7.5 Lab Medicine and Allied Posting

Candidate must know the basic principles, indications, procedure/techniques, interpretations and use in day-to-day clinical practice of various laboratory and imaging test, including but not limited to

Biochemistry

Pathology

Radiology

Nuclear Medicine

10. ACADEMIC ACTIVITY:

Academic Activity	Frequency
Clinical case presentation (Long and short)	Once a Week
Seminar	Once a week
Journal club	Once a month
Departmental dialysis meets	Once a month
Transplant meet	As per the cases scheduled
Nephro-patho (Histopathology) meet	Once a month
Nephro-Uro meet	Once a month
Mortality/ audit /Data meeting	Once a month
Institutional level CME	As per the institute's schedule
Research Project Progress Report	Once in 6 months

11. LOG BOOK

During the training period, the DM nephrology student shall maintain a detailed and comprehensive log book indicating the duration of the postings and work done in Nephrology Wards, ICU, OPDs, minor OT, nephrology, cath lab., hemodialysis unit and peritoneal dialysis unit. Data should include the procedures assisted and performed, and teaching sessions attended. The purpose of the Log Book is to:

a) Maintain a record of the work profile during training,

b) Enable consultants to access information about the work of the student

c) Keep an eye on the progress and intervene if and when necessary

d) As a means to assess from time to time, the experience gained and quality of work performed by the DM trainee.

The Log Book shall also serve as a source to help in the internal evaluation of the DM trainee. The logbook shall be cross-checked and assessed periodically by the faculty members who are involved in imparting the training. It shall be signed by the Head of the Department and a proficiency certificate from the Head of Department regarding the student's clinical competence, overall skilful performance of procedures and a general approach towards patients will be necessary before the student is allowed to appear in the final examination.

12. DISSERTATION:

The postgraduate dissertation will orient the student to the principles of research methodology, will instill an element of inquiry, with development of a research aptitude.

Activity	Schedule
Selection of topic in consultation with PG Guide	As per the Institute's academic calendar
Approval by Department PG Committee	
Institute Scientific Committee approval	
Institute Ethics Committee approval	
Final approval letter by Academics Section	
Final submission to the academic section	

13. TEACHING AND LEARNING METHODS

a. General principles

The basic aim of postgraduate medical training and education is to produce specialists who understand the needs of community health of the state and country and enhance the quality of health care as well as provide an impetus to research, education, and training of the medical community. The postgraduate doctor after completion of the skill-based competency training programme should be able to successfully address the medical requirements of the community. Learning during the programme is not only goal-oriented and didactic but also essentially self-directed and emanates from clinical and academic work. The designated academic sessions are meant to supplement the student's core efforts.

b. Teaching Methodology

The post graduate student shall be given the responsibility of managing and caring for patients in a gradual and phased manner under supervision, after the student demonstrates skill and efficiency at each step. Teaching sessions shall be an overall judicious amalgamation of case presentations, journal clubs, seminars, group discussion related to various kidney related ailments and its management, bed-side teaching, focused brief topic presentations as allotted from time to time, case-based learning, integrated and interdepartmental meetings including any other collaborative activity with allied departments, as deemed necessary. Suggested modalities of teaching-learning methods are summarized below but shall not be limited to these. The frequency of the mentioned teaching and learning methods may vary based on perceived requirements, candidates' competencies, workload load and overall working schedule. Self-directed motivational learning forms a key part of the training for which although the hours are not specifically earmarked, it shall be integrated into day-to-day learning.

- Each student is expected to attend accredited scientific meetings (CME, symposia, conferences, seminars) at least once or twice a year.
- Sessions on Research methodology, experimental methods relevant to the

nephrology specialty, digital application and use of computers and artificial intelligence in nephrology, Biostatistics, pertinent ethical and legal issues in cardiology practice including teaching methodologies, hospital waste management, health sanitation, health economics, are additionally suggested.

• Each post graduate student of a post graduate degree course in super specialties would be required to present one poster presentation or read one paper at a national/state conference.

• The student should write a research paper from the allotted research protocol which should be published/accepted for publication/sent for publication during the tenure of the postgraduate study.

c. Research

Each post graduate student is required to undertake research under the guidance and mentorship of a faculty member. The DM nephrology student is required to submit a research protocol after due advice and approval from the faculty guide within 6 months after joining the course. In addition, the post graduate student will also participate in various departmental research activities from time to time.

During the training program, patient safety is of paramount importance; therefore, skills are to be learnt and performed initially under supervision followed by performing independently in a phased and guided manner. For this purpose, documentation of the proficiency of skills is mandatory

14. ASSESSMENT

A. INTERNAL ASSESSMENT (FORMATIVE ASSESSMENT)

During the training includes:

1. Evaluation of clinical skills, academic performance and personal attributes will be an ongoing process. Periodic formative assessment will be done every 6 months and feedback will be given to trainee.
2. The academic presentations shall be graded at the time of presentation

by the faculty in-charge/HOD.

A 1. Six-monthly Progress Report

The progress of the PG student will be monitored with the help of a six monthly structured report. The report will contain details pertaining to attendance, teaching-learning activities, clinical duties, teaching assignments, practical work, marks obtained at intermediate examinations, papers/posters presented, and progress of dissertation work. The performance of the student will be graded by the PG Guide and the Head of the Department.

ASSESSMENT METHODS:

FORMATIVE ASSESSMENT, during the training programme

Formative assessment (periodic, multiple) is an internal assessment by the teaching faculty of the department. The faculty should assess medical knowledge, patient care, procedural & academic skills, interpersonal skills, professionalism, self-directed learning and ability to practice in the system.

Each trainee should attend regular appraisal meetings and reviews of their academic performances, competence progression and workplace-based assessments by the faculty of the department. It is frequent, covers small content areas and provides immediate feedback to the teacher and the taught.

Assessment

Personal attributes include a broad assessment of general attitude, interest in work, initiative, responsibility and reliability, organizational ability, communication skills, professional attitude and team work.

Assessment of academic activities includes Journal based / recent advances learning, participation in departmental and interdepartmental learning activity, external and outreach activities and attending /presenting abstracts in CMEs and conferences.

SUMMATIVE ASSESSMENT, namely, assessment at the end of training

The summative examination should be carried out as per the Rules given in POSTGRADUATE MEDICAL EDUCATION REGULATIONS, 2000. The Post graduate examination shall be in two parts and will be as per the details given in Post Graduate Regulations, 2000.

Summative evaluation (terminal, single) is a combined assessment by the internal and external examiners designated by the NMC/Medical University of the State at the end of the course.

The DM examination shall be in two parts: Theory and Clinical / Practical and Oral/viva voce Examination.

1. Theory: There shall be four theory papers ...

Paper I: Basic Sciences as applied to the subject including physiology, anatomy, embryology epidemiology, pharmacology, biochemistry, pathology, genetics and biostatistics

Paper II: Clinical nephrology

Paper III: Dialysis, Transplantation and Nephro-urology

Paper IV: Recent advances in Nephrology

The theory examination shall be held in advance before the clinical and practical examination, so that the answer books can be assessed and evaluated before the commencement of the clinical/practical/oral examination.

Evaluation: The answer books shall be valued by two examiners or as per Rules of the University. The average of the two marks secured by the post graduate student will be taken into account. If the difference between two marks exceeds 10%, the answer scripts shall be valued by the third examiner. The average of the nearest two marks shall be considered as the final mark.

2. Practical: The practical examination should consist of the following and should be spread over two days, if the number of candidates appearing is more than five.

One long case: History taking, physical examination, interpretation of clinical findings, differential diagnosis, investigations, prognosis and management.

2 short cases

Ward rounds for clinical, procedural and communication skills (4 cases)

Log Book Records and day-to-day observation during the training

Viva-voce Examination: - - - -

Viva – Research/Thesis related

Instruments/Drugs

Radiology/Nuclear imaging/Investigations

Renal Pathology

15 RECOMMENDED READING /LEARNING RESOURCES

Trainees should make use of learning resources in both offline and online modes including but not limited to the list given below.

Recommended Books

1. Brenner and Rectors The Kidney.
2. Oxford Textbook of Clinical Nephrology.
3. Schrier's Diseases of the Kidney.
4. Comprehensive Clinical Nephrology
5. Handbook of Dialysis by John T. Daugirdas.
6. Handbook of Kidney Transplantation by Dr. Gabriel M. Danovitch MD.
7. Kidney Transplantation - Principles and Practice by Peter Morris.
8. Nolph and Gokal's Textbook of Peritoneal Dialysis.
9. Heptinstall's Pathology of the Kidney.
10. Acid-Base and Electrolytes disorders Burton D Rose.
11. Harrison's Principles of Internal Medicine
12. Textbook of Paediatric Nephrology
13. Textbook of Intervention Nephrology
14. Critical Care Nephrology

Recommended Journals

National

1. Indian Journal of Nephrology (IJN)
2. Indian Journal of Transplant (IJT).
3. Indian Journal of Peritoneal Dialysis (IJPD).
4. Journal of Nephrology Society (JONS)

International

1. Kidney International (KI)
2. American Journal of Kidney Disease (AJKD)
3. Nephrology Dialysis and Transplantation (NDT)
4. Journal of American Society of Nephrology (JASN)

5.	Clinical Journal of American Society of Nephrology (CJASN)
6.	Transplantation
7.	Saudi Journal of kidney Diseases and Transplantation (SJKDT)
8.	New England Journal of Medicine (NEJM)
9.	Seminars in nephrology
10.	Seminars in dialysis
11.	Nature Reviews Nephrology
12.	The Lancet
Society Guidelines /Learning resources	
1.	International Society of Nephrology (ISN)
2.	The Transplantation Society (TTS)
3.	American Society of Nephrology (ASN)
4.	European Renal Association (ERA)
5.	European Dialysis and Transplant Association (EDTA)
6.	International Society of Peritoneal Dialysis (ISPD)
7.	Indian Society of Nephrology (ISN, India) & its various zones
8.	Indian Society of Organ Transplant (ISOT)
9.	Peritoneal Dialysis Society of India (PDSI)
10.	The Nephrology Society
Online Learning Materials (Websites and Programme)	
1.	https://www.uptodate.com/contents/search
2.	https://notto.gov.in/
3.	https://qxmd.com
4.	https://kdigo.org/guidelines/
5.	https://twitter.com/NephJC/
6.	https://www.kidney.org/
7.	https://www.theisn.org/in-action/education/
8.	https://kidneyeducation.com/
9.	NephroPOCUS.com

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Department of Nephrology

Letter No.....531.....

Date..10/12/25.....

Minutes of meeting Board of Studies dated 24th November 2025

1. With reference to circular 604/PG Cell/RMLIMS/2025, Board of Studies meeting was held on 24th November 2025 at 4 PM in both physical and virtual modes at the Department of Nephrology, Academic Block, Dr RMLIMS. The following members were present in the meeting:

S. No.	Name of Committee member	Current position
1.	Dr Narayan Prasad	Professor & Head, Department of Nephrology, SGPGIMS, Lucknow
2.	Dr Anupma Kaul	Professor, Department of Nephrology, SGPGIMS, Lucknow
3.	Dr Abhilash Chandra	Professor & Head, Department of Nephrology, Dr RMLIMS, Lucknow
4.	Dr Namrata Rao S	Additional Professor, Department of Nephrology, Dr RMLIMS, Lucknow

2. Dr Abhilash Chandra, Professor and Head, Department of Nephrology, Dr RMLIMS welcomed all members present in the meeting.
3. Curriculum for DM Nephrology and in particular, the addition of sections on Course Outcomes (CO) and Program Education Objectives (PEOs) were discussed and approved, as per reference 604/PG Cell/RMLIMS/2025 dated 11/11/2025
4. To conclude the meeting, the experts were thanked and meeting was declared closed.

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SGPGIMS, Lucknow

Dr Anupma Kaul
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