

Curriculum

DrNB Super Specialty



Nephrology

- ◆ AIM
- ◆ Objectives of the Programme
- ◆ Teaching and Training Activities
- ◆ Syllabus
- ◆ Log Book
- ◆ Recommended Text Books and Journals

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I. AIM:

The programme 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

II. OBJECTIVES OF THE PROGRAMME:

1. Programme Goal

The goal of the programme is to produce a competent nephrologist who:

- i. Has acquired the competence pertaining to Nephrology that is required to be practiced in the community and at all levels of health care system
- ii. Has acquired the skills to manage the patient effectively pertaining to nephrology
- iii. Has acquired skill in effectively communicating with patient and his attendants.
- iv. Has the desired skills to independently manage emergency cases
- v. Is aware of the latest developments in the field of nephrology oriented to principles of research methodology
- vi. Has acquired skills in educating medical and paramedical professionals.

2. Programme Objectives

The main objective of postgraduate medical education shall be to produce specialists of Nephrology who shall have the following competencies

- i. Practice the specialty of nephrology in keeping with the principles of professional ethics
- ii. Recognize and identify the various renal problems
- iii. Institute diagnostic, therapeutic, rehabilitative and preventive measures to provide holistic care to the patient
- iv. Take detailed history, perform full physical examination and make clinical diagnosis, perform relevant investigative and therapeutic procedures
- v. Interpret important imaging and laboratory results
- vi. Independently perform basic surgical procedures
- vii. Manage emergency efficiently

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- viii. Demonstrate empathy and human approach towards patients and their families.
 - ix. Demonstrate communication skills of a high order in explaining management and prognosis, providing counseling and giving health education to patients, families and communities,
 - x. Develop skills as a self-directed learner, recognize continuing educational needs, use appropriate learning resources, and critically analyze relevant published literature in order to practice evidence based medicine, facilitate learning of medical/nursing students, practicing physicians, paramedical health workers and other providers as a teacher/trainer organize and supervise the desired managerial and leadership

III. TEACHING AND TRAINING ACTIVITIES:

The fundamental components of the teaching programme should include:

1. Case presentations & discussion- once a week
2. Seminar – Once a week
3. Journal club- Once a week
4. Grand round presentation (by rotation departments and subspecialties)- once a week
5. Faculty lecture teaching- once a month
6. Clinical Audit-Once a Month
7. A poster and have one oral presentation at least once during their training period in a recognized conference.

The rounds should include bedside sessions, file rounds & documentation of case history and examination, progress notes, round discussions, investigations and management plan) interesting and difficult case unit discussions.

The training program would focus on knowledge, skills and attitudes (behavior), all essential components of education. It is being divided into theoretical, clinical and practical in all aspects of the delivery of the rehabilitative care, including methodology of research and teaching.

- i. **Theoretical:** The theoretical knowledge would be imparted to the candidates through discussions, journal clubs, symposia and seminars. The students are exposed to recent advances through discussions in journal clubs. These are considered necessary in view of an inadequate exposure to the subject in the undergraduate curriculum.

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- ii. **Symposia:** Trainees would be required to present a minimum of 20 topics based on the curriculum in a period of three years to the combined class of teachers and students. A free discussion would be encouraged in these symposia. The topics of the symposia would be given to the trainees with the dates for presentation.
 - iii. **Clinical:** The trainee would be attached to a faculty member to be able to pick up methods of history taking, examination, prescription writing and management in rehabilitation practice.
 - iv. **Bedside:** The trainee would work up cases, learn management of cases by discussion with faculty of the department.
 - v. **Journal Clubs:** This would be a weekly academic exercise. A list of suggested Journals is given towards the end of this document. The candidate would summarize and discuss the scientific article critically. A faculty member will suggest the article and moderate the discussion, with participation by other faculty members and resident doctors. The contributions made by the article in furtherance of the scientific knowledge and limitations, if any, will be highlighted.
 - vi. **Research:** The student would carry out the research project and write a thesis/ dissertation in accordance with NBE guidelines. He/ she would also be given exposure to partake in the research projects going on in the departments to learn their planning, methodology and execution so as to learn various aspects of research.

IV. SYLLABUS:

1. Applied basic sciences knowledge relevant to the field of nephrology including electrolyte and acid base disorders.
2. Investigative techniques, selection and interpretation of results
3. Pathogenesis of renal diseases and renal histopathology
4. Diseases of the urinary tract (glomerular diseases urinary tract infection, tubulointerstitial diseases, inherited diseases, toxic nephropathies, systemic diseases with renal involvement, renal stone disease, urinary tract obstruction, vascular diseases of kidney, hypertension, neoplasia etc)

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5. Renal failure (diagnosis and medical management)
 6. Principles and practice of dialysis
 7. Renal transplantation and Transplant immunology
 8. Recent advances in nephrology
 9. Biostatistics and clinical epidemiology
 10. Ethics, psychosocial, economics of management of renal diseases, human organ transplant act and medicolegal aspects of transplantation.

i. Assessment of Renal Disease

- History and clinical examination of patients with renal disease
- Urinalysis and microscopy
- Clinical assessment of renal function
- Renal function in the newborn infant
- The aging kidney
- Imaging in renal disease
- Renal biopsy Immunological investigation of renal disease

ii. BASICS- Embryology of the kidney

- Anatomy of the kidney
- Renal circulation
- Solute transport / Both organic and inorganic
- Renal Acidification Urine Concentration & Dilution
- Role of kidney in blood pressure regulation
- Endocrine and Autocrine function of the kidney

iii. Pharmacology and Drug

- Handling of drugs in kidney disease Drug-induced nephropathies
- Clinical use of diuretics
- Systemic cancer therapies and the kidney

iv. Fluid and Electrolyte Disorders

- Hypo/hyponatremia:
- Disorders of water balance
- Hypo/hyperkalemia
- Hypo/hypercalcemia
- Hypo/hyperphosphatemia
- Hypo/hypermagnesemia
- Clinical acid-base disorders

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- v. Epidemiology and Risk Factors
 - Epidemiology of kidney disease Kidney disease in Indian subcontinents
 - Risk factors of CKD Nephron endowment
 - Aging and kidney disease
 - CKDu (chronic kidney disease of unknown etiology)

 - vi. Pediatric Nephrology
 - Malformation of the kidney
 - Fluid, Electrolyte,
 - Acid base disturbance
 - Disease of kidney and Urinary track
 - Dialysis in Children

 - vii. Urologic Aspects of Pediatric Nephrology
 - Anomalies of the urinary tract: the trainee will understand a. Diagnosis, evaluation, treatment, and long term outcome of anomalies of the upper and lower urinary tract such
 - a. Hydronephrosis,
 - b. Hydroureter
 - c. Ureterocoele
 - d. Posterior urethral valves, prune belly triad syndrome, ectopic or fused kidney
 - The pathophysiologic consequences of urinary tract obstruction
 - Special fetal and neonatal issues genitourinary (GU) issues such as
 - Evaluation and management GU abnormalities detected in utero
 - a. Indications for prenatal intervention for fetal urinary tract obstruction
 - b. Diagnosis and management of hematuria in neonates
 - Urinary tract infection (UTI) in infancy, childhood, adolescence: the trainee will know
 - a. The definition, epidemiology, pathogenesis and spectrum of causative organisms
 - b. Appropriate diagnostic methods and pitfalls
 - c. Modes of therapy
 - d. Appropriate follow up and imaging evaluation
 - e. The causes of sterile pyuria
 - Vesicoureteral reflux (VUR): the trainee will understand

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- The epidemiology, natural history, appropriate imaging and VUR grading
 - The clinical management and long term follow up of each grade of VUR reflux

 - Neurogenic bladder: the trainee will understand
 - a. Normal physiologic phases of micturition
 - b. Different types of neurogenic bladder, including “non neurogenic”
 - c. Etiologies, pathophysiology, and treatment options
 - Enuresis in Children: the trainee will understand
 - a. The maturation of bladder function
 - b. The definition, incidence and pathogenesis of enuresis
 - c. When and how to evaluate enuresis, and therapeutic modalities for the treatment
 - Urinary tract trauma: the trainee will recognize
 - a. Predisposing factors, physical, laboratory and imaging findings, and possible sequelae
 - Renal tumours in children: the trainee will know and understand
 - a. The clinical features, natural history, evaluation and diagnosis of nephroblastoma (Wilms’ tumour), mesoblasticnephroma,
 - b. The genetic implications and associated phenotypic abnormalities

viii. Glomerular Disease

- Proteinuria and/or hematuria
- Nephrotic syndrome
- Minimal change disease Focal segmental glomerulosclerosis
- Immunoglobulin A nephropathy and Henoch-Schönlein purpura
- Membranous nephropathy
- Mesangiocapillary glomerulonephritis
- Acute endocapillary glomerulonephritis
- Crescentic glomerulonephritis
- Antiglomerular basement membrane (Goodpasture’s) disease
- Infection-related glomerulonephritis
- Malignancy-associated glomerular disease
- Glomerular disease in the tropics

ix. The Kidney in Systemic Disease

- Diabetes mellitus
- Amyloid and immunotactoidglomerulopathy
- Plasma cell dyscrasias Sarcoidosis

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- Systemic vasculitis
 - Mixed cryoglobulinemia and hepatitis C infection
 - Systemic lupus erythematosus
 - Scleroderma-systemic
 - scleroderma Rheumatoid arthritis,
 - connective tissue disease, and
 - sjögren's syndrome
 - Sickle cell nephropathy
 - Cancer and the kidney
- x. Tubular Disease
- Isolated defects of tubular function
 - Fanconi syndrome
 - Renal tubular acidosis
 - Hypokalemia
 - tubular disorders
 - Nephrogenic diabetes insipidus
- xi. Chronic Interstitial Disease
- Analgesic nephropathy
 - Nonsteroidal anti-inflammatory drugs and the kidney
 - Nephrotoxic metals Balkan nephropathy
 - Aristocholic acid nephropathy ('Chinese herb nephropathy') and other rare causes of chronic interstitial nephritis
- xii. Urinary Tract Infection
- Lower and upper urinary tract infection in adults
 - Urinary tract infection in children
 - Renal tuberculosis or other mycobacterial infections Fungal infections and the kidney
 - UTI in Pregnancy and Graft pyelonephritis
- xiii. Renal Stone Disease
- Medical management of stone disease
 - Surgical management of stone disease
 - Nephrocalcinosis
 - Renal stone disease in children

xiv. Acute Kidney Injury (Aki)

- Clinical approach to AKI
- Renal replacement therapies in AKI
- Dialysis and hemoperfusion treatment of acute poisoning
- Glomerulonephritis,
- vasculitis, and nephritic syndrome
- Acute tubulointerstitial nephritis
- Hemolytic uremic syndrome and thrombotic thrombocytopenic purpura
- Hepatorenal syndrome
- Ischemic AKI
- Pigment-induced AKI
- AKI in tropical countries
- AKI in infants and children
- AKI in pregnancy AKI in the elderly

xv. Chronic Kidney Disease (Ckd)

- Assessment of CKD
- Endocrine disorders in CKD
- Sexual disorders in CKD
- Hypertension in CKD
- Cardiovascular risk factors in CKD
- Gastrointestinal disorders in CKD
- Liver disorder in CKD
- Hematological disorders in CKD
- Skeletal disorders in CKD
- β 2-Microglobulin amyloidosis in CKD
- Immune function in CKD
- Coagulation disorders in CKD
- Dermatologic disorders in CKD
- Neuropsychiatric disorders in CKD

xvi. Special Problems in Ckd

- CKD in the elderly
- CKD in diabetic patients
- CKD in pregnancy
- CKD in children
- Growth and endocrine disturbances in children with CKD

xvii. Dialysis

- Dialysis strategies
- Vascular access Hemodialysis,
- hemofiltration and hemodiafiltration
- Peritoneal dialysis
- Adequacy of dialysis
- Medical management of the dialysis patient
- Psychological aspects of treatment for renal failure

xviii. Renal Transplantation

- Donor & Recipient issues
- Transplantation immunobiology
- Medical & surgical complications following transplantation
- Early management of transplant recipients
- Immunosuppression for renal transplantation
- Chronic complications in transplant recipients
- CMV, BKV and other virus related renal damage.

xix. Inherited Renal Disease

- Investigation of inherited renal disease
- Autosomal dominant polycystic kidney disease
- Nephronophthisis
- Alport's syndrome
- Primary hyperoxalurias

xx. Structural and Congenital Abnormalities

- Renal dysplasia
- Vesicoureteric reflux and reflux nephropathy
- Urinary tract obstruction
- Congenital abnormalities of the urinary tract
- Medullary sponge kidney

xxi. Method of Training

The training of the post graduate courses shall be on a residency pattern with assigned responsibilities of patient care. The participation of the students in all facts of the training process shall be insisted upon.

- Nephrology ward 12 months (split it into 1st yr. & 2nd yr.)

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|----------------------|--------------------------------------------|
| ○ Dialysis | 12months (split it into 1st yr. & 2nd yr.) |
| ○ Transplantation | 10 months (in the 3rd year) |
| ○ Radiology, Urology | 1 month |
| ○ Outstation posting | maximum period of 2 months |
- a. Nephrology ward posting - Candidate is expected to acquire the ability of case taking and healthy personal relationship with the patient, Investigate and manage the patient under the guidance of a Postgraduate Teacher.
 - b. Dialysis posting - Trainee is expected to do the canulations, making access for different extracorporeal treatments, peritoneal catheter insertions and renal biopsy procedures under the guidance of a postgraduate teacher.
 - c. Renal Transplantation posting -Trainee is expected to do the donor, recipient evaluation, perfusion procedures of transplantation, Brain death criteria and diagnosis, counselling for organ transplantation, ICU care of recipients and follow up of the transplant recipients under the cover of a post graduate teacher.

During the training period he/she is expected to participate in a public meeting where renal diseases are discussed for the common people.

During the training period he/she is expected to take classes for undergraduates, postgraduates, nursing students, and trainees of dialysis technology.

- Bedside rounds - daily
 - Mortality meeting - once a week
 - Seminar - once in two weeks
 - Grand rounds - once a week
 - Journal club - once in two weeks
 - Renal histology conference - once in two weeks
 - Clinical case discussion - once a week
 - Transplant meeting - once a week
 - Nephro-urology conference - once a month
 - Nephro-radiology conference - once a month
 - Outpatient nephrology care including renal transplant clinic
- d. Didactic Lectures -A minimum of 15-20 lectures/year covering the recent advances in all aspects of renal diseases would be delivered by

consultant faculty. In addition, candidates will be required to attend the complete, short term basic and clinical courses on

- Bio-statistics
- Research methodology and experimental lab medicine relevant to Nephrology
- Use of Computers in Medicine
- Bio ethics, ethical issues in transplantation including "Human Organ Transplant Act"

- e. **Interventional Procedures-**A candidate will be required to have achieved proficiency in performing and supervising hemodialysis, peritoneal dialysis and renal biopsies.

He would be expected to have performed a minimum of 50 renal biopsies (native), minimum 25 graft biopsies, 300 hemodialysis including CVVHD, CRRT and 50 peritoneal dialysis- rather 5-10 intermittent peritoneal dialysis. (PD is not being practiced by most of the hospitals. However, resident need to be familiar with this life saving procedure) The candidate would be expected to involve and be trained in all aspects of CAPD programme.

The candidate would also be expected to have inserted at least 50 internal jugulars, 50 femoral catheters and atleast 5-10 AVF and 10 CAPD catheters.

The candidate would maintain record of all the procedures/ interventions in a log book, which would be certified by the Head of the department. Investigative work-up.

The candidate is expected to perform routine urine examination and ultrasonography. In addition, he/she must familiarize himself/herself with the following investigations:

- f. **Laboratory:**
- Electrolyte and acid base analysis
 - Renal function tests
 - Auto analyzer functioning
 - Renal pathology interpretation including immuno-fluorescence and electron microscopy.

- g. **Radiological:**

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- Intravenous urography
 - Micturating cystourethrography
 - Digital subtraction angiography
 - Selective renal angiography and interventional angioplasty and stenting
 - Selective renal venography
 - Doppler studies
 - Antegrade and retrograde pyelography
 - CT imaging
 - Magnetic resonance imaging
- h. Nuclear Medicine:
- Various renal isotope imaging and functional techniques
 - Urodynamic studies
- i. Microbiology:
- Viral, Bacterial and fungal cultures, Serological and PCR techniques
- j. Immunological test:
- ANCA, ANA, anti DsDNA, complement, anti GBM ab, cryoglobulin, immunoelectrophoresis
- k. Tissue typing:
- Cross match, serological typing, molecular HLA typing, PRA
- l. Renal function testing
- Renal plasma flow, GRF
 - Renal concentrating, diluting capacity
 - Micro albuminuria
 - Proteinuria measurement
 - Urinary acidification
 - Renal sodium and potassium handling

V. LOG BOOK:

A candidate shall maintain a log book of operations (assisted / performed) during the training period, certified by the concerned post graduate teacher / Head of the department / senior consultant.

This log book shall be made available to the board of examiners for their perusal at the time of the final examination.

The log book should show evidence that the before mentioned subjects were covered (with dates and the name of teacher(s) The candidate will maintain the record of all academic activities undertaken by him/her in log book.

1. Personal profile of the candidate
2. Educational qualification/Professional data
3. Record of case histories
4. Procedures learnt
5. Record of case Demonstration/Presentations
6. Every candidate, at the time of practical examination, will be required to produce performance record (log book) containing details of the work done by him/her during the entire period of training as per requirements of the log book. It should be duly certified by the supervisor as work done by the candidate and countersigned by the administrative Head of the Institution.
7. In the absence of production of log book, the result will not be declared.

VI. RECOMMENDED TEXT BOOKS AND JOURNALS:

Books

1. Diagnostic Atlas of Renal Pathology, Fogo, Agnes B 7th ED. Elsevier , 2005
2. Clinical Dialysis, Nissenson, Allen R, 4th ED. Mc Graw Hill, 2005
3. Hypertension companion to Brenner & Rectors the Kidney, Oparil, Suzanne, 2nd Ed. Elsevier, 2005
4. Nephrology Secrets, Brown, David E, 2nd ED. Elsevier, 2003
5. Disease of the Kidney & Urinary tract , Schrier, Robert W, 8th ED. Vol I, Lippincott, 2007
6. Disease of the Kidney & Urinary tract, Schrier, Robert W, 8th ED. Vol II, Lippincott, 2007
7. Disease of the Kidney & Urinary tract , Schrier, Robert W, 8th ED. Vol III, Lippincott, 2007
8. Comprehensive Clinical Nephrology, Feehally, John, 3rd ED. Mosby 2007.
9. Renal Diseases Prevention and Management: A physicians perspective, Feehally, John , Jaypee Brothers, 2008.
10. Seldin and Giebischs the Kidney: Physiology and Pathophysiology, Alpern, Robert. J, Vol I 4th ED. Academic Publisher, 2008 11.

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- Seldin and Giebischs the Kidney: Physiology and Pathophysiology, Alpern, Robert. J, Vol II 4th ED. Academic Publisher, 2008
11. Comprehensive Pediatrics Nephrology, Geary, Denis. F (ED), 1st ED. Elsevier 2008.
 13. Evidence-Based Nephrology, Molony, Donald. A, John wiley, 2009
 12. Handbook of Dialysis, Daugirdas, John. T, 4th ED. Lippincott, 2009
 13. Manual of Nephrology, Schrier, Robert. W, 7th ED. Lippincott, 2009
 14. Oxford Handbook of Dialysis, Levy, Jeremy, 2nd ED. Oxford, 2007
 15. Ganongs Review of Medical Physiology, Barrett, Kim. E (Etal), 24rd ED. Mc Graw Hill, 2012
 16. Renal Disease Techniques and Protocols, Goligorsky, Michael. S, Humana Press, 2003
 19. Renal and Electrolyte Disorders, Schrier, Robert. W, 7th ED. Lippincott, 2010
 17. Acid-Base Disorder and their Treatment, Gennari, John F (Et al), Taylor & Francis, 2005
 18. Primer on Kidney Diseases, Greenberg, Arthur, 5th ED. Saunders, 2009
 19. The Kidney, Brenner & Rector - 8th ED. Saunders, 2008
 25. Critical Care Nephrology, C. Roncu – 2nd ED. Saunders, 2009.
 20. Oxford desk Reference Nephrology, Jonathan Barratt, Kevin harris, Peter Topham, 1st Indian ED, 2009.

Journals

International

1. Transplantation
2. Kidney International
3. Hemodialysis International
4. Clinical Journal of the American Society of Nephrology

Indian

1. Indian Journal of Nephrology

Online Journals

1. BMC Nephrology
2. Clinical and Experimental Nephrology
3. International Urology and Nephrology
4. Journal of Artificial Organs
5. Hong Kong Journal of Nephrology
6. Clinical Queries: Nephrology

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7. Journal of American society of Hypertension
 8. Journal of Cardiothoracic- Renal research
 9. Indian Journal of Transplantation
 10. Pediatric Nephrology in various



आयुर्विज्ञान में राष्ट्रीय परीक्षा बोर्ड
स्वास्थ्य एवं परिवार कल्याण मंत्रालय, भारत सरकार
मेडिकल एन्क्लेव, अंसारी नगर, नई दिल्ली – 110029

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