

Curriculum for
Fellowship
in
Pediatric Nephrology

of

The Tamilnadu DR.MGR
Medical University
Chennai

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INTRODUCTION:

Medicine and medical care are getting more complex by the day. Certain branches of medicine such as internal medicine and general surgery were the first to respond to these changes. There is cardiology, gastroenterology, pulmonology, nephrology as a subspecialty of internal medicine. Likewise on the surgical side there is urology, neurosurgery, thoracic surgery and surgical gastroenterology. It is the need of the hour to provide the best of the care for the expanding pediatric community in India. It would not be possible for a single pediatrician to provide all the care. He will need the help of fellow pediatrician trained and experienced in the concerned specialty to manage pediatric problems efficiently. Secondly, present postgraduate students do not wish to end formal education after obtaining postgraduate degree in Pediatrics. Whenever options exist, they opt for the pediatric super specialty of their choice. Since there are no courses available in specialties concerned with pediatrics they undertake super specialty courses in adult nephrology, cardiology, gastroenterology with the hope that they would be able to practice pediatric super specialty through the experience gained in adult medicine. Some, if affordable, would go abroad for training through fellowship.

Hence there is an absolute need to start Fellowship training courses in Pediatrics particularly in Nephrology to meet the demands of the community for high medical care for children and incidentally fulfill the aspirations of the young pediatricians in India for specialty training.

GOAL:

The goal of this course is to provide training in Pediatric Nephrology for Pediatricians to enable them to provide medical care to the infants and children with congenital, inherited and acquired renal and genitourinary disorders

LEARNING OBJECTIVES:

After completing the certification, the Fellow should be able to:

- a. Analyze problems scientifically, taking into account the biological basis and epidemiology of renal diseases in children
- b. Provide acute care to patients with renal diseases
- c. Recognize surgically treatable conditions
- d. Implement a follow-up plan for patients with chronic kidney disease
- e. Seek and analyze new literature in the specialty, and apply it in their work
- f. Play a catalytic role in prevention of renal disorders

Duration of the course :

- 12 months at present and 24 months is always desirable to get adequate and complete training in Pediatric Nephrology.

SCHEDULE OF POSTINGS:

The schedule of postings and teaching sessions, during 12-months' shall, with some flexibility, be as follows

Clinical pediatric nephrology	8 months
Hemodialysis, CAPD, acute dialysis	4 months
Pediatric Urology/ Pediatric Surgery	Once a week
Nuclear Medicine, Radiology, Pathology & Microbiology	Once a week

LEARNING OPPORTUNITIES:

Learning shall be self-directed and occur while working in various areas & through interactions in the rounds. Formal sessions aim to facilitate & supplement these efforts:

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|-------------------------------|-----------------------|
| ➤ Journal Club | Once a week |
| ➤ Topic/protocol discussion | Once a week |
| ➤ Renal pathology | Once a week/fortnight |
| ➤ Radiology, Nuclear Medicine | Once a week |

REQUIREMENT FOR ACCREDITATION OF INSTITUTIONS OFFERING PEDIATRIC NEPHROLOGY TRAINING

- The hospital should be affiliated to a University or National Board of Examination for Pediatrics, New Delhi
- Dedicated Nephrology OPD with at least 100-150 patients in a month
- 10 beds for indoor Nephrology patients
- In-house laboratory for renal biochemistry, microbiology, basic immunology and histopathology
- In-house department for Radiology and Ultrasound
- Accessibility for renal nuclear scans and urodynamics
- Kidney biopsies at least 30 in a year
- Intermittent peritoneal dialysis (IPD) at least 20 in a year
- Facilities for IPD, CAPD care and haemo dialysis are recommended
- Facilities for CAPD initiation and plasmapheresis are desirable
- Program for ESRD recommended
- Transplantation unit is optional. It could have a link up with some other hospital if there is no in-house transplant programme
- Neonatal unit, Neonatal Intensive care unit, Pediatric beds, Pediatric Intensive care unit to a total of 80-100 are a must
- Pediatric surgical cum urology unit is a must

Affiliation fees of the hospital to the university:

As decided by the committee of the University

Reaccreditation:

Once in 3 years

FACULTY:

- The faculty should consist of formally trained Pediatric Nephrologist or Pediatrician with DM in Nephrology of recognized University or DNB Nephrology of National Board, New Delhi.
- A junior consultant trained in Pediatric Nephrology with experience in Pediatric Nephrology unit for at least 3 years
- The team should have maintained the department for at least 5 years prior to applying for the programme
- Appropriate number of Residents and Nursing staff should be present

SCHEME OF EXAMINATION:

At the end of the course the Fellow will require to write a theory examination and evaluation will be a one internal and one external examiner

- **Theory examination:** This is conducted by the center offering the fellowship programme and not by University. This is mainly to give adequate theoretical knowledge to the trainee undergoing the fellowship. It can have 2 papers of 100 marks each with **Paper I** covering Basics and clinical nephrology and **Paper II** on Acute and chronic renal failure, hypertension and RRT
- **Practical Examination: It will have OSCE and clinical examination. OSCE will have minimum 20 stations and clinical examination will have 4 tables with clinical cases. OSCE will be for 100 marks and clinicals 100 marks and the candidate should get through with 50% in each. Candidate must pass in both the heads of passing at the same attempt**

Guidelines for the appointment of examiners for clinical and OSCE examination:

- There shall be 2 examiners: One internal examiner of The Tamilnadu Dr.MGR Medical University from Centers conducting the Fellowship Programme and another one external to the University
- The external examiner should have at least 5 years of experience in Pediatric Nephrology
- Same set of examiners will be responsible for OSCE and clinical examination
- The external examiner may be appointed for not more than 3 years consecutively. However, he/she may be reappointed after an interval of two years

Examination fees:

As decided by the committee of the University

ADMISSION NORMS:

- **Selection:** The selection of candidate for the course should be based on the knowledge, clinical skills and aptitude which should ideally be assessed through a detailed interview following an application sent by the candidates.
- **Eligibility:** Only MD / DNB Pediatric Graduates will be eligible. Candidates with only DCH will not be eligible.

The candidates selected for the said Programmes should have undergone structured training or actively worked in a recognised Pediatric Nephrology Centre for a minimum period of one Year before joining this Fellowship training.

- The number of candidate to be admitted should be one Fellow per year per recognized senior consultant in the unit. If the number of senior consultant in the unit is more than one then the number of students may be increased proportionately but not more than two in a unit per year in any circumstances. For this purpose, one student should be associated with one senior consultant.
- The academic year should begin from 1st January
- **Course fees** – As decided by the committee of the University

PROPOSED SYLLABUS:

The major goals for trainee are to acquire 1) Developmental Anatomy of the Kidney and allied structures and its abnormalities, 2) Basic renal physiology and disorders of renal functions, 3) Clinical knowledge and experience in common pediatric nephro-urological problems, 4) Skill in performing renal biopsies and acute peritoneal dialysis, 5) Skill in managing children needing chronic peritoneal dialysis and hemodialysis, 6) Skill in managing renal transplant (optional) These goal are attained by 1) Providing Pediatric nephrology care for hospitalized patients on the pediatric nephrology service in general pediatrics, PICU, Neonatal, Cardiac and Surgical Intensive Care units, 2) Provide consultation for children with suspected renal diseases and complications of fluid and electrolyte balance in the Medical and Surgical Units, 3) Attend OP clinics.

These responsibilities will provide the trainee with a wide variety of patients with all type of diseases, urological abnormalities, hypertension and disorders of fluid and electrolyte imbalance. The trainee is responsible for the rounds on a daily basis on all patients, to provide clinical supervision of the patients, medical evaluation and therapy, formal teaching rounds to be held with the Consulting Pediatric Nephrologists by reviewing all patients on the Inpatient Pediatric Nephrology service.

In addition, information rounds will be held with the junior consultant to assure that all patient medical needs are being met. The primary goal of these responsibilities is education of the trainee to develop a proper differential diagnosis of the patient's problems, plan the proper medical evaluation and initiate therapy for the problem.

The trainee is responsible for the evaluation of chronic patients assigned to him/her and follows these patients longitudinally during the year of training. The trainee is also responsible for evaluation of other selected patients and evaluation of appropriate new patients referred to the program. The renal clinics will be combined with pediatric urologic consultants and Radiology consultants. On these days, investigations, diagnosis and management problems of Nephro-Urological will be decided. The use of ultrasonogram, isotope renal scan, CT scan and other imaging modalities will be discussed with the respective consultant.

The clinical responsibilities for the pediatric nephrology trainee, includes attendance at renal clinics for longitudinal follow-up of all patients assigned to the trainee, provide primary clinical care responsibility with the pediatric postgraduates. The trainee will be responsible for reviewing a topic of clinical interest at the management conference once a month, share in Presenting cases at Clinical meetings and share in presenting articles at the Nephrology Journal club. In addition, the trainee will be responsible for presenting one formal lecture on clinical pediatric nephrology to the general pediatric residents once a month

CURRICULUM DETAILS:

ANNEXURE I: Overview of curriculum

During the training, satisfactory understanding and expertise should be obtained in both inpatient and outpatient environments of

- Pathophysiology of congenital & acquired diseases of the kidney and urinary tract in the growing child
- Etiology, clinical features, diagnosis and differential diagnosis of congenital & acquired renal diseases in the fetus, infant and child, their evaluation and management
- Performance/knowledge of
 - Renal biopsy, interpretation of renal histology
 - Renal ultrasound
 - Techniques for the assessment of glomerular and tubular function
 - Application of peritoneal dialysis, hemodialysis
- Use of diet and drugs for the treatment of renal diseases
- Understanding the management of surgical conditions of the urinary tract.
- Exposure to transplantation services to know the basic issues is desirable. It is only an exposure and not meant for testing them in the final examination in theory and viva.

ANNEXURE II: Skills and Procedures

A high standard of expertise should be obtained in performance of the following procedures:

- Urinalysis
- Renal biopsy and interpretation of histology
- Tests for assessment of glomerular and tubular functions
- Application of peritoneal dialysis, hemodialysis and related techniques
- Use of diet and drugs for the treatment of renal diseases
- Communication with patients

ANNEXURE III: CURRICULUM CONTENT

Investigations

1. Imaging

Knowledge	- To understand the role, limitations and interpretation of commonly used imaging modalities - To know the practicalities and safety precautions associated with each test
Skills	- To request the different radiological investigations - To be able to interpret scan images - Should involve directly with the Radiologist and Sonologist in various imaging procedures and ultrasound

2. Renal Physiology

Skills, Knowledge	- To appropriately request & interpret investigations for assessment of - GFR from height and plasma creatinine - Calcium, phosphate & bone mineral metabolism - Urinary concentrating and diluting ability - Tubular handling of fluid and electrolytes - Acid-base balance - To understand the practicalities, limitations and precautions for measurement of: - Creatinine clearance - Protein and calcium excretion - Tubular handling - Tests for urinary acidification
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3. Renal Biopsy

Knowledge	To know the indications, procedure and complications
Skills	- To perform a kidney biopsy safely - To recognize common histological appearances and consequences for diagnosis, prognosis and treatment - Should perform with assistance on at least 10 children and do it without assistance in minimum 10 children

(B) Urinary tract infection (UTI) and vesicoureteric reflux

Knowledge	- To understand the epidemiology, clinical features and issues in diagnosis - Role of imaging, other investigations and therapy - To understand the options/management of UTI & VUR
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(C) Structural malformations

Knowledge	- To know the presentations of developmental variants and abnormalities, including obstruction - To be aware of different reconstructive procedures
Skills	To be able to provide medical support to urological services

(D) Disorders of micturition & neuropathic bladder

Knowledge	- To know the common renal and non-renal diagnoses associated with enuresis - Understand the appropriate use of urodynamic studies and instigate management strategies
Skills	To appropriately assess a child with bladder dysfunction

(E) Hematuria

Knowledge	To understand the pathophysiology and etiology of macroscopic and microscopic hematuria
Skills	- To be able to perform urinalysis - To demonstrate appropriate investigation and management of the child with hematuria, including role of imaging, urological assessment, renal biopsy and genetic and molecular studies

(F) Proteinuria

Knowledge	- To know and differentiate between physiological and pathological causes of proteinuria - To know the methods of investigation, indications for biopsy; and management of a child with proteinuria
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Antenatal renal problems.

Knowledge	Rental disorders in the foetus. Signs and symptoms
Skills	Parental counseling and Mangement

(G) Glomerular disease

Knowledge	• To know the etiology and immunological basis of glomerulonephritis • To know the different forms of presentation and their appropriate management • To understand the clinical course and prognosis of acute and chronic glomerulonephritis • To know the indications for immunosuppressive agents, cytotoxic drugs, plasmapheresis and dialysis
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(H) Nephrotic syndrome

Knowledge	• To know the pathophysiology of nephrotic syndrome • To understand the investigation of nephrotic syndrome including indications for renal biopsy • To know the pharmacology and side-effects of steroids, other immunosuppressive agents and other agents
Skills	• To detect and manage associated complications • To manage the initial presentation of nephrotic syndrome • To manage steroid-sensitive, steroid-dependent & steroid-resistant nephrotic syndrome, including indications and choice of treatment • To be able to manage congenital nephrotic syndrome

(I) Systemic lupus erythematosus

Knowledge	• To understand the classification, clinical course and treatment options in lupus nephritis
Skills	• To perform clinical examination, plan and interpret investigations, including histology & immunology

(J) Vasculitides

Knowledge	• To know the causes, presentation, patterns of multisystem involvement and spectrum of disease • To describe the investigation and monitoring of the patient with vasculitis • To list the different therapeutic options available, including adverse effects
Skills	• To be able to appropriately investigate and treat vasculitis, including use of immunosuppression

(K) Hemolytic uremic syndrome

Knowledge	• To understand its pathophysiology & epidemiology • To know the presentation and clinical course of diarrhea-positive and atypical HUS • To understand principles of treatment, role of plasma exchange and dialysis, and long-term management including implications for transplantation
Skills	• To be able to investigate, diagnose and manage the initial presentation of HUS

(L) Interstitial nephritis

Knowledge	To list causes of interstitial nephritis/ tubulointerstitial disease
Skills	To appropriately investigate and manage the child with interstitial nephritis, including use of corticosteroids

(M) Hypertension

Knowledge	• To define & understand the diagnosis of hypertension; know the common conditions in different age groups • To describe the possible mechanisms causing essential and secondary hypertension • To describe the investigations in these cases • To describe the mechanism of action and side-effects of anti-hypertensive agents
Skills	• To be able to investigate a child with hypertension • To be competent in management of hypertensive emergencies • To be competent in the management of chronic hypertension, and in using various drugs

(N) Nephrolithiasis:

Knowledge	• To know the etiology of renal stone formation, including underlying tubular abnormalities • To know the biochemical and radiological investigations • To understand the medical (including prevention of stones) and surgical management
Skills	• To demonstrate ability to appropriately investigate the child with renal stones • To manage the child with renal stones

(O) Tubular disorders:

Knowledge	• To understand the causes and different presentations of primary and secondary tubular disorders • To understand the investigation of tubulopathies
Skills	• To be competent in the investigation and management of tubular disorders

(P) Cystic disease:

Knowledge	• To list the different causes of renal cystic disease in different age groups • To describe the mode of inheritance and methods of screening, including for multicystic dysplasia • To know the clinical course of polycystic kidney disease, nephronophthisis
Skills	• To examine and investigate the child with renal cysts in different age groups • To manage a child with cystic kidney disease

(Q) Genetic disorders:

Knowledge	• To know the presentation and management of common inherited renal disease including renal involvement in syndromes, familial nephritis and cystic kidney disease • To understand basic genetic principles
Skills	• To be able to advise parents of the risk of recurrence and the need for family screening

(R) Fluid and electrolyte disturbances

Knowledge	• To understand the physiology of fluid and electrolyte imbalance • To know the principles of treatment of fluid and electrolyte imbalance • To know the endocrine diseases associated with imbalance
Skills	To be able to manage fluid and electrolyte imbalances in non-renal disease including overdose

(S) Acute kidney injury

Knowledge	• To know the differential diagnosis of AKI • To know the investigation including role of biopsy • To describe the methods to correct fluid/biochemical abnormalities and indications for dialysis • To know the treatment of reversible causes of AKI
Skills	• To perform a reliable and accurate clinical assessment of the patient's fluid status • To be able to appropriately manage the complications of AKI – conservative and dialysis • To be able to select and practically manage the different dialysis modalities including peritoneal dialysis, hemodialysis and hemofiltration • To be able to begin treatment of the underlying cause • To manage the patient with multiorgan failure or systemic disease requiring renal replacement therapy

(T) Chronic kidney disease (CKD); chronic renal failure (CRF)

Knowledge	• To know the epidemiology, causes of CKD • To know the investigations required in a child with new presentation, including assessment of the degree of renal failure and reversibility of the condition • To understand the natural history and prognosis of common diseases causing CKD, and treatment strategies that may ameliorate the condition • To understand factors involved in failure to thrive • To describe the pathophysiology, investigation and indications for treatment in mineral bone disease • To describe the pathophysiology of renal anemia, its investigation and appropriate management
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Skills	• To identify/appropriately manage the underlying cause • To diagnose and treat the child with CKD including biochemical disturbance, bone disease and anemia • To appropriately counsel the family to facilitate the selection of dialysis modality and prior to referral for renal transplantation • To make an accurate assessment of nutritional status & use appropriate advice with the assistance of dietitians • To show ability to prevent, diagnose and manage mineral bone disease
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(T) Transplantation

Knowledge	<i>Pre-Transplantation</i> • To understand the ethical issues surrounding organ donation/ transplant; principles of recipient selection, indications and contraindications • To know what is involved in a transplant work-up <i>Transplantation</i> • To know the basic surgical procedures involved • To know the medications used, including side-effects <i>Post-Transplantation</i> • To know the indications for renal transplant biopsy • To understand the immune mechanisms of rejection, know the recurrence rate of disease & complications
Skills	<i>Pre-transplantation</i> • To assess the suitability of a patient, discuss issues of transplantation <i>Post-transplantation</i> • To be able to manage the stable transplant patient • To be able to advise the child, family and school <i>Minimum requirement</i> • Should involve in at least 5 transplant programs in the preparation of the patient and on post transplant follow-up

(U) DIALYSIS

Renal replacement therapy

Knowledge	• To describe the principles of dialysis and dialytic procedures in AKI and ICU setting ; peritoneal dialysis. Intermittent hemodialysis, CRRT, SLEDD. • To describe the methods of vascular access, and their complications • To list the complications occurring during dialysis
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Skills	• To be able to plan the initiation of hemodialysis • To manage different forms of vascular access • To adjust the prescription, manage the complications of hemodialysis • Should involve in at least 50 HD sessions
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Peritoneal Dialysis

Knowledge	• To describe the principles of acute and chronic dialysis, & the advantages/disadvantages compared to hemodialysis • To know the complications of peritoneal dialysis, both infective and mechanical
Skills	• To be able to prescribe/monitor patients on dialysis • To manage the complications of peritoneal dialysis • Involve in at least 10 PD sessions

(V) Pharmacology

Knowledge	• To define principles of pharmacokinetics and drug handling in renal impairment • To list ways in which different classes of drugs act on the nephron and affect renal function • To list the effects of hemodialysis, hemofiltration and peritoneal dialysis on drug prescribing • To describe principles of drug interactions, especially immunosuppressive agents
Skills	• To prescribe safely to patients with renal disease

(W) Communication and counseling to include affective skills

Knowledge	• Counseling techniques for renal biopsy in relation to the child and the parents • Counseling techniques in children with ESRD • Counseling techniques for transplant patient • Communication with parents, families and care takes • Communication with intern department staff, co-medical staff • Communication with other departments
Skills	• Ability to understand with empathy needs of the sick children, social psychological and economical burden of their parents • To maintain friendly and equality relationship with colleagues, juniors and inter departmental staff

(X) Research activity

Knowledge	• Ideas of formulating the topic for research and formalizing the various components of a research report • Interaction with Ethical Committee and modifying the topic and the contents as per need
Skills	• Should undertake one prospective and one retrospective study and complete it for publication before the completion of the fellowship program

TEACHING LEARNING METHODS AND ACTIVITIES**Presentation**

Seminars and symposia	1 per month
Journal club	2 per month
Clinical case conference	2 per month
Bedside presentation	2 per week
Inter departmental discussion	1 per month
Mortality / audit meetings	1 per month

To take first nephrology calls

from the ward, emergency

dept and PICU and NICU On all days,

Conferences, CME

Should attend State / National conference of Pediatric Nephrology

Should attend CME in on Pediatric Nephrology

Recommended books and journals

Journals published from India: Indian Pediatrics

Indian Journal of Practical Pediatrics

Indian Journal of Nephrology

International Journal : British Medical Journal
New England Journal of Medicine
Pediatric Nephrology

Textbooks : Nelson Text- Book of Pediatrics
Forfar & Arneils Text- Book of Pediatrics
D . Avner - Pediatric Nephrology
Schaffers - Comprehensive Pediatric Nephrology.

Website : ispn-online.org
isn-india.org
ipna-online.org