

NATIONAL POSTGRADUATE MEDICAL COLLEGE OF NIGERIA



CURRICULUM FOR SUBSPECIALTY OF  
NEPHROLOGY

FACULTY OF PAEDIATRICS

APPROVED BY THE SENATE ON 3<sup>RD</sup> JUNE, 2021

A handwritten signature in blue ink, appearing to read 'F. A. Arogundade', is positioned above the name of the Registrar.

DR F. A. AROGUNDADE, MD FMCP  
COLLEGE REGISTRAR



## **Proposed Training Curriculum in Paediatric Nephrology of the Faculty of Paediatrics, National Postgraduate Medical College of Nigeria**

### **Philosophy:**

Kidney diseases remain a leading cause of childhood morbidity and acute kidney injury (AKI) is responsible for over 20% of deaths in children under 5 years of age in most developing countries and in particular those in sub-Saharan Africa. Due to almost non-existent facilities, most trainees in general paediatrics are not exposed to in-depth investigations and the appropriate management of kidney diseases during their training in the sub region. Also the training is unstructured with less than desired interactions with paediatric nephrologists, limited opportunity to develop advanced knowledge of acute and chronic paediatric renal diseases and lack of use of advanced diagnostic and treatment modalities such as renal biopsy and renal replacement therapy. As a result, training and expertise in this subspecialty lags behind significantly compared to the skills, knowledge and experience available in more developed countries.

Creating subspecialty training in this field within the sub region is now essential given the magnitude of occurrence of renal diseases in the sub region such as nephrotic syndrome, the glomerulonephritides, hypertension, urinary tract infection, congenital anomalies of the kidney and urinary tract and renal failure.

## **Introduction:**

1. Sub-specialty training in paediatric nephrology will improve the quality of care for children with kidney disease and will promote awareness and also facilitate research required for better understanding of the local and regional kidney diseases and management protocols. It will produce relevant data required for the development of local and region-specific public health interventions and evidence-based policies that will improve child survival.

**Mission:** To train paediatricians with the requisite expertise to provide excellent health care to children with kidney diseases in Nigeria and internationally, in cognisance of the special requirements of children to attain optimum mental, emotional and physical growth.

**Vision** To provide a training programme in Paediatric Nephrology best tailored to Nigeria and accorded international recognition.

## **2. Aims and Objectives**

- a. To develop manpower at the specialist level for the care and advocacy of children with kidney diseases
- b. To develop specialists skilled in the knowledge and practice of paediatric nephrology with particular focus on children with kidney disease peculiar to the tropics
- c. To develop manpower with the skillset for training of future personnel in paediatric nephrology practice and research.

## **3. Expected Outcomes**

At the end of the training, the trainee is expected to:

- a. Be skilled in taking history and performing physical examination geared towards making appropriate diagnoses of kidney diseases in children
- b. Effectively and efficiently utilise diagnostic tools/services to make diagnoses and care for children with kidney diseases
- c. Provide generic and tailored services to children with varied kidney diseases including those peculiar to the region
- d. Communicate effectively with caregivers, other health care providers, those in authority and the public in advocating for improvement in kidney care services to children

- e. To identify knowledge gaps, develop and test hypotheses concerning epidemiology, diagnoses, management, and prognosis of childhood kidney diseases

#### **4. Training in Paediatric Nephrology**

The training in Paediatric Nephrology shall take place in accredited training centres of the College in Nigeria and any other place so designated.

##### ***a. Training Admission Requirements***

- Completion of a minimum of 24 months rotations in general paediatrics at the Part I level of the National Postgraduate Medical College of Nigeria (NPMCN) or its equivalents
- A pass at the Part I examinations of the NPMCN in Paediatrics or its equivalent

##### ***b. Mode of entry into the training programme***

A written application to the Faculty of Paediatrics of NPMCN for admission into the Paediatric Nephrology subspecialty training programme by a candidate gainfully employed in an accredited centre

##### ***c. Components of the training***

The major components of the paediatric nephrology Subspecialty shall be:

- Theoretical knowledge of childhood kidney diseases with emphases on those prevalent in the country and sub region.
- Practical and clinical skills in childhood kidney diseases with emphases on those prevalent in the country and sub region.
- Research skills culminating in the development of a Thesis..
- Right and appropriate attitudes to patients/their families/other care givers and hospital authority including communication skills.
- Training in basic and advanced research methodology.
- Leadership and managerial skills.

##### ***d. Duration of training***

- Regular residents

The training duration in Paediatric Nephrology shall be for a minimum of 36 months

**Table 1: Disposition and duration of postings in Paediatric Nephrology Training Programme**

s/no	Postings	Minimum duration		Comments
		For Post part I residents(36months)(6 semesters)		
1.	General Paediatrics	12 months 1. Emergency paediatrics 2. Neonatology 3. Community Paediatric  (6months each in two of the THREE core areas of General Paediatrics.		
2.	Training in Areas relevant to Paediatric Nephrology	Total of 12 months spent in the various units.		
2.1	Radiology.	2 months		
2.2	Histopathology	2 months		Core exposure in renal immune-histochemistry/histology
2.3	Dialysis Unit.	2 month		
2.4	Neonatology	One month		

2.5	Medical Microbiology.	One month		
2.6	Adult nephrology	One month		
2.7	Cardiothoracic unit	1 month		Creation of vascular access. This should be undertaken only in accredited centers
2.8	NPMCN mandatory courses including Research methodology	1 months		
2.9	Emergency Paediatric Unit	One month		
3.0	Paediatric Nephrology Unit	12 months of continuous stay in the Unit		

*e. Methods and opportunities for training/Mode of delivery*

- Ward rounds; ward consultation and outpatient clinics
- Bedside teachings
- Didactic Lectures
- Essay writing
- **Procedure sessions:** urinalyses, urine microscopy, insertion of peritoneal dialysis and haemodialysis catheters, peritoneal and haemodialysis sessions, kidney biopsy and histologic assessment of slides, renal imaging session, (recorded in log book)
- **Seminars and tutorials** in relevant topics in Paediatric nephrology at least 3 seminars
- Grand rounds and teaching practices
- Unit-led research, dissertation writing

- Radio-nephrology and histo-nephrology sessions
- Workshops and Conferences focusing on kidney health and diseases in children
- Community outreaches including World Kidney Day

• Mandatory courses of the NPMCN including Research methodology, Management, Ethics in clinical practice/research and health resources management courses and any other that may be prescribed by the College from time to time.

## **5. Examination and formative Assessment format**

### **a. Mode of formative assessment:**

- Continuous assessment activities recorded and scored in the purposive specialty log books.
- One essay on a relevant paediatric nephrology topic every month (minimum of 15)

### **b. Eligibility for final examination**

- Training for the stipulated minimum duration
- A logbook indicating that the needed training has taken place
- Submission of a dissertation in basic, epidemiologic or clinical Paediatric Nephrology. The proposal must have been approved at least 12 months before the Fellowship examinations date. One of the supervisors must meet the requirement for accreditation of a training centre
- An attestation from a trainer in Paediatric nephrology that the trainee has met all the training requirements approved by the Faculty

### **c. Format of the examination**

- A dissertation addressing a problem or topic relating to kidney diseases in children. An oral defense of the dissertation before an examination panel consisting of at least two eligible examiners
- A 100 question multiple-choice type examination assessing knowledge of the principles and practice of paediatric nephrology
- An oral examination consisting of two sections:
  - a. General Paediatrics: where the candidate is expected to meet a set of at least two examiners to answer THREE questions in general paediatrics over a 30 minute period
  - b. Paediatric Nephrology: where the candidate is expected to meet a set of at least two specialists to answer THREE questions in the sub specialty over a 30 minute period

### **d. Classification of Examination Results**

- Pass: means a pass or provisional pass in dissertation and a pass in in both multiple-choice question paper and Oral examinations
- Passed dissertation: means pass or provisional pass in the dissertation but failed the multiple choice paper and OR the Orals

- Passed theory: means pass in pass in the multiple-choice question paper and the Orals and a referral or rejection in the dissertation Fail: means a fail result in all aspects of the examination

## 6. Designation of Fellowship in Paediatric Nephrology

The designation of a fellowship in Paediatric Nephrology of the College shall be: **FMC Paed (Neph)**.

## 7. Training institution eligibility criteria

- Shall meet the requirements of the Faculty of Paediatrics of NPMCN training requirements in General Paediatrics
- Facility and equipment: in-hospital radiology, basic biochemistry, haematology, microbiology and renal histology services with the requisite manpower
- Accredited adult nephrology services
- Manpower: at least one Paediatric Nephrologist with a minimum of 10 years post fellowship in Paediatrics and minimum 5 years practising Paediatric Nephrology
- Case load:
  - Minimum 10 new paediatric admissions including at least 5 children with kidney diseases per month into the paediatric nephrology unit
  - Clinic load of a minimum 10 children with kidney diseases per week
  - A sufficient case load of children with CAKUT, nephrotic syndrome, acute kidney injury, chronic kidney disease, or requiring peritoneal dialysis or haemodialysis

## 8. Syllabus/Themes

### a. YEAR 1

### b. **General Course Code: PNP 901 (2 credit units)**

#### **Anatomy including embryology of the kidneys:**

- Congenital anomalies of the kidneys and urinary tract(CAKUT): classifications, emphasis on PUV, PUJ and Multi-Cystic Dysplastic Kidneys, Renal agenesis, Ectopic kidneys, Solitary kidneys, Renal cysts, Nephronophrisis, Congenital nephrotic syndrome, Mal-rotation and Ectopiae of the ureters, Duplex systems, PUV, Ectopiae vesica, Hypo and Epispadias, Dysfunctional bladder disorders,
- **Learning objectives:**
  - To acquire basic knowledge on the development and anatomy of the kidneys;
  - Competences required: To understand the genesis of congenital and developmental anomalies of the kidneys and urinary tract and relate them to the embryology of the kidneys.

#### **Renal physiology: Course Code: PNP 911 ( 2 credit units)**



- **Renal pathophysiology:** Nephrogenic diabetes insipidus, Renal tubular disorders, Hypophosphataemic rickets, Physiology of edema in renal disorders, Electrolyte disorders, Enuresis, Dysfunctional bladder disorders
- Fluid and electrolytes homeostasis and disturbances in kidney diseases: Hyponatraemia, Hypernatraemia, Hyperkalaemia, Acid-base imbalance

- Learning objectives: To understand the basic physiological and hormonal functions of the kidneys and relate them to common renal disorders, understand the mechanism of common acid-base electrolyte disorders.
- Competencies and skills: To identify these disorders, conduct relevant investigations and interpret laboratory test results in terms of physiological dysfunction and acquire the skills to correct common acid-base /electrolyte disorders

**Genetics and genetic basis of kidney diseases:** mode of inheritance, APOL1 GPN 931 2 credit units

- Gene mutations and FSGS; Polygenic kidney disorders, inheritance and CAKUT
- Learning objectives: To understand the genetic basis and inheritance of kidney disorders.
- Competencies/skill: Ability: Ability to conduct a satisfactory differential diagnosis, carry out relevant investigations, confirm diagnosis, prognosticate and manage these conditions.

**Clinical methods in Paediatric Nephrology: PNP 921 2 credit units**

- Learning objectives: history taking peculiar to renal disorders and physical examination (general and urogenital system): Appropriate techniques and tools for BP measurements and ABPM
- Competencies and skills: interpretation and use of BP charts, grading of hypertension
- Classification and causes of hypertension; management of hypertension in children.

• **Immune systems and complements in kidney diseases: Course code : PNP 941 (2 credit units)**

- Learning objectives: To comprehend the immunological basis of common kidney diseases in children, the role of the complement system in kidney diseases, vasculitis and connective tissue disorders with renal manifestations; SLE, HUS, IgA nephropathy Henoch Schonlein Purpura, Alport's syndrome, Vasculitis in children: small, medium and large vessels vasculitis. Emphasis on SLE.
- Competencies/skill: To conduct a differential diagnoses of these conditions, identify characteristic features, select and carry out appropriate investigations to confirm diagnosis to treat and manage such cases.

• **Childhood hypertension: Course code: PNP 951 ( 2 credit units)**

- Learning objectives: To understand the global and local epidemiology, Classification and staging of hypertension in children,
- **Competences/skills:** Use of BP nomogram in children, causes of hypertension in children highlighting renal causes as the most prominent, monogenic hypertension, hypertensive urgency and emergencies, investigations and medications.
- **Kidney involvement in systemic disease:** Course code :**PNP 961 (2 credit unit)**
- Learning objectives: characteristic features of sickle cell nephropathy, HIVAN, HBV nephropathy HCV nephropathy, Malaria nephropathy, differential diagnosis, Investigation and specific management.
- Pharmacology of commonly used medications in paediatric nephrology; nephrotoxins
- **b. Glomerular diseases in children: Course code :PNP 981 (4 credit units)**
- **Childhood Nephrotic Syndrome:**
- **Learning objectives:** features and classification of childhood Nephrotic syndrome, investigation of the child with nephrotic syndrome, differential diagnosis, management and complications,current guidelines for management
- **Competencies /skills:** to diagnose and classify nephrotic syndrome, to manage nephrotic syndrome along current guidelines. To identify and manage complications of nephrotic syndrome in children.
- **Acute glomerulonephritis:**
- **Learning objectives:** Pathognomonic features of the acute nephritic syndrome, and rapidly progressing glomerulonephritis,
- **Competencies and skills:** to investigate and make differential diagnosis, to manage along current guidelines.
- **Acute kidney injury:**
- **Learning objectives:** different consensus definitions, Epidemiology of AKI, aetiology, with emphasis on those common in the tropics, Novel biomarkers of AKI, staging and various modes of therapy.
- **Competencies /skills:** Early recognition of AKI, management of AKI including hands on skill acquisition for RRT
- **Chronic kidney disease:**
- **Learning objectives:** definition, classifications, common causes, complications ,management
- **Competencies/skills:** Early recognition of CKD, Staging of CKD, Management of CKD,
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- **YEAR 2**

**Laboratory investigation of the diseased kidneys: PNP 912 2 credit units**

- Learning objectives: The theoretical basis of urinalysis, urine microscopy culture and sensitivity, and GFR measurement and estimation.
- Competencies and skills: Appropriate specimen collection and interpretation of urine results, calculation of eGFR estimates and its relevance to practice.

**Renal imaging and urodynamics: Ultrasound, MCUG, IVP, Nuclear scans, CT and MRI urography Course code: PNP 922 (4 credit units)**

Learning objectives: Theoretical basis of renal imaging studies, specific indications and contraindications for the studies, the complications that may arise from the studies.

Competencies and skills; ability to conduct and interpret renal ultrasonographic studies, ability to interpret reports of MCUG, IVU, Nuclear scans, CT and MRI urography.

**Kidney biopsy and laboratory assessment of biopsy tissue: indications, contraindications, technique, complications and tissue processing Course code: PNP 932 (4 credit units)**

- Learning objectives: The indications for renal biopsy, the procedure of renal biopsy (various techniques); preparation for renal biopsy, contraindications, sedation of paediatric patients for biopsy, post biopsy care, adequacy of biopsy specimens, tissue processing and renal histopathological findings in common renal diseases seen in children.
- Competencies/skills: Preparation of a child for renal biopsy, selection of materials and location of the kidney for biopsy, hands on practice of renal biopsy, post biopsy care and early identification of complications and management.

**Research methods in Paediatric Nephrology: practical biostatistics, study designs, , research ethics , grants writing workshop. Course code: PNP 942 (2 credit unit)**

- Learning objectives: How to conceptualize research problems, identify appropriate study designs and statistics, ethical implications of conducting research on children, conducting literature review, systematic reviews and meta-analysis, data analysis and presentation of data.
- Competencies/skills: Proposal writing, execute research studies and analyse/present data, dissertation and defense, manuscript writing for journal publications and application for grants.

**c. Tubulo-interstitial diseases: Course code: PNP 952 (2 credit units)**

- Acute and chronic interstitial nephritis:
- Learning objectives: Definition, aetiology pathogenesis and pathophysiology, toxic nephropathy with emphasis on the role of medications and herbal concoctions, typical features histopathological findings and management.

- Urinary tract infection:
- Learning objectives: Definition ,causes, risk factors, two clinical forms of cystitis and pyelonephritis, imaging after UTI
- Competencies/skills: Investigation and interpretation of results and reports, treatment and prophylaxis
- Fanconi syndrome:
- Learning objectives: Definition ,classification and clinical features of congenital and acquired types, complications and treatment
- Rare tubular dysfunction: cystinosis, Barter syndrome, Gitelman syndrome, nephrogenic diabetes insipidus
- Learning objectives: clinical and lab features, genetic basis and inheritance ,management and complications
- Competencies /skills: Early identification of cases, investigation and interpretation of relevant laboratory results, line of management and complications.
- Urinary incontinence including enuresis: neuropathic bladder, overactive and underactive bladder, mono and non-monosymptomatic enuresis, urodynamics

**d. Diagnostic and Therapeutic Procedures/seminars and grand rounds (*Log book ,see Appendix*) Course code :PNP 962 (4 credit units)**

- Urinalysis including microscopy
- Kidney biopsy ( Preparation, choice of needles, adequacy of specimen)
- Reading of kidney histologic preparation.
- Peritoneal dialysis: (catheter insertion, choice of fluids, complications and set up)
- Haemodialysis (Dialysis prescription,KT/V and URR, choice of catheters and setting up),management of complications
- Vascular access ( Central and peripheral catheter insertion)
- Kidney transplantation (Pre and post transplant management)

YEAR 3

**e) Dissertation (12 credit units )**

**D.Some Recommended Reading Materials**

**a. Textbooks:**

- Paediatric Nephrology textbook

- African Pediatric Nephrology Guidebook
- Oxford Specialists' Handbook in Pediatric Nephrology
- Comprehensive Pediatric Nephrology
- Clinical Paediatric Nephrology

**b. Journals:**

- Pediatric Nephrology
- Kidney International
- Kidney International Supplements
- African Journal of Paediatric Nephrology
- Nephrology, Dialysis and Transplantation
- Peritoneal Dialysis International
- Clinical Journal of the American Society of Nephrology
- Journal of the American Society of Nephrology
- BMC Nephrology

**c. Websites:**

- <https://kdigo.org/>
- <https://www.kidney.org/>