NATIONAL POSTGRADUATE MEDICAL COLLEGE OF NIGERIA

CURRICULUM FOR SUBSPECIALTY OF PAEDIATRIC HAEMATOLOGY ONCOLOGY

FACULTY OF PAEDIATRICS

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NATIONAL POSTGRADUATE MEDICAL COLLEGE OF NIGERIA

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CURRICULUM FOR SUB-SPECIALTY TRAINING IN: CLINICAL PAEDIATRIC HAEMATOLOGY / ONCOLOGY

Preamble

Clinical Paediatric Haematology- Qncology (PHO) is a subspecialty of Paediatrics which is concerned with diagnosis, treatment and prevention of bone marrow and blood diseases and malignancies in children. In developed countries, mortality from childhood blood diseases and neoplasms has tremendously improved partly because of increase in the number of specialists involved in the diagnosis and management of these children and partly due to availability of specialized diagnostic tools. However, Paediatric Haematology / Oncology services in this country face several challenges principally due to poor access to its management with attendant poor outcomes. In line with the National Strategy for Paediatric Haematology/ Oncology control, doctors with training in this specialty are required, as part of multidisciplinary teams, to manage childhood haemato- oncological problems so that such services can be made available in all the regional hospitals and beyond. Being in the forefront of postgraduate medical training in Nigeria, the National Postgraduate Medical College is in a position to spearhead the training of competent specialists in clinical Paediatric Haematology / Oncology to address the country's health sector manpower needs.

Aim:

To produce well trained Fellows of the National Postgraduate Medical College, Nigeria, who are competent and capable of undertaking the duties of a specialist in managing childhood Haematology/ Oncological disorders.

Specific Objectives

By the end of the training the Fellow should be able to:

- Know, initiate and evaluate the diagnostic investigations of children with Haematology / Oncological disorders
- Lead and coordinate the multidisciplinary team management of childhood Haematological and Oncological disorders.
- Communicate appropriately with the affected children and their families
- Understand the problems of a terminally ill patient and be able to address the palliative care needs
- Evaluate and institute management of a child with Haematological / Oncological problems.
- Demonstrate an understanding of the values, behaviours and relationships that underpin the trust the public has in doctors.
- Understand the principles and ethics of research protocols and clinical trials and be able to use them.
- Develop skills in research methodology that are necessary to structure and perform research under appropriate guidance. These skills will include the ability to review published articles critically and to perform effective literature searches on a given topic.
- Develop the capacity to **lead and motivate** the health team in the management and conduct research on haemato-oncologic disorders in children

Overview

Paediatric Haematology / Oncology is an integrated discipline incorporating clinical and laboratory aspects of diseases of the blood and blood-forming organs and neoplasms. This diverse specialty encompasses the investigation and treatment of a wide range of malignant and benign diseases, including leukaemias, lymphoproliferative disorders, inherited and acquired coagulation abnormalities, abnormalities of haemoglobin and red cells, haemopoietic stem cell transplantation and transfusion medicine.

Key features of the Paediatric Haematology / Oncology specialty and its practice include:

- Clinical, translational and basic research as a significant component of practice for many Paediatric Haematologists. They contribute to the substantial advances in cell and molecular biology, therapeutics, and patient management
- The provision for a clinical-laboratory interface of knowledge, skills and judgment
- The opportunity for long-term medical relationships with patients and their families
- The opportunity for teaching in undergraduate and graduate medical programs, as well as in post-graduate advanced medical training
- The status of Haematology at the forefront of the molecular understanding of the basis of disease, as well as translation into clinical practice and improved outcomes.

The requirement for the services provided by Haematologists /Oncologists is expected to increase, with the growth in consumer demand due to population growth, the increasing incidence of haematological malignancies, and the expanding treatment options as well as increasing survival of our patients to treatment. As with any other profession, Haematologists need to respond to evolving societal, workplace, legislative and technological developments.

Some of the currently identified emerging developments include the:

- Advances in medical technology
- Expected increase in availability of complex and expensive investigative tests and procedures
- Need for Haematologists to provide expert interpretative analysis and opinion
- Growth in consumer demand specifically with the increasing incidence of haematological and solid tumour malignancies
- Expected technological advances in chemotherapy and immunotherapy
- Increased use of strong and expensive drugs which will increase requirement for Haematologists and higher levels of medical supervision.

ADMISSION REQUIREMENT:

- A pass at the Part I Fellowship Examination of the National Postgraduate Medical College of Nigeria (Faculty of Paediatrics) or its equivalent.
- Membership from recognized Colleges (National and International) that are accepted as equivalent to the Part I of the National Postgraduate Medical College of Nigeria (NPMCN).

- Passed the compulsory College courses applicable before Part 1 [ATLS/ACLS] and other compulsory Faculty courses at that level

MODE OF ENTRY INTO PROGRAMME

- Progression from training in general Paediatrics during Junior residency programme to PHO specialist training in Senior Residency training.
- Others shall be by application to training institution and National Postgraduate Medical College of Nigeria (NPMCN) on the recommendation of the Board of the Faculty of Paediatrics.

Paediatric Haematology / Oncology Training Curriculum

This curriculum outlines the broad concepts, related learning objectives and the associated theoretical knowledge, clinical skills, attitudes and behaviours required and commonly utilized by Paediatric Haematologist / Oncologist within Nigeria. The purpose of Advanced Training is for trainees to build on the cognitive and practical skills acquired during basic postgraduate training. At the completion of the Paediatric Haematology/Oncology Training Program, trainees should be competent to provide, at consultant level, unsupervised comprehensive medical care to patients with Paediatric Haematology/Oncology challenges.

Attaining competency in all aspects of this curriculum is expected to take twenty-four months of training. It is expected that all teaching, learning and assessment associated with the Paediatric Haematology/Oncology Training Curriculum will be undertaken within the context of the Paediatrician's everyday clinical practice and will accommodate discipline-specific contexts and practices as required. As such, it will need to be implemented within the reality of current workplace and workforce issues and the needs of health service provision. There may be learning objectives that overlap with or could easily relate to other domains; however, to avoid repetition, these have been assigned to only one area. In practice, it is anticipated that within the teaching/learning environment, the progression of each objective would be explored.

Note: The curriculum shall always be studied in conjunction with the relevant College Training Handbook available on the College website.

EXPECTED OUTCOMES AT THE COMPLETION OF TRAINING

Graduates from this training program will be equipped to function effectively within current and emerging professional, medical and societal contexts. At the completion of the Postgraduate Training

Program in Paediatric Haematology/Oncology, as defined by this curriculum, it is expected that a new Fellow will have developed the clinical skills and have acquired the theoretical knowledge for competent paediatric haematology/oncology practice. It is expected that a new Fellow will be able to:

- diagnose and treat haemato-oncological disorders and manage complications
- function as a competent clinician, understanding the principles and the interpretation of a wide range of laboratory procedures, based upon a sound knowledge of the basic sciences, the relevant aspects of biochemistry, genetics, immunology, pathology, pharmacology, and pathophysiology of haematological and malignant diseases
- develop and apply appropriate management, communication and patient advocacy skills
- be aware of the haematological changes that occur during in the neonatal period and childhood
- obtain bone marrow and other tissue samples for diagnostic purposes
- diagnose and manage general medical problems, such as infections and disorders of the heart, lungs, liver and kidney etc
- demonstrate an understanding of biomedical ethics in the investigation and care of patients.
- apply the principles of quality assurance to clinical care and laboratory medicine, as well as in the critical appraisal of the medical literature
- contribute to the education of colleagues, students, junior medical officers and other health care workers, through teaching and professional leadership
- encourage and sustain a harmonious team approach to patient care
- apply knowledge of basic science, clinical and laboratory skills in patient management.
- process new knowledge through actively participating in clinical and/or basic research.

CURRICULUM, SYLLABUS AND LEARNING OBJECTIVES

Each of the curriculum documents has been developed using a common format, thereby ensuring a degree of consistency and approach across the spectrum of training.

The syllabus identifies and links more specific aspects of learning into logical or related groups.

The learning objectives outline the specific requirements of learning. They provide a focus for identifying and detailing the required knowledge, skills and attitudes. They also provide a context for specifying assessment standards and criteria as well as providing a context for identifying a range of teaching and learning strategies.

Teaching and Learning methods

1. Lectures
2. Tutorials and Seminars
3. Demonstrations / Observations
4. Task performance/practice/observation
5. Assignments / projects
6. Research, including audits
7. Conferences / workshops
8. Journal clubs
9. Clinics / tailored clinical experiences
10. Ward rounds
11. Grand rounds
12. Committee / multidisciplinary meetings
13. Mentoring
14. Simulations (computer / virtual reality)
15. Interactive multimedia, including audio/video conferencing
16. Critical incident analysis
17. Case studies
18. Online mediated / tutor- monitored discussion groups
19. Laboratory exposure, including processing, analysis of samples and interpretation of results

Monitoring of Training:

Training will be monitored in the under listed ways:

1. Use of Record / log of attendance (at procedures)
2. Case note reviews
3. Case studies / presentations
4. Simulations
5. Discussion/debriefing sessions
6. Tutorial records
7. Peer assessment
8. Multi-source Feedback

Training rotations:

The total duration of training post Part 1 is thirty-six months as stated in the Curriculum, Faculty of Paediatrics.

This period of training will consist of:

- Twelve-month rotation in General Paediatrics during which Residents shall undertake six-month rotations in general Paediatrics and
- Subspecialty training which will last for Twenty -four months.

It is expected that candidates for Haematology / Oncology subspecialty will spend a total of twenty-four months (including elective postings) in Haematology / Oncology Unit which consists of the following**:**

A. Paediatric Haematology / Oncology Unit (PHOU) for seventeen (17) months.

i. The first 6 months of the PHO training should be in the PHOU. During this period, the candidate is expected to have basic knowledge sufficient to recognize and to know when to refer patient under close supervision by a Consultant Paediatric Haematology / Oncology Clinician.

ii. After this period, candidate shall do some elective postings as itemized in (B). It is expected that during this posting, the candidate should have acquired intermediate knowledge sufficient to manage Paediatric Haematology / Oncological diseases under supervision by a consultant or at least have basic knowledge sufficient to recognize and know vital information for disease diagnosis and referral. It is also expected that candidates should be able to acquire the skills for patients and equipment handling in the laboratory

iii. The last Eleven (11) months of the 24 months in PHO training must also be spent in PHOU. During this period, the candidate would have had in-depth and advanced knowledge sufficient for independent tertiary specialist practice.

B. Elective in subspecialty for seven (7) months:

Elective posting in this subspecialty is done **within** the twenty-four months of training.

The electives include:

S/N	Elective posting	Expected skill / competence	Duration
1	Adult Haematology/ Immunology	Enhanced skill in bone marrow aspirate, apheresis, HPLC for Hb quantification and newborn screening	2 months
2	Paediatric surgery	Enhance skill in cut down for EBT,	1 months

3	Radiology	Experience in radiological findings of some haematological malignancies and SCD	1 month
4	Radiotherapy	• radiation therapy in management of haematological malignancies Location of site of irradiation • Steps to minimize exposure to radiation	1 month
5	Morbid anatomy including autopsy demonstrations	Experience in film reports of specimens, histological and cytological findings of childhood malignancies	1 month
6	Palliative care and communicative skills	• Participate in hands-on sessions and recognise circumstances palliative care should commence • Recognizes the role of palliative care professionals in managing childhood neoplasms	1 month

Proposed academic flow chart for the twenty-four-month period in Clinical Paediatric Haematology / Oncology subspecialty

Academic and clinical program	**1st month**	**2nd**	**3rd**	**4th**	**5th month**	**6th month**	**7th month**	**8th month**	**9th month**	**10th month**	**11th month**	**12th month**
Year 1		**Seminar 1** **Title of study, Research Questions, Objectives of study**			**Seminar 2** **Literature review /Methodology**		**Adult Haemtology / Immunology postings**		**Paediatric surgery posting**	**Radiology posting**	**Radiotherapy posting**	**Morbid anatomy posting**
Year 2	**Palliative care posting**	**Field work / Data collection**					**Data analysis**	**Clinical /lectures**	**Clinical /lectures**	**Seminar 3** **Results and Discussion References**	**Clinical /lectures**	**Mock Oral and Dissertation** **presentation**

The identified syllabus, learning objectives and expected competences in Paediatric Haematology / Oncology include:

PHO 900 : 1credit unit	**Laboratory Management and Technical Procedures**
Learning Objective	**Develop efficient laboratory management procedures**
Knowledge of:	**Skills- to be able to:**
• principles of administration and governance of a haematology laboratory. • procedures and risks of performing bone marrow biopsies and lumbar punctures in patients with haematological disorders	• explain the administrative issues involved in running a typical haematology laboratory, including accreditation, quality assurance, document control and conflict resolution. • perform bone marrow aspirates and trephine biopsies from the posterior iliac crest and sternum in adolescents • perform bone marrow biopsies in children • perform lumbar punctures

PHO 901 : 3 credit units	**Anaemias in Childhood**
Learning Objective	• **Diagnose and manage Anaemia** • **Recognize and manage iron def. & overload disorders, folate and Vit. B 12 deficiency**
Knowledge of:	**Skills- to be able to:**
• mechanisms of erythropoiesis • the less common causes of anaemia, such as: red cell aplasia (see bone marrow failure) red cell membrane disorders metabolic enzyme deficiencies define and • the appropriate modalities of treatment of anaemia	• discuss the mechanisms of erythropoiesis, including the role of erythropoietin and the ontogeny of red cell precursors • identify the appropriate clinical situations in which these diagnoses should be investigated and perform the appropriate investigations

• the pathophysiology of anaemia, including the nutritional causes and the pathophysiology of-- ✓ iron deficiency ✓ B12 deficiency ✓ folate deficiency • the causes and characteristics of anaemia in chronic disease • the investigative techniques required for the investigation of anaemia, including: ✓ clinical ✓ pathological ✓ assays of haematinic factors bone marrow examination • radiological the appropriate investigations and evaluate results, such as: full blood count • iron and folate metabolism and cause of iron overload, the causes of iron and folate deficiency.	• explain the diagnosis of anaemia to patients and their families • apply the appropriate treatment for anaemia according to its pathophysiology, including supportive treatment such as transfusion • explain the treatment to patients and their families • interpret the nutritional causes of anaemia and the pathophysiology, including: ✓ iron deficiency ✓ B12 deficiency ✓ folate deficiency • interpret the causes and characteristics of anaemia of chronic disease • identify the characteristics of haemoglobinopathies as a cause of anaemia, including: thalassemia, sickle cell anaemia, and unstable haemoglobins • explain the diagnosis of anaemia to patients and their families • Identify the causes of haemolysis, including: autoimmune haemolytic anaemia metabolic enzyme deficiencies red cell membrane disorders microangiopathic haemolytic anaemias • identify primary marrow causes of anaemia, such as refractory anaemias, and myelodysplastic syndromes • Evaluate the signs of anaemia clinically by history and examination • diagnose and manage anaemia

	• explain investigations to patients and families, including possible morbidities • communicate the results of investigations and their implications to patients and their families. • investigate and manage iron overload, including therapeutic venesection, chelation therapy and monitoring investigate

PHO: 902 3 credit units	**Haemoglobinopathies**
Learning Objectives	• **Construct/generate laboratory diagnosis of haemoglobinopathies and abnormal haemoglobins** • **Manage individuals with Haemoglobinopathies**
Knowledge of:	**Skills – to be able to:**
• blood film features and haematological parameters associated with haemoglobinopathies • laboratory diagnosis of haemoglobinopathies and abnormal haemoglobins, including: haemoglobin electrophoresis high-performance liquid chromatography (HPLC) approaches to diagnosis sickle testing testing for unstable haemoglobins • the molecular basis of haemoglobinopathies • the prevalence and geographic distribution of haemoglobinopathies. • the types of crisis in Sickle cell Disease and basis for the occurrence	• recognize red cell changes in thalassaemias and haemoglobinopathies, including sickle cell disease perform haemoglobin electrophoresis, HPLC and identify and interpret abnormal patterns • perform and interpret sickle tests and stability testing • explain the cause and implications of thalassaemia to patients and their families. • discuss: ✓ acute and chronic pain management ✓ drug management- Hydroxyurea, Opioids, NSAIDs etc ✓ blood transfusion protocols on SCA ✓ care of patients with SCA requiring surgery • manage acute and chronic painful episodes

• of complications in SCA including stroke, acute chest syndrome, aplastic, sequestration, hyperhaemolytic crises, osteomyelitis, infections etc • health maintenance in SCA Sickle cell disease- classification, epidemiology, pathophysiology. • Clinical manifestations- anaemic: aplastic, acute sequestration, hyperhaemolysis • Other clinical features including normal habitus of SCA • Disease modifiers of SCD eg Hydroxyurea, L glutamin • Management of patient with SCA • Vaso occlusive crises: acute chest syndrome, acute painful crisis, osteomyelitis, stroke, priapism etc • Others complications including leg ulceration, pulmonary hypertension etc • Blood transfusion practices in SCA • Psychological effect of SCA • New and emerging therapies for SCD: reduction of polymerization, Apixabin, prasugrel • Bone marrow transplantation (BMT) • Gene therapy in SCD • the management of individuals with thalassaemia major, including: transfusion chelation therapy, diagnosis and • management of the complications of iron overload • management of splenectomised individuals • psychological aspects of chronic illness	• use age-specific rating scales for assessing pain and their interpretations and uses • understand clinical manifestations of the disease • manage of stroke in patients with SCA • support care in patients with SCA • treat infections • apply knowledge of blood transfusion practices in patients with SCA • treatment and manage of SCA • counsel parents on immunization practices in children with SCD • evaluate the adequacy of chelation therapy in patients with sickle cell disease or thalassaemia major • perform assessments for endocrine and other complications of iron overload • explain the diagnosis of sickle cell disease or thalassaemia to patients and families • communicate the consequences of inadequate chelation n therapy to patients and their families • evaluate the adequacy and provide prophylaxis in patients with sickle cell disease • manage all sickling crises and provide advice regarding the genetics of sickle cell disease • explain the genetic issues associated with haemoglobinopathies explain the procedure and implications of prenatal testing for sickle cell anaemia or thalassaemia syndromes

• the management of the patient with sickle cell disease in terms of: ✓ transfusion regimens, ✓ approaches to minimize sickling, ✓ principles of genetic counselling in families with haemoglobinopathies • the principles of prenatal diagnosis of haemoglobinopathies. •	

PHO 903 : 2 credit units	**Bone Marrow Syndromes and White Cell Disorders**
Learning Objective	**Diagnose and manage bone marrow failure syndromes**
Knowledge of:	**Skills- to be able to:**
• definition and explanation of the causes of pancytopenia • the causes of bone marrow failure, including aplastic anaemia • the myelodysplastic syndromes and their haematological sequelae • the natural history, pathophysiological mechanisms, and morphological classification of the myelodysplastic syndromes, including the International Prognostic Scoring System (IPSS) and WHO system, and their clinical significance, including the importance of cytogenetic and molecular analyses • the clinical manifestations of bone marrow failure and pancytopenia explain the investigations that are required • the cause of bone marrow failure	• define and explain the causes of pancytopenia differentiate between the primary (idiopathic) and secondary causes of bone marrow aplasia, including drugs, radiation, viruses • explain the diagnosis of bone marrow aplasia to patients and their families • explain the diagnosis of myelodysplastic syndromes to patients and their families • evaluate the clinical signs and sequelae of bone marrow failure • explain the diagnosis and sequelae of bone marrow failure to patients and their families • discuss, perform and evaluate the appropriate investigations for bone marrow failure, including full blood counts and morphology, bone marrow examination, cytogenetic and molecular analyses, and viral serology

• treatment modalities of bone marrow aplasia. - explanation and discussion	• explain the investigations of bone marrow failure and the results to patients and their families • discuss and apply the appropriate treatment for bone marrow aplasia, including the cessation of causative drugs, anti-thymocyte globulin, and cyclosporin, other immune modulators, and stem cell transplantation for aplastic anaemia • evaluate the efficacy and toxicities of these treatments • explain the appropriate treatment, and the morbidities and mortalities, for bone marrow failure to patients and their families.

PHO 904: 3 credit units	**Leukaemias in childhood**
Learning Objective	**Describe the principles of diagnosis and management of the acute leukaemias**
Knowledge of:	**Skills- to be able to:**
• normal haematopoiesis and stem cell biology. This should include as a minimum knowledge of: intrinsic and extrinsic regulators of blood cell development hierarchical ordering of blood cell development from stem cell to mature blood cell • classification of acute leukaemias integrating: ✓ morphology ✓ cytochemistry ✓ immunophenotyping ✓ cytogenetics ✓ molecular biology	• explain the process of normal marrow function and how these processes are disrupted in acute leukaemia and by therapy • communicate these concepts in non-technical language to patients with acute leukaemia • recognize how new knowledge in basic haematopoietic biology may underpin current therapy, and influence future therapies for acute leukaemia • integrate diagnostic information to classify acute leukaemia into lymphoblastic and myeloid and their subtypes, according to WHO criteria

• the pathophysiology and natural history of leukaemia including the clinical features • the principles of induction, consolidation and maintenance cytotoxic chemotherapy, including attendant side effects • the principles of targeted, non-cytotoxic therapies including retinoic acid, arsenic, imatinib, rituximab • the principles of adjusting dose, schedule and regimens of therapy according to organ dysfunction and comorbidities • the role of palliative care in management • principles of supportive care, including: ✓ prevention and management of opportunistic infection ✓ use of blood components ✓ appropriate use of haemostatic agents, anti-emetics and analgesics • outcomes of leukaemia according to classification, prognostic indices and treatment strategy • principles of determining prognosis using validated objective criteria. • the appropriate components of supportive care for acute leukaemia patients • the urgency of management of infections in immunocompromised patients • prognosis in newly diagnosed patients according to clinical and laboratory indices • when to convey to patients and their families the possible outcomes of treatment, including prognostic uncertainty	• differentiate between the different modes of clinical presentation and various complications of acute leukaemia • interpret patterns of organ dysfunction directly or indirectly due to acute leukaemia or its complications • convey explanation of consequences of disease process to patients and their families • identify, perform and interpret appropriate diagnostic and supportive investigations for acute leukaemia • evaluate commonly used treatment protocols in for major forms of acute leukaemia, and the major side effects associated with them • communicate the goals and aims of treatment to patients, their families and other health professionals • discuss pertinent clinical, social, cultural and financial considerations in selection of therapeutic options for patients • communicate the side effects, and their short- and long-term consequences to patients, their families and other health professionals accurately calculate and prescription of appropriate doses of chemotherapy and other anti-leukaemia therapies • select appropriate palliative modalities for patients with haematological disease • recognize and manage childhood leukaemia and their challenges and complications • communicate with colleagues, other health professional, patients and their families about supportive treatments

	• articulate the range of therapeutic outcomes for acute leukaemias
PHO 905: 2 credits units	**Lymphoproliferative Disorders**
Learning Objective	**Identify, diagnose and manage Hodgkin's and non-Hodgkin's lymphoma**
Knowledge of:	**Skills- to be able to:**
• the normal anatomy and physiology of the lymphoid system as a basis for understanding disease • the natural history, classification and molecular biology of Hodgkin's and non-Hodgkin's lymphoma and related disorders • the current staging and prognostic systems recognize disease specific presentations and complications • appropriate management principles, including: choice of specific chemotherapy regimens, for initial treatment, relapse and salvage therapy disease-specific complications place of radiotherapy, indications for high dose therapy clinical trials palliative care • the current histological classification(s) WHO classification. • bone marrow biopsy/trephine specimens in lymphoma patients	• explain lymphocyte molecular biology, cluster differentiation (CD) classification, immunoglobulin and functional assays • recognize the importance of understanding 'normal' parameters/finding • recognize presenting features and conduct history and examination competently • use clinical findings, laboratory, radiological and nuclear medicine investigations to establish a diagnosis, stage and determine prognosis of the disease • manage patients throughout the course of their illness • formulate an overall management plan for the initial presentation • manage cases of relapse • evaluate the need for high dose therapy and assess patient suitability identify long-term complications of the disease and therapy, including second malignancies and their management and implications for fertility

• the consequences of correct and incorrect interpretation of laboratory reports in lymphoma (include cytogenetic and molecular).	• manage end-of-life issues and interact with other relevant specialists, such as radiation oncology and palliative medicine • communicate the management options to patients and their families explain the use of transplantation and its limitations to patients and their families • recognize indications for consultation with other appropriate clinicians in patient management • interpret histopathological reports • collaborate with anatomical pathologists and related specialists in the diagnosis and assessment of patients • manage Hodgkin's and non-Hodgkin's lymphoma
PHO 906: 2credit units	**Solid Tumours in childhood**
Learning Objective	**Diagnose and manage Solid tumours**
Attitudes	**Act with empathy in the course of discussing diagnosis and treatment of patients with caregivers and their families**
Knowledge of:	**Skills- to be able to:**
• the normal anatomy and physiology of the relevant aspects of the immune system as a basis for understanding of disease, including: lymphocyte molecular biology, oncogenesis and biology of cancer • the natural history, classification and molecular biology of childhood solid tumours including	• recognize the importance of understanding 'normal' parameters and findings • recognize presenting features and conduct history and examination competently • recognize disease-specific and treatment complication

Burkitt lymphoma, nephroblastoma, retinoblastoma, neuroblastoma, hepatoblastoma, connective tissue sarcomas e.g. rhabdomyosacroma, osteosarcoma, fibrosarcoma, etc; CNS tumours. • the clinical manifestations and current staging and prognostic system • disease specific complications • the distinction between various types of solid tumours • management principles, including: management of disease-specific complications, choice of specific chemotherapy regimens, place of radiotherapy, indications for high dose therapy clinical trials • a clear understanding on recent advances and techniques/technologies in managing solid tumours • bone marrow biopsy and trephine specimens in patients with plasma cell disorders; other solid tumour biopsy, including ultrasound guided and their interpretation • recognize and interpret different biomarkers associated with childhood solid tumors. • Oncologic emergencies monitoring for relapse, assess suitability for, and manage, high dose therapy, including radiotherapy. • long-term complications of disease and therapy, including second cancers and their management, and implications for fertility	• use appropriate investigations and findings to establish diagnosis stage and determine the prognosis of the disease recognize the importance of clinical assessment • recognize the importance of appropriate investigations • distinguish between the various plasma cell disorders using clinical and laboratory criteria • recognise the relevance and importance of the distinction between these clinical presentations • explain and monitor long-term complications of disease and therapy, including second cancers and their management, and implications for fertility • manage end-of-life issues with compassion and collaboration • interact with other relevant specialists such as radiation oncology and palliative medicine • provide a full explanation of management options to patient and family, including: consequence of no treatment disease complication benefits and side effects of therapy • explain use of specific organ transplantation (e.g kidneys) and its limitations to patient and family • manage patients throughout the course of their illness, including: formulating overall management plan for the initial presentation. • manage acute and chronic specific complications, e.g. hypercalcaemia, bone disease, pathological fractures and metastases

• end-of-life issues with compassion and collaboration as well as interacting with other relevant specialists such as radiation oncology and palliative medicine • full explanation of management options to patient and family, including consequence of no treatment, disease complications benefits and side effects of therapy • use of specific organ transplantation (e.g kidneys) and its limitations to patient and family • indications for consultation with appropriate specialties in patient management. • palliative care.	

PHO 907: 2 credit units	**Myeloproliferative disorders**
Learning Objective	**Diagnose and manage myeloproliferative disorders**
Knowledge of	**Skills- to be able to:**
• the clinical features of the various myeloproliferative disorders • the criteria for each phase of chronic myeloid leukaemia (CML), i.e. chronic, accelerated, blast crisis the factors associated with prognosis in CML and the commonly used methods of clinical assessment, e.g. Hasford score • pathophysiology of CML on a genetic level the methods used to monitor disease progress in CML including type of test, preferred specimen and optimal interval	• recognize presenting features and conduct history and examination competently • use appropriate clinical findings, laboratory, radiological and nuclear medicine investigations to establish diagnosis and stage, and determine prognosis of the disease • communicate information about diagnosis and treatment to patients and their families in a caring manner • evaluate treatment effectiveness regularly and at appropriate intervals

• current treatment options for CML with consideration of issues such as efficacy, availability, toxicity, cost effectiveness, age appropriateness, • role of transplantation and any other relevant information • the diagnostic criteria and major differential diagnoses of polycythaemia vera (PV) • the treatment plan for patients with PV, including venesection, radio-isotope and pharmacological means as appropriate the venesection cut-off criteria for different polycythaemia groups and justify management plan, the diagnostic criteria of essential thrombocythaemia (ET) the treatment strategies for ET, including treatment initiation points and agents for various groups and alternative strategies the non-surgical management of massive splenomegaly • defining the diagnostic criteria for MF outline a treatment strategy for MF, including all possible modalities that might be required such as surgical, pharmacological and radioisotopes. as well as comparing and reconsidering the various treatment modalities • the common and serious complications of PV, ET and MF e.g. thrombosis, haemorrhage leukaemia • the differences in incidence of these complications between the types of	• communicate with members of other teams (radiotherapy, surgery) regarding management of patients who need multidisciplinary care, e.g. PV and myelofibrosis (MF) • manage patients throughout the course of their illness.

myeloproliferative disorders (MPD) and the interaction of treatment on these complications.	
PHO 908: 2credit units	**Stem Cell Transplantation**
Learning Objective	**Describe the principles and practice of autologous and allogeneic haematopoietic stem cell transplantation**
Attitudes	• **Recognize, respect and protect the rights and needs of donors** • **Involve and consult the multidisciplinary team in management of graft vs. host disease (GVHD)**
Knowledge of:	**Skills- to be able to:**
• normal haematopoiesis and stem cell biology • the mechanisms of stem cell mobilization • the biology of different stem cells sources • the patterns of haematopoietic reconstitution following stem cell transplantation • the indications for allogeneic stem cell transplantation (SCT): standard indications, experimental indications • the indications for autologous SCT**:** standard indications. experimental indications, potential toxicity, side effects of cytokines for mobilization • the principles of: ✓ histocompatibility, donor-recipient matching ✓ GVHD, ✓ graft vs. leukaemia (GVL) effect • the principles of:	• consult colleagues, other health professionals, patients and families about supportive treatments • convey compassionately and accurately to patients and families the likely outcomes of treatment, including prognostic uncertainty • display empathy when discussing prognosis, complications and imminent death • use chemotherapy and cytokines appropriately to mobilise stem cells into the peripheral blood • communicate these concepts in non-technical language to patients who are candidates for stem cell transplantation • interpret the pattern of haematopoietic reconstitution following transplantation

✓ donor health assessment, ✓ stem cell collection: ✓ bone marrow harvesting peripheral blood mobilization ✓ leucapheresis, ✓ umbilical cord blood collection and storage • the principles of supportive care (to be read in conjunction with acute leukaemia section) with special focus on: ✓ prevention and management of opportunistic infection, ✓ use of blood components ✓ appropriate use of haemostatic agents, ✓ anti-emetics and analgesics • diagnosis and treatment of late toxicities from SCT • the outcomes of SCT considering the causes and incidences of transplant-related mortality for: autologous transplants, allogenic transplants. • diagnosis and management of GVHD	• recognise how new knowledge in basic haemopoietic biology influences future improvements in SCT • recognise the importance of selection of appropriate stem cell source • communicate the curative potential of allogeneic and autologous transplantation in different disease settings • recognise the patterns of treatment failure related to disease or complications of transplantation • apply the prognostic indicators of disease responsiveness and treatment-related mortality to decision making • appropriately select and refer patients for consideration of SCT • effectively communicate with patients the possible role of SCT in their care • explain to the patient/donor the side effects of cytokines used in stem cell mobilisation and manage these side effects • consult colleagues, other health professionals, patients and families of the likely outcomes of treatment including prognostic uncertainty. • convey compassionately and precisely to patients and families the likely outcomes of treatment including prognostic uncertainty. • identify suitable allogeneic donors communicate the relative risks of severe acute GVHD

	• communicate the suitability of siblings, family members or unrelated volunteers as donors • assess volunteer donors and explain process of stem cell collection, including risks • identify appropriate stem cell sources for different clinical scenarios • prescribe the appropriate doses of chemotherapy and immunosuppressive therapies • diagnose veno-occlusive disease and interstitial pneumonitis • recognise the differences in efficacy and toxicity of autologous and allogeneic transplantation manage GVHD • apply and use the relevant components of supportive care for stem cell transplant (SCT) patients: during the neutropenic phase, following engraftment, during long-term immunosuppression • recognize the urgency of management of infections in immunocompromised patients • recognize the long-term toxicity and quality of life issues in long-term survivors • effectively articulate the range of therapeutic outcomes for SCT • assess prognosis in patients with multi-organ failure.

PHO 909: 2credit units	**Bleeding Disorders in children**
Learning Objective	• **Diagnose and manage patients with inherited coagulation disorders** • **Diagnose and manage patients with acquired bleeding**
Attitudes	**Exhibit understanding and sensitivity when considering the psychological impact of the diagnosis of an inherited and acquired bleeding disorders when managing patients and their families**
Knowledge of:	**Skills- to be able to:**
• the pathophysiology of normal haemostasis • the natural history, presentation, diagnostic strategies and complications of inherited coagulation disorders in particular deficiencies of Factor VIII (FVIII), Factor IX (FIX) and Von Willebrand factor (VWF) • the diagnostic methods used in assessment of inherited coagulation disorders, including specific assays • the use of molecular biological techniques to identify genetic disorders • the natural history, presentation, diagnostic strategies and complications of coagulation factor inhibitors • the mechanism of action, indications for use and side effects of available coagulation factor concentrates and relevant haemostatic agents. **<u>Acquired Bleeding Disorders</u>** • the various clinical presentations • normal haemostasis and fibrinolytic mechanisms	• relate theoretical knowledge to patient management, including risks and benefits of therapy • demonstrate competence in taking history and performing examination of patients • formulate and implementing appropriate management plan • recognise impact of the condition on patients and their families • interprete and applying laboratory results to patient management relating laboratory information to patient • formulate management plan for patient with inhibitors, including liaison with clinical team • advise on appropriate prophylaxis and treatment of inherited coagulation disorders. **<u>Acquired Bleeding Disorders</u>** • demonstrate competence at evaluating patients with possible bleeding tendency • relate theoretical knowledge to patients

• pathophysiology of acquired bleeding disorders, including: disseminated intravascular coagulation (DIC), massive transfusion, renal disease, hepatic disease, obstetric complications, acquired Factor deficiency, especially FVIII, coagulant (FVIIIc) and VWF the mechanism of action, indications for use and adverse effects of available haemostatic agents, including blood and coagulation factor products, Desmopressin (DDAVP), anti-fibrinolytics, and other adjunctive agents	• apply appropriate clinical and laboratory methods to define the bleeding disorder(s) • formulate an appropriate plan of management in these disorders • relate theoretical knowledge to patient management • advise on appropriate use of haemostatic agents in acquired bleeding disorders relate theoretical knowledge to patient, including risks and benefits of therapy.
PHO: 1 credit unit	**Thrombotic Disorders**
Learning Objectives	• **Evaluate and diagnose patients with thrombotic disorders** • **Diagnose, treat and advise patients requiring antithrombotic therapy**
Knowledge of:	**Skills -to be able to:**
• pathophysiology of arterial and venous thrombosis, including epidemiology and molecular basis of thrombophilia • natural history, presentation, diagnostic strategies and complications of inherited and acquired thrombophilia • the techniques for the measurement of recognised laboratory thrombophilia • the appropriate diagnostic imaging techniques to investigate thrombosis • the changes to haemostasis during pregnancy	• evaluate inherited and acquired risk factors and associations in patients with thromboembolic disease • relate theoretical knowledge to patient, including genetic counselling • request and interpret appropriate clinical and laboratory methods to diagnose thromboembolic disease and possible causative factors • contribute to patient management especially during the perioperative period • interpret and apply laboratory results to patient management

• the natural history, presentation, diagnostic strategies of pregnancy-associated thrombotic disease and its management. • the mechanism of action, clinical indications and dosing for the use of heparins, oral anticoagulants, antiplatelet and fibrinolytic agents • the differences between different models of anticoagulant control • adverse effects of antithrombotic therapies and their management • appropriate diagnostic imaging techniques used to investigate thrombosi perioperative management of patients on antithrombotic therapy.	• display appropriate ordering of radiological investigations • manage venous thromboembolism in pregnant patients • advise patients on the issues relating to prothrombotic states and their implications and management during pregnancy • evaluate risks and benefits of antithrombotic therapy, including potential adverse effects • competently initiate and control heparin and oral anticoagulant therapy • explain risks and benefits of therapy • competently advise on the follow-up of patients receiving anticoagulants • work effectively as part of a multidisciplinary team • recognise and advise on the management of over-anticoagulation • recognise and advise on heparin-induced thrombocytopenia • advise in clear comprehensive manner on antithrombotic management in pregnancy • display appropriate ordering of radiologic investigations and liaison with other clinical teams

PHO 911: 1 credit unit	**Platelet Disorders, Apheresis and Venesections**
Learning Objective	• **Diagnose and manage patients with congenital and acquired platelet disorders** • **Recognize and manage the use of therapeutic apheresis**
Knowledge of:	**Skills – to be able to:**
• platelet structure and function the techniques for, and limitations of measuring platelet number and function • aetiology, natural history, presentation, diagnosis and management of congenital and acquired disorders of platelet number and/or function • mechanism of action and adverse effects of medications/compounds with antiplatelet activity. • the principles of automated apheresis techniques in therapy or collection of components • the use of apheresis, including the therapeutic removal of plasma and cellular elements, provision of specific blood components and processing of harvested bone marrow • indications in which apheresis can be used, the standards for the collection of cellular products and their storage • the possible adverse effects of apheresis • the adverse clinical effects associated with apheresis.	• interpret and apply laboratory results to patient management • formulate diagnostic and management plans for patients with platelet disorders, both inherited and acquired • provide appropriate clinical advice on the use of antiplatelet agents in medical and surgical contexts. • evaluate patients referred for apheresis, including the principles of informed consent • appropriately use apheresis to treat specific diseases and collect cellular components.

PHO 912: 1credit unit	**Clinical Blood Transfusion Practice**
Learning Objectives	• **Outline and direct the safe and appropriate use of blood and blood components** • **Diagnose and manage possible adverse effects related to transfusion**
Knowledge of:	**Skills – to be able to:**
• the main blood components, including their content, storage, preparation, administration and any specific precaution • the indications for use of blood components to patients and their families • the criteria for appropriate use of blood components, transfusion support in complex clinical situations including: major blood loss, autoimmune haemolytic anaemia, foetal/neonatal alloimmune thrombocytopenia, cytopenias, bone marrow transplantation, haemoglobinopathies • the adverse effects and risks of blood transfusion and the methods by which they can be reduced • the principles of pre-transfusion testing • the management of adverse effects of transfusion • alternatives to homologous transfusion • principles of quality systems and clinical governance for clinical transfusion • the principles of appropriate processing of specimens for pre-transfusion testing. • the calculation of the quantity of blood to be transfused and duration of transfusion	• describe the appropriate use of blood components • appropriately use blood components • apply the recommendations in national guidelines for use of blood and specifically for each blood component. • discuss the options for blood component support for complex clinical situations with patients and their families • appropriately use modified blood products • demonstrate an understanding of the major categories of adverse effects associate with blood transfusion, including the most common risks, and ways in which adverse effects can be reduced • demonstrate an understanding the principles of pre-transfusion testing • discuss the main risks and benefits of blood transfusion with patients and their families • manage acute and delayed transfusion reactions • discuss the management of adverse effects of transfusion with patients and their families • provide alternatives to homologous transfusion, including: various types of autologous transfusion, bloodless surgery' techniques • discuss possible alternatives to transfusion with patients and their families

	• participate in the function of the hospital transfusion committee • the role of audit in transfusion and methods which can be used to improve clinical transfusion practice • use the criteria for acceptance/validity of pre-transfusion specimens.
PHO 913: 1 credit unit	**Radiation Principles and Use; Palliative Care**
Learning Objectives	• **Describe the principles of radiation therapy** • **Manage the risks and safety issues associated with diagnostic and therapeutic radiation** • **Outline the principles and timely application of palliative care**
Knowledge of:	**Skills – to be able to:**
• the principles underlying radiation therapy • risks and safety associated with diagnostic and therapeutic radiation. • the principles of caring for a dying patient • the challenges of changing the intent of care from disease control to symptom control.	• consult and use nuclear medicine investigations and radiation therapy in the management of haematological/oncological malignancies • minimize exposure to radiation. • recognize circumstances and time under which discussions about palliative care should commence • conduct family meetings focused on prognosis, death and dying • consult with palliative care professionals

Links-- Medical Oncology Curriculum

PHO 914: 1credit unit	**Principles and Rational Use of Therapeutics in Paediatric Haemato-Oncology**
Learning Objectives	• **Describe the Principles and Rational Use of Therapeutics in Paediatric Haemato-oncology** • **Manage the Risks and Safety Issues Associated with Therapeutic Drugs**

Knowledge of:	**Skills-to be able to:**
• the principles underlying therapy in heamato-oncology including combination therapy • the risks and safety associated with therapeutic drugs.	• consult and use chemotherapeutic agents, and biologic agents (monoclonal antibodies) in the management of haematological malignancies with minimal side effects and • manage the side effects accordingly.

Links ----- National Cancer Registry and Guidelines

Time-based requirements - Training time and rotations

Purpose

To ensure adequate time for trainees to gain necessary learning experiences across a range of relevant rotations.

Contact hours per week /year for three years during Senior Residency training:

The Credit units for Clinical Paediatric Haematology / Oncology subspecialty are as follows.

- Clinical / Outside postings of 16 hours per week for 42weeks/year = 45Credit Units/ for three years
- Practical (calls etc) 16hrs /week for 42 weeks per year = 45credit units/ three years
- Seminars, three in number (each with 2credit units) = 18 Credit Units/for three years
- Tutorials and clinical presentation of 8hrs per week for 42weeks/year = 22 credit units for three years
- Dissertation = 12 Credit Units.
- Research methodology = 2 credit Units
- Health management course = 2 Credit Units
- Medical Education = 2 Credit Units
- Assessment and Examination methods = 2 Credit Units

TOTAL CREDIT UNIT FOR THE THREE YEARS OF TRAINING = 150 Credit Units

<u>The 42-weeks/ year excludes the candidate's period of annual leave, examination leave / conferences / workshops etc</u>

Methods of formative Assessment

- Practical skills tests/exams
- Written (knowledge-based) tests/exams
- Multiple choice questions / Matching questions
- Oral examinations
- Case studies/presentations
- Presentations
- Clinical skills assessments e.g. Objective Structured Clinical Examination (OSCE)
- Simulations
- Online delivery of assessment

THE DISSERTATION IN PARTIAL FULFILMENT OF GRADUATION REQUIREMENTS

One of the features of FMCPaed program is the requirement that trainees complete and successfully defend a dissertation. The dissertation is mandatory for trainees who opt to follow the subspecialty tract to obtaining a Fellowship.

OBJECTIVES OF DISSERTATION

The goal of the dissertation in the fellowship program is to produce a physician that is proficient in the conduct of research. In the course of preparing the dissertation, the candidate should demonstrate the ability:

- To identify researchable health problems
- To clearly define a subject chosen for study (the subject should be clinical or have explicitly stated clinical application)
- To clearly identify specific aims of a study designed to address a researchable question i.e. be able to define the scope and objectives of the study bearing in mind the feasibility of the research project in terms of time, materials and human resources available.
- To demonstrate a working knowledge of study design, data collection, data storage, analytical techniques, computer skills, statistical and graphical techniques needed for planning and executing a research project
- To conduct a critical appraisal of the biomedical literature using standard internationally accepted databases such as Medline® . To design the materials and method of the study in such a way as to obtain results that are relevant to the objective of the study and can be reproduced by other researchers

- To collect, collate and evaluate research data
- Using appropriate statistical tools and software's to analyze the research data and draw logical conclusions from them
- To experience the process and technicalities of scientific writing and communication so as to be able to apply for research grants and publish biomedical papers
- To understand the "why and how"research contributes to good clinical practice and evidence-based practice
- To discuss the findings in relation to existing body of knowledge on the subject demonstrated an understanding of the rights of patients, consent and ethics in human research.

It is required that candidate's personal involvement in the performance of the study reported must be clearly stated, and obviously identifiable. A report of the management of a clinical problem, retrospective or otherwise, in which the personal input of the candidate in the management of the patients is not obvious is not permissible.

- **CANDIDATES WHO OPTED TO DO THE DOCTOR OF MEDICINE (MD) PROGRAMME BEFORE THEIR FELLOWSHIP WILL ONLY DEFEND THE DISSERTATION / THESIS AT THE END OF THE MD TRAINING AND PROCEED TO TAKE THE SUB SPECIALTY EXAMINATION AT LEAST SIX MONTHS LATER USING THE FORMAT INDICATED IN "APPENDIX A".**
- **CANDIDATES <u>WHO ARE NOT</u> PARTICIPATING IN THE DOCTOR OF MEDICINE (MD) PROGRAM, WILL DEFEND THEIR DISSERTATION / THESIS AND ALSO TAKE THE ORAL EXAMINATIONS IN GENERAL PAEDIATRICS AS WELL AS THE FORMAT IN APPENDIX A**

APPENDIX A

Summative Assessment for subspecialty examination in clinical Paediatric Haematology / Oncology:

The **Sub specialty examination** in clinical Paediatric Haematology / Oncology will **consist of two parts** namely:

A. A two- hour written paper on Haematology / Oncology made up of MCQ and with Best of Four format

- Standard setting**:** Modified Angoff method will be used to determine the Pass mark.

- **College approved grade of scores are as follows:**

  - 70% or more –– A
  - 60 -69% ---------B
  - 50 -59 % ------- C
  - 40 -49% ---------D
  - 39% and below- E

- Candidate must have an average score of "C" or 50-59% to be awarded a pass.

B. One-hour Oral examination in Clinical Paediatric Haematology / Oncology

The questions will cover the range of topics in Haematology / Oncology domains of learning and the levels of competences using blue printing.

- **Candidates must pass both parts of the examination to be awarded Pass in the subspecialty.**
- **Successful candidates will have the acronym FMCPaed (Haem-Oncol) after their names**

Core training: Core clinical training must be spent in an accredited core clinical training position.

while core laboratory training must be spent in an accredited core laboratory position.

Basic training period:

Postgraduate Training in Clinical Paediatric Haematology / Oncolgy must be completed, with the trainee spending a minimum of thirty-six (36) months post Part 1 and will consist of twelve months on General Paediatrics and twenty-four months in Clinical Paediatric Haematology / Oncology Sub specialty.

Accreditation

Accreditation requirements for sub-specialty training in Clinical Paediatric Haematology/Oncology are:

- accreditation in general Paediatrics.
- Minimum staffing: Consultant Paediatric Haematology / Oncology, preferably more than one (and with minimum of 5 years practicing experience),
- at least a Fellow-in-training
- at least one clinic in a week
- at least two ward rounds in a week in clinical Paediatric Haematology /Oncology
- Evidence of rotation as indicated in the Curriculum
- Seminars/teaching sessions in Paediatric Haematology / Oncology- two per week

Supervisor's Reports

Purpose

To evaluate and provide feedback on the trainee's progress, which informs the certification of training decision. This is a summative assessment.

Supervisor's Reports

It is the trainee's responsibility to ensure that all supervisors receive a copy of the Supervisor's Report. Failure to do this may result in delays or non-certification of a period of training.

Progression to the next year of training is dependent upon the College receiving satisfactory Supervisor's Report(s) covering the full year/period of training completed.

Trainees must provide copies of previous Supervisor's Report(s) to the next year's / rotation's supervisor. The College may provide subsequent supervisors with copies of past reports (and any other documents deemed relevant to the trainee's training).

RECOMMENDED READING MATERIALS:

Books

1. Postgraduate Hematology, Ed by A. Victor Hoffbrand, Daniel Catorsky, Edward G.D
2. Clinical Hematology Theory & Procedures, 6th Ed. By Mary Lou Turgeon
3. Lanzkowsky's Manual of Paediatric Hematology and Oncology. 6th Ed.
4. Color Atlas of Hematology Practical Microscopic and Clinical Diagnosis. H. Thenl, H.Diem, I Haterlach
5. Nathan and Oski's Hematology and Oncology of Infancy and Childhood. 2nd Vol. Saunders. by Stuart H Orkin MD, David G. Nathan MD, Thomas Look MD
6. Handbook of Pediatric Hematology and Oncology: Children's Hospital and Research Center, Oakland, 2nd ed. By Wiley- Blackwell, Caroline A. Hastings, Joseph C

Journal

1. The Lancet Oncology – donotreply@elsevierhealth.com

Web sites

1. American Cancer Society www.cancer.org
2. Cure Search for Children's cancer – http://www.curesearch.org/our_research/index_sub.aspx?id=1473
3. www.amazon.com
4. www.lulu.com
5. sajo.org.za
6. www.oatext.com
7. www.gfmer.CH
8. oncologypro.esmo.org

9. www.theafjho.com
10. jhoonline.biomedcentral.com
11. www.omicsonline.org