Guidelines for

Post-Doctoral Fellowship Course

in

Pediatrics Hemato Oncology

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**SRI AUROBINDO UNIVERSITY**

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## INTRODUCTION

The discipline of Pediatric Hematology/Oncology has continued to expand in both the clinical and basic science arenas over the last several decades. Discoveries of dominant oncogenes, tumor suppressor genes, gene transfer technology and hematopoietic growth factors have opened new areas of clinical and basic research, as well as provided new potential therapies for patients. Both the demonstrated improvement in care for pediatric patients with hematologic-oncologic disorders as well as the scientific excitement generated through research directed toward understanding of these disorders ensures that the discipline of Pediatric Hematology/Oncology will continue to be an exciting part of pediatric medicine and science in the future.

The field of Pediatric Hematology-Oncology encompasses a broad array of disorders of children and adolescents with Primary immunodeficiency disorders, solid tumors, hematological cancers and non-malignant disorders of the blood and blood-forming tissues. The intent of the Pediatric Hematology-Oncology fellowship Program is to train physician scientists, with the following attributes:

1. Skill in the prevention, diagnosis and management of disease so as to provide comprehensive, compassionate care for children and adolescents
2. Ability to contribute to the progress of the field through research
3. Ability to understand and interpret the research of others, and to integrate that understanding into their own practice
4. Excellence in teaching of medical students, residents and colleagues

Pediatric Hematology-Oncology Fellowship Training Program provides trainees with the necessary knowledge, skills, experience and mentorship to develop into independent physician-scientists or clinical/ translational investigators who will lead the field forward.

# PROGRAMME GOAL

The main goals of Pediatric Hemato Oncology fellowship are

* + Provide the clinical experience and educational opportunities necessary to build a solid foundation of medical knowledge, critical thinking abilities, literature review, diagnostic acumen and technical skills.
  + Develop well-rounded, empathetic clinicians with the skills to successfully communicate and give counsel to patients and families.
  + Provide academic pediatricians the research training and experience to develop careers as physician-scientists.
  + Impart the skills necessary to become lifelong learners, teachers, and leaders who can work effectively with team members.
  + Teach professionalism via mentorship with emphasis on the critical roles of personal ethics, responsibility, respect, compassion, communication and self- awareness.

# PROGRAMME OBJECTIVES

* + Acquisition of a fundamental knowledge base in Pediatric Hematology and Oncology.
  + Development of clinical skills in Pediatric Hematology and Oncology.
  + Development of skills in interpreting basic laboratory tests pertinent to Pediatric Hematology and Oncology.
  + Development of skills in preparing clinical presentations, discussions of cases, and case reports
  + Development of skills in process improvement
  + Initiation of research interests

# ELIGIBILITY CRITERIA FOR ADMISSIONS TO THE PROGRAMME

## Post doctoral Pediatric Hemato-Oncology fellowship Course:

* 1. Any medical graduate with ***MD/ DNB Pediatrics*** qualification and fulfills the eligibility criteria for admission to fellowship courses at Sri Aurobindo Medical College and Postgraduate Institute purely on merit cum choice basis. There will be a written MCQ based exam followed by interview.
  2. Admission to 2 years Fellowship course is as per prescribed guidelines

# Duration of Course: 2 Years

Every candidate admitted to the training programme shall pursue a regular course of study (on full time basis) under the guidance of recognized post graduate teacher for assigned period of the course.

# TEACHING AND TRAINING ACTIVITIES

The fundamental components of the teaching programme should include:

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

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

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

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

**Symposia:** Trainees would be required to present a minimum of 10 topics based on the curriculum in a period of two years to the combined class of teachers and students. A free discussion would be encouraged in these symposia. The topics of the symposia would be given to the trainees with the dates for presentation.

**Clinical:** The trainee would be attached to a faculty member to be able to pick up methods of history taking, examination, prescription writing and management in rehabilitation practice.

**Bedside:** The trainee would work up cases, learn management of cases by discussion with faculty of the department.

**Journal Clubs:** This would be a weekly academic exercise. A list of suggested Journals is given towards the end of this document. The candidate would summarize and discuss the scientific article critically. A faculty member will suggest the article and moderate the discussion, with participation by other faculty members and resident doctors. The contributions made by the article in furtherance of the scientific knowledge and limitations, if any, will be highlighted.

**Research:** The student would carry out the research project and write atleast one publication during the course duration. He/ she would also be given exposure to partake in the research projects going on in the departments to learn their planning, methodology and execution so as to learn various aspects of research.

# SYLLABUS

HEMATOLOGY

* Physiology of Hemostasis and Hematopoiesis
* Classification & Diagnosis of Anemia during Childhood
* Anemia During the Neonatal Period
* Erythroblastosis Fetalis
* Iron-Deficiency Anemia
* Magaloblastic Anemia
* Hematologic Manifestations of Systemic Illness
* Bone Marrow Failure syndromes including Acquired Marrow failure
* Hemolytic Anemia due to Membrane & Enzyme Defects
* Hemoglobinopathies…. Sickle Cell Disease/ Thalassemia
* Extracorpuscular Hemolytic Disease (AIHA etc)
* Polycythemia
* Disorders of White Blood Cell
* Disorders of Platelets
* Hemostatic Disorders
* Thrombotic Disorders
* Lymphadenopathy and Splenomegaly
* Porphyrias
* Diagnostic Methodologies in Pediatric Hematology
* Various National Health Programme in Anemia Transfusion medicine
  + Indications for transfusion of various components
  + Methods of preparation of components
  + Cryopreservation of Stem Cells
  + Transfusion Reactions
  + Transfusion Transmitted Diseases

ONCOLOGY

Main Objective: To understand the epidemiology, molecular and cellular biology of various tumors.

* Chemotherapy

Main objective: To know the mechanism of action, indications, toxicities and management of chemotherapeutic agents used in patients with malignancies.

A. Principles of chemotherapy

1. Principles of combination chemotherapy
2. Principles of drug resistance
3. Specific agents

* Immunologic Abnormalities

Main Objective: To know the management of infections in immuno compromised patients.

* 1. Bacterial Prophylaxis
  2. Fungal Prophylaxis
  3. Viral Prophylaxis
  4. Treatment of infection in immunocompromised patients
  5. Early Warning Signs of Cancer in Children/ Models for Early Diagnosis
  6. Procedures in Pediatric Oncology: Practical Guidelines
* Cancer

Etio-pathogenesis of cancer

#### Epidemiology of cancer

* 1. Age-related incidence
  2. Race-related incidence
  3. Genetic factors
  4. Chemical-related factors
  5. Environmental factors
  6. Immunologic factors

#### Tumor molecular and cellular biology factors

1. ***Oncogenesis and cell growth regulation factors***

* Lymphoproliferative Disorders
* Myelodysplastic Syndromes
* Myeloproliferative Disorders
* Leukemias
* Histiocytosis Syndromes
* Hodgkin's Disease
* Non-Hodgkin Lymphoma
* Central Nervous System Malignancies
* Neuroblastoma
* Wilms' Tumor
* Rhabdomyosarcoma & Other Soft Tissue Sarcomas
* Malignant Bone Tumors and Osteosarcoma
* Retinoblastoma
* Germ Cell Tumors
* Primary Hepatic Tumors
* Gonadal/ Germ cell tumors
* Rare Tumors
* Tumors in adolescents and young adult
* HLH
* Rationale, principles, procedures of Hematopoietic stem cell transplant
* Gene Therapy
* Monoclonal Antibodies in Pediatric Hematology and Oncology
* Biological Response Modifiers
* Management of Oncologic Emergencies
* Supportive Care of Patients with Cancer
* [Nutritional Assessment and Intervention](https://link.springer.com/chapter/10.1007/978-1-4614-3891-5_8)
* [Palliative and Supportive Care](https://link.springer.com/chapter/10.1007/978-1-4614-3891-5_11)
* Evaluation, Investigations & Management of Late Effects of Childhood Cancer
* Psycho-Social Aspects of Managing Oncologic Patients
* Childhood Cancer in Low-Income and Middle-Income Countries in the Twenty-First Century
* Cancer Registries and the Descriptive Epidemiology of Pediatric Cancer in Low-and Middle-Income Countries
* The Role of International Organizations on Collaboration for Global Pediatric Cancer Control
* The Role of Twinning Programs and Telemedicine in Pediatric Oncology
* Paediatric Radiotherapy
* [Central Venous Catheters](http://onlinelibrary.wiley.com/doi/10.1002/9781118358139.ch26/summary)
* [Management of Fever in the Child with Cancer](http://onlinelibrary.wiley.com/doi/10.1002/9781118358139.ch27/summary)
* [Acute Pain Management in the Inpatient Setting](http://onlinelibrary.wiley.com/doi/10.1002/9781118358139.ch28/summary)
* [Palliative Care](http://onlinelibrary.wiley.com/doi/10.1002/9781118358139.ch29/summary)
* [Chemotherapy Basics](http://onlinelibrary.wiley.com/doi/10.1002/9781118358139.ch30/summary)
* [Guide to Procedures](http://onlinelibrary.wiley.com/doi/10.1002/9781118358139.ch31/summary)
* [Treatment of Chemotherapy Extravasations](http://onlinelibrary.wiley.com/doi/10.1002/9781118358139.ch32/summary)
* **Biostatistics, Research Methodology and Clinical Epidemiology**
* **Ethics**

### Medico legal aspects relevant to the discipline

* **Health Policy issues as may be applicable to the discipline**

# Competencies

1. Clinical Hematology – Oncology
   1. **Leukemias**: Acute and chronic leukemias

Clinical evaluation, diagnostic confirmation by morphology, immunophenotyping, special stains, cytogenetics and electron microscopy. The trainee must be familiar with the principles of leukemia management and the various protocols available. He/She should be familiar with the statistical tools used to evaluate therapy protocols, survival curves etc. He/she should also be familiar with the pharmacology of antimitotic drugs and their toxicity and well versed in the supportive management of patients with all types of leukemia.

### Myeloproliferatie disorders

Classification, systemic diagnostic evaluation of erythrocytosis, including polycythemia vera; interpretation of blood volume studies; with radionuclides, familiarity with current management strategies of MPD including the use of interferon.

### Lymphoma

Classification of lymphomas, principles of staging and management of different types of lymphomas. The trainee must be familiar with the principles of lymphoma management and the various protocols available.

* 1. **Miscellaneous disorders** like Histiocytosis, Splenic disorders and systemic diseases affecting the haemopoietic system, etc.

### Chemotherapy

Various chemotherapy related protocols, practical training in giving the chemotherapy; recognition and management of complications related to chemotherapy. The trainee must be familiar with the principles of hematooncology management and the various protocols available.

### Transfusion Medicine :

* + 1. Blood component preparation and their clinical use Collection of blood, correct techniques of venepuncture, plastic systems, anticoagulants and additives, and their effect of storage stability, centrifugation, preparation of platelets, fresh frozen plasma and cryoprecipitate, storage of components, principles of fractionation. Quality control. A thorough understanding of the clinical indications for proper use of specific blood components.
    2. Diagnosis & Management of Transfusion related complications

Febrile transfusion reactions- laboratory investigations, diagnosis, management and prevention. Diagnosis and management of hemolytic transfusion reactions. Infections transmitted by transfusion, physical and clinical complications of transfusion.

* + 1. Cell separation principles

The trainee must be able to perform cell separation and apheresis. Principles of cell separators; continuous versus intermittent flow techniques, replacement fluids for plasmapheresis, current status and indications in various diseases should be known and understood.

* + 1. Techniques of leuco-depletion

Problems related to white cells in donor blood and techniques of removal. Principles of filter design and use.

* + 1. Irradiation of blood and components

Biology of irradiation of blood and components, transfusion graft versus host disease (GVHD) Indications for irradiation of blood and protocols. Use of equipment.

* + 1. Management of alloimmunization in relation to transfusion Techniques for prevention of alloimmunization, role of ultraviolet radiation and photosensitizers, management of patients with red cell and platelet alloantibodies.

### Practical Laboratory Training

* + - 1. General Hematology
* Proper use and care of common instruments such as light microscope, centrifuge, water baths, freezers, weighing balance, etc.
* Blood collection samples – venepuncture and finger prick methods of sample collection, types of anticoagulants, containers and the effects of delay in processing and storage.
* Determination of peripheral blood counts (Hemoglobin, Hematocrit,
* Total WBC and platelets) manually and calculation of red cell indices.
* Use of automated blood cell counters including principles and practice.
* Interpretation of peripheral blood counts and abnormal flags.
* Preparation of blood films and, staining of peripheral blood films and cytospin slides with Romanowsky and other dyes.
* Review of normal and abnormal blood films with emphasis on morphology of red cells, white cells and platelets.
* Performance of WBC differential counts; subjective assessment of platelet counts and diagnostic interpretation of abnormal counts.
* Preparation and staining of thick and thin blood films for malarial parasites.
* Measurement and significance of ESR and plasma viscosity
* Supravital staining of reticulocytes, counting of reticulocytes.
* Performance of bone marrow aspiration; trephine needle biopsy, splenic aspiration.
* Preparation of smears of bone marrow aspirates and biopsy (touch) imprints.
* Staining and diagnostic evaluation of bone marrow aspirates.
  + - 1. Cytochemistry

Performance of the following staining procedures, Sudan Black, Myleloperoxidase, specific and non specific esterases, acid phosphatase. PAS and ‘Iron Staining’.

* + - 1. Cytogenetics

Familiarisation with cytogenetics, understanding the principles of cytogenetics and appreciating the relevance and significance of chromosomes in diagnostic hematology, interpreting the results of chromosome preparation of hemapoietic cells.

* + - 1. Flow Cytometry

A working knowledge of the principle and practice of flowcytometry and interpretation of the clinical significance of common leukocyte immunophenotypes.

Histocompatibility laboratory, Stem Cell processing Laboratory and Clinical immunology Laboratory experience

* + - 1. Teaching scheme :

Total periods and periods allotted to each topic

Didactic lectures: These will be held once a week and will be delivered either by a faculty member or by a specialist in the area from hemato-oncology and allied disciplines.

**Seminars and journal clubs**: Seminars and journal clubs will be held once a week. Candidates are required to present 1 seminar and 1 journal club per month.

Therapeutic case and problem discussions: This will be held every week and each

student is expected to present every week after the first 3 months. Experts from related specialties will be present for these discussions.

**Patient care, teaching and research**: It is expected that the fellowship candidates will contribute to patient care in the hematology department in all aspects i.e. management of indoor patients, OPDs, emergencies, as well as the laboratory work up of the patients. They are also required to give lectures on selected topics to the postgraduate medical students of Pediatrics.

**Project work and paper publication**: Each fellowship candidate will be required to undertake a research project on a topic decide after consultation with the guide. This topic will require to be approved by the institutional ethics committee. This project will also be written up for publication and sent to a suitable journal before completion of the fellowship.

**Attending conferences**: The candidate will attend the Annual conference of the Pediatric Hematology Oncology Chapter or any other similar conference

and present a paper (oral)/ poster on the work carried out during

the fellowship tenure. Candidates will also be encouraged to participate in other related, CMEs etc. organized in the city.

**Schedule for Postings**

* Inpatient hematology and oncology
* Outpatient hematology and oncology
* Hematology rotation (including transfusion medicine, hematopathology, special coagulation)
* Radiation Oncology

## LOG BOOK

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

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

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

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

# Leave Rules

* 1. Post Doctoral Fellowship Trainees are entitled to leave during the course of training as per Leave Rules prescribed by Sri Aurobindo University.
  2. Candidate can avail a maximum of 19 days of leave in a year excluding regular duty off/ Gazetted holidays as per hospital/institute calendar/policy.

# EXAMINATION

**FORMATIVE ASSESSMENT**

Formative assessment includes various formal and informal assessment procedures by which evaluation of student’s learning, comprehension, and academic progress is done by the teachers/ faculty to improve student attainment.

**Formative assessment will be performed every 6 monthly,**

# FELLOWSHIP EXIT EXAMINATION

The summative assessment of competence will be done in the form of Fellowship Exit Examination.

### Practical Examination:

### Comprises of Clinical Examination and viva

* + The candidate has to score a minimum of 50% marks in aggregate

# RECOMMENDED TEXT BOOKS AND JOURNALS

## Textbooks & Reference Books

* + William’s Haematology [Beutler, Lichtman, Coller & Kipps]
  + Wintrobe’s Clinical Haematology [Lee, Boggs, Bithell, Foerster, Athens, Lukins]
  + Haematology-Basic Principles & Practice [Hoffman, Benz, Shattil,
  + Furie, Cohen & Silberstein
  + Blood – [Jandl]
  + Practical Haematology [Dacie & Lewis]
  + Thalassaemia Syndromes – [Weatherall & Clegg]
  + Haemostasis & Thrombosis – Basic Principle & Clinical Practice (Coleman, Hirsch, Marder & Salzman)
  + Blood Banking (Mollison)
  + Modern Blood banking & transfusion Practices (Denese M Hannening)
  + Bone Marrow Transplantation, (Forman, Blume & Thomas)
  + The molecular basis of Blood Diseases (Stamatoyannopoulos, Neinhuis, Leder & Majerus)
  + Paediatric Haematology by (Nathan & Oskie)
  + Lanzkowsky's Manual of Pediatric Hematology and Oncology
  + Textbook Of Pediatric Hematology & Hemato-Oncology Paperback – 2016

by Lokeshwar

* + Pediatric Hematology/Oncology Secrets Paperback – 31 Aug 2001 by [Weiner](http://www.amazon.in/s/ref%3Ddp_byline_sr_book_1?ie=UTF8&field-author=Weiner&search-alias=stripbooks)
  + Rudolph's Textbook of Pediatrics, 21st Edition, McGraw-Hill 2003
  + Nelson Textbook of Pediatrics. 17th Edition Saunders 2004
  + Pizzo and Poplack Principles and Practice of Pediatric Oncology. Fourth Edition.
  + Lippincott 2002
  + Nathan and Oski’s Hematology of Infancy and Childhood. Sixth Edition. Saunders 2003

## Journals

* Blood
* British J. Hematology
* Seminars in Haematology
* Haematology & Oncology clinics
* Transfusion
* Indian J. Hematology & Blood Transfusion
* Hemostasis & Thrombosis
* Bone Marrow Transplantation
* Lancet
* New England Journal of Medicine
* Iranian journal of pediatric hematology oncology |
* Journal of Pediatric Hematology/Oncology
* Pediatric Blood and Cancer
* The Japanese Journal of Pediatric Hematology / Oncology