

# A PROPOSAL OF TRAINING CURRICULUM FOR PAEDIATRIC HAEMATOLOGY & ONCOLOGY (PHO)

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## Contents

List of members and drafting panel .....	3
Contact Information .....	4
Preface .....	5
Program Description .....	6
Mission and Objectives .....	7-8
Training Syllabus of PHO .....	9-16
Method of Evaluation and Exit Assessment of PHO.....	17-18

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## **Preface**

With the establishment of the Hong Kong Paediatric Haematology & Oncology Study Group for 28 years and also the commencement of territory-wide Paediatric Oncology Service at the Hong Kong Children's Hospital since July 2019. All these are the results of selfless devotion and collaboration among the local paediatricians, no matter they have special interest in the field of paediatric haematology and oncology or not. It also involves the endless efforts and contributions of at least four generations of colleagues before we can arrive at where we stand today.

Since 1992, our seniors taking care of children with cancers from different hospitals worked together and formed the Hong Kong Paediatric Haematology & Oncology Study Group. The treatment protocols of common childhood cancers were then unified and shared. All the newly diagnosed cases were registered but that was a very laborious process. Subsequently, with the help of Children's Cancer Foundation, full time data managers were employed to manage the database and then we could prospectively capture the treatment outcome and complications of all patients under our care. Since then, we have the first and most comprehensive population based epidemiology data of Chinese children with cancers.

However, the specialty development encountered a bottleneck because of the relatively low number of patients in each individual hospital. Again, with the help of many seniors, Government and Children's Cancer Foundation, the plan of establishing a long awaited Hong Kong Children's Hospital was finally approved. And we witnessed her commencement of operation just over the last few months. Now the patients can have better care under one location and paediatric trainees can maximise their exposure and learning. Moreover, the service of Hong Kong Children's Hospital not only cover highly complex oncology diseases, the service also covers most of the rare or complicated blood diseases, for example in haematological disorders, namely haemophilia and thalassemia, patients will receive routine care in their original regional hospitals but will be seen in a comprehensive clinic at the Children's Hospital around once or twice a year. Then patients from different regional hospitals can have standardized treatment approach and care.

At this unique point of time, it is a good opportunity for us to plan ahead for the professional development in the field of Paediatric Haematology & Oncology . We envisage there is a genuine need in Hong Kong to establish a training program encompassing Paediatric Haematology & Oncology aiming at providing a formal and structured training for paediatric trainees with interest in professional development in this field.

Under the template of subspecialty training program, the Hong Kong Children's Hospital will serve as the major hub for the future Paediatric Haematology & Oncology (PHO) Training Centre.

The draft panel members of the proposal of curriculum are Fellows of the Hong Kong College of Paediatricians who are recognized at institutional level with the appointments of Professors, Associate Professor, Consultants, Associate Consultants in the subspecialty in Universities and Hospital Authority in Hong Kong. All of them are recognized locally, regionally, and internationally as the leading experts in this field.

**Prof Chan Chi Fung, Godfrey**

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## Program Description

Paediatric Haematology & Oncology (PHO) is a branch of paediatric medicine concerned with the diagnosis and treatment of infants, children, and adolescents with cancers and non-malignant disorders of blood and blood-forming tissues.

A subspecialist in Paediatric Haematology & Oncology (PHO) has the necessary medical knowledge and skills to deal with the prevention, diagnosis, and management of a broad range of conditions affecting children with cancers and non-malignant disorders of the blood. In addition to providing clinical care in PHO in children, a PHO subspecialty specialist can make significant contributions to the development of knowledge in the field and educate the next generation of subspecialists.

The Paediatric Haematology & Oncology (PHO) subspecialty training program offers a 36-month training programme in Hong Kong. The major training centre will be in the Hong Kong Children's Hospital.

Candidates must have completed 3 years basic training in general paediatrics and have passed the Joint MRCPCH (UK) / Hong Kong College of Paediatricians Intermediate Examination. At their period of general higher paediatric training, they are eligible for commencing the PHO Subspecialty Training with the approval of the Subspecialty Board of PHO with maximal 12 months overlapping with general higher paediatric training.

The curriculum is designed to train trainees in an environment which prepares them to provide up-to-standard clinical care, to develop the essential skills and the attitude with which to pursue a life-long career in the relevant subspecialty.

The outline of our training syllabus comprises a 36-month training program. In which the first 24 months is a core clinical rotation-based training in Leukaemia / Lymphoma / Haematology (9 months); Solid Tumours / Neuro-oncology (9 months); Haematopoietic Stem Cell Transplantation (6 months); The remaining 12 months is an elective module in which trainees can choose General Haematology and Laboratory (3 months) or choose to have attachment in overseas recognised haematology & oncology tertiary care centres with a recognised program subjected to the approval by the Training Director or trainees can choose to have more exposure and training in specific areas in Haematology & Oncology in local centre.

Training modalities should be competence-based that integrates clinical care with small group tutorials, clinical case dissertations, postgraduate courses, journal clubs, clinical and/or laboratory meetings, inter-disciplinary conferences, and grand rounds. During the 36 months of PHO subspecialty training, trainees need to pursue at least one basic or clinical research project developed during the PHO subspecialty training period. Supervision is provided by the trainers who have achieved stature as clinicians, educators, and scientists.

Obtaining the qualification of a postgraduate diploma or degree (e.g. MSc, MPhil, PhD or MD) related to Paediatric Haematology & Oncology may be recognized as completion of training for up to a maximum of 6 months subject to approval by the Training Director.

## Mission and Objectives

Upon completion of training, a subspecialty specialist is expected to be a competent subspecialist in Paediatric Haematology & Oncology (PHO), capable of performing consultant's role in the subspecialty. The subspecialty specialist should acquire sufficient knowledge of the theoretical basis of the subspecialty, including its foundations in related medical sciences and research.

Subspecialty specialist should demonstrate the requisite knowledge, skills, and attitude for effective patient-centered care and service to a diverse population. In all aspects of subspecialist practice, the specialist should be able to address relevant ethical issues and issues of gender, age, culture, beliefs, and ethnicity in a professional manner.

The mission of PHO training programmes is to train up paediatric subspecialists who are

(1) clinically competent and can commence independent practice in the field of Paediatric Haematology & Oncology (PHO);

(2) possess habits of life-long learning to build upon their knowledge, skills and professionalism in the field of Paediatric Haematology & Oncology (PHO).

1. Clinical competence is defined as:
  - a. Acquire core of knowledge of clinical manifestations, pathophysiology, management of diseases and conditions in the subspecialty of PHO. This knowledge base should include an appropriate content of epidemiology, pathophysiology, genetics, biochemistry, pharmacology, statistics, ethics, and human behaviour in relation to the practice of PHO.
  - b. Acquire the clinical skill of clinical data collection including history-taking, physical examination and the appropriate request of laboratory and imaging studies.
  - c. Acquire adequate skill in the performance and/or interpretation of diagnostic and therapeutic procedures common in the practice of PHO.
  - d. Acquire the ability to formulate appropriate differential diagnoses and therapeutic plans based on the ability to critically analyse the clinical data, and integrate this analysis with the basic foundation of medical knowledge.
  - e. Acquire the ability in recommending treatment options for patients and get appropriate informed treatment consent from families and patients.
  - f. Acquire key knowledge to treat the common and uncommon diseases in the field of PHO.
  - g. Demonstrate good understanding of the principles, indications, contraindications, risks, costs and expected outcomes of the various treatments..
  - h. Develop sufficient communication skills with patients, peers and paramedical personnel with the aim at providing up-to-standard level of care of patients in the field of PHO.

- i. Demonstrate ability in further development of qualities of professionalism and humanistic skills including integrity, ethics, compassion, willingness to teach and inspire junior trainees, and respect for patients, peers and paramedical personnel.
  - j. Acquire appropriate level of skill and expertise in research. Capable of demonstrating competence in the understanding of the design, implementation and interpretation of research studies; specifically include research methodology, critical interpretation of data, critical interpretation of published research, and the responsible use of informed research consent.
2. Life-long learning is a key component for clinically competent paediatricians and requires for the acquisition, critical analysis, synthesis and assessment of knowledge, skills and professionalism. PHO subspecialty specialist needs to be capable of demonstrating their ability to be life-long learners by their:
- a. Independent study habits in the acquisition of clinical and research knowledge and skills.
  - b. Attendance, presentation and participation in the organization of local scientific conferences.
  - c. Attendance and presentation at regional and international professional scientific conferences.
  - d. Commitment in the design, implementation, analysis and reporting of clinical audits and research projects



# Training Syllabus of Paediatric Haematology & Oncology (PHO)

## Training Syllabus Outline

The outline of our training syllabus comprises a 36-month training program. The first 24 months is a core rotation-based training modules in Leukaemia / Lymphoma / Haematology (9 months); Solid Tumours / Neuro-oncology (9 months); Haematopoietic Stem Cell Transplantation (6 months) respectively. The above will take place in Hong Kong Children's Hospital as training site. The remaining 12 months is an elective module which include General Haematology / Laboratory (3 months) or in one regional oversea recognised haematology & oncology tertiary care centre with a recognised program subjected to the approval by the Training Director or trainees can choose to have more exposure and training in specific areas in Haematology & Oncology in local centre.

## Responsibilities of PHO Subspecialty Trainee for patient management:

- a. PHO In-patients, Ambulatory and Outpatients:
  1. The subspecialty trainee is posted to Leukaemia Lymphoma Haematology (LLH); Solid Tumour & Neuro-oncology (ST&NO); Chemotherapy Ambulatory Care Centre and Bone Marrow Transplant (BMT) wards of Hong Kong Children's Hospital (HKCH);
  2. The subspecialty trainee is responsible to work along with Team heads, the multidisciplinary team which includes General Paediatric trainees, nurses, pharmacists, allied health professionals and social workers involved in the care of PHO patients to formulate the plan of care and implement associated procedures and treatment options;
  3. The subspecialty trainee is responsible to work with Team heads in preparing and giving presentations related to specific patient problems or topics on rounds, at weekly team meetings or at a variety of multidisciplinary conferences.
  4. The subspecialty trainee is responsible to work along with Team heads in taking care Haematology in-patient referrals from all regional paediatric units, receiving and answering consultation calls related to Oncology and General Haematology from regional paediatric units in Hong Kong. Trainees need to attend these consultations, assessing haematology patients in regional paediatric units and general haematology outpatient clinics with team heads in regional paediatric units and so as to broaden their exposure in Haematology aspects.
  5. For radiation oncology, subspecialty trainee is responsible to work along with Lymphoma / Solid Tumor / Neuro-oncology Team Heads in preparation of Multi-Disciplinary Team Meeting and broaden the exposure in radiation oncology with our radiation oncologists. Subspecialty trainees are encouraged to participate in radiation oncology planning clinic in units that our patients receive radiotherapy in their elective module. This will enhance their exposure in this area.
- b. PHO Specialist Outpatient Clinics :
  1. The subspecialty trainee is responsible to work with Team for management of PHO specialist outpatients in Haematology, Oncology, BMT clinics in consultation with Team heads where appropriate.

## Foundational Knowledge of PHO

- a. General principles of anatomical pathology as relate to PHO.
- b. Physiological changes in growth and development as relate to cancers and non-malignant hematological disorders in paediatric patients, including but not limited to normal values and the maturation of hematopoietic organs and tissues.
- c. Pathophysiological processes as relate to cancers and non-malignant haematological disorders.
- d. Cellular and molecular biology, genetics, biochemistry, pharmacology, pathophysiology and immunology as relate to the understanding of cancers and non-malignant haematologic disorders.
- e. Disorders of immune function as related to PHO.
- f. Psychological processes in paediatric patients with cancers and non-malignant haematological disorders.
- g. Diagnostic workup for a patient with a potential underlying malignancy.
- h. General principles of diagnostic imaging as they apply to PHO.
- i. Understand potential genetic implications for patients and families with inherited cancer predispositions, and the importance of genetic counselling.
- j. Supportive care related to the management of PHO patients
  - Prevention and treatment of infectious in immunocompromised hosts
  - Prevention and treatment of chemotherapy-related organ dysfunctions
  - Management of pain, recognition and assessment of patients in need of pain and symptom management, including use of appropriate pain scales, Recognition of the psychosocial needs of the patient and family in the context of palliative care and complex pain management
  - Management of mucositis
  - Nutritional support
  - Anti-emetic therapy
  - Blood product support and transfusion medicine
  - Care and use of central venous access devices
  - Psychosocial support

- k. Long-term follow-up of PHO patients with for the purposes of
  - i. Disease monitoring
  - ii. Detecting late effects of therapy, recognizing the particular risks and needs of children, including but not limited to early mortality, second malignancy, cardio-pulmonary toxicity, neurocognitive deficits, endocrine dysfunction, and psychosocial challenges
  - iii. Promotion and maintenance of a healthy lifestyle
  
- l. Palliative Care
  - i. Palliative care including but not limited to appropriate use of medications and other therapies to provide complex symptom relief for children
  - ii. Community and hospital resources necessary to provide appropriate palliative care services
  - iii. Recognition of the psychosocial needs of the patient and family in the context of palliative care and complex pain management
  
- m. Manage paediatric oncologic emergencies, including but not limited to
  - 1. Fever and neutropenia
  - 2. Tumor lysis syndrome
  - 3. Superior mediastinal syndrome
  - 4. Hyperleukocytosis
  - 5. Spinal cord compression
  - 6. Splenic sequestration crisis
  - 7. Stroke
  - 8. Life-threatening hemorrhage
  - 9. Hemolytic crisis
  - 10. Pulmonary embolism

## Fundamental skills of PHO Trainees

1. A subspecialty trainee can perform a complete and appropriate assessment of a patient to identify and explore issues to be addressed in a patient encounter effectively, including the patient's context and preferences.
2. Subspecialty trainee can elicit a history that is relevant, concise, and accurate to context and preferences, for the purposes of prevention and health promotion, diagnosis and/or management.
3. Can perform an efficient physical examination, demonstrating sensitivity to the patient's needs and modifications necessary based on the patient's age, gender, sexual orientation, and ethnicity.
4. Select medically appropriate investigative methods in a resource-effective and ethical manner.
5. Demonstrate effective clinical problem solving and judgment to address patient problems, including interpreting available data and integrating information to generate differential diagnoses and management plans.
6. Can plan and coordinate an appropriate diagnostic workup for any new patient with a potential underlying malignancy.
7. Subspecialty trainee can competently perform diagnostic bone marrow aspiration, bone marrow trephine biopsy, bone marrow harvesting, diagnostic lumbar puncture, administration of intrathecal chemotherapy with appropriate informed consent procedure independently.
8. Select chemotherapy and other forms of systemic therapies, and describe the acute and chronic side effects related to the therapies.
9. Can integrate multimodal therapies, including surgery and radiation therapy, for individualized patient care plans.
10. Can manage medical emergencies and complications that may arise as a result of cancer or non-malignant hematological disorders and their treatment.
11. Provide supportive care, including but not limited to the prevention and management of pain, nausea, vomiting, and infections; the applicability/ usefulness of blood components and growth factors; and the use and complications of central venous access devices.
12. Obtain appropriate informed consent for therapies.
13. Demonstrate proficient and appropriate use of procedural skills, both diagnostic and therapeutic.
14. Able to document and disseminate information related to procedures performed and their outcomes.
15. Ensure adequate follow-up is arranged for procedures performed.

16. Can demonstrate effective, appropriate, and timely consultation of another health professional as needed for optimal patient care.
17. Provide comprehensive, multidisciplinary care, including prevention and monitoring of complications, for patients with chronic hematologic conditions, including but not limited to sickle cell disease, thalassemia, and bleeding and thrombotic disorders.
18. Subspecialty trainee can work effectively with other haematology-oncology team members, other paediatric subspecialties and other specialties for overall patient management in the field of PHO.
19. Subspecialty trainee can supervise general paediatric trainees appropriately.
20. Subspecialty trainee can give effective presentations and lead patient-focused discussion in relation to specific patient problems or topics on clinical rounds and in multidisciplinary conferences.
21. Can seek appropriate consultation from other health professionals, recognizing the limits of their own expertise.
22. Can demonstrate insight into their own limits of expertise.

#### Attitudes of PHO Subspecialty Trainees

1. Subspecialty trainee should adopt a supportive attitude to provide adequate information, appropriate support and counselling to patients and families.
2. Subspecialty trainee should appreciate the patient's perspective and perception of health, concerns and the impact of the disease and transplant procedures on the patient and family.
3. Subspecialty trainee should appreciate the importance of teamwork, effective communication and coordination among health care providers.

#### Rotation in Leukemia / Lymphoma / Haematology (9 months)

Key knowledge in haematopathology and laboratory medicine as it relates to Leukemia Lymphoma and Haematology, including but not limited to knowledge of the appropriate indications for, methods of, and limitations of

- a. Peripheral blood morphology
- b. Bone marrow aspirations and biopsies
- c. Cerebral spinal fluid (CSF) assessment
- d. Haemostasis and thrombosis evaluation
- e. Transfusion medicine
- f. Flow cytometry, including but not limited to immunophenotyping
- g. Cytogenetics and molecular diagnostics

Key knowledge in diagnosis and management of paediatric haematological malignancies, including but not limited to

- a. Acute lymphoblastic leukemia
- b. Acute myeloid leukemia
- c. Non-Hodgkin lymphoma
- d. Hodgkin Lymphoma
- e. Chronic Leukemias,
- f. Myelodysplastic syndromes and Preleukemic disorders.
- g. Bone marrow failure syndromes
- h. Langerhans Cell Histiocytosis
- i. Haemophagocytic Lymphohistiocytosis

Key knowledge in cancer chemotherapy and common protocols as it applies to paediatric haematological malignancies, including but not limited to its role, mechanisms of action, and toxicities related to specific chemotherapy agents.

#### Rotation in Solid Tumors / Neuro-oncology (9 months)

Key knowledge in diagnosis and management of paediatric solid tumors and neuro-oncology, including but not limited to

- a. Central nervous system (CNS) tumors
- b. Retinoblastoma
- c. Wilms tumor
- d. Neuroblastoma
- e. Hepatoblastoma
- f. Ewing sarcoma
- g. Osteogenic sarcoma
- h. Rhabdomyosarcoma
- i. Germ cell tumor
- j. Others miscellaneous solid tumors

Key knowledge in cancer chemotherapy and common protocols as it applies to pediatric oncology patients, including but not limited to its role, mechanisms of action, and toxicities related to specific chemotherapy agents

Key knowledge in the role, indications, and complications of surgery as applied to the management of children with cancer

Key knowledge in the role, indications, and complications of radiation therapy as applied to the management of children with cancer.

Rotation in General Haematology / Laboratory (Elective for 3 months)

Key knowledge of non-malignant haematologic diseases in diagnosis and management of paediatric haematological diseases, including but not limited to

- a. Disorders of hematopoiesis
- b. Red cell aplasia and polycythemia
- c. Leukopenia and leukocytosis
- d. Amegakaryocytic thrombocytopenia and thrombocytosis
- e. Red cell disorders
- f. Haemoglobinopathies
- g. Red cell membrane defects
- h. Red cell enzyme deficiencies
- i. Nutritional anemias
- j. Iron deficiency
- k. Megaloblastic anemia
- l. Dyserythropoiesis
- m. Immune hemolytic anemia
- n. White cell disorders
- o. Lymphopenia and lymphocytosis
- p. Neutropenia and neutrophilia
- q. Eosinophilia
- r. Neutrophil function defects
- s. Disorders of hemostasis and thrombosis
- t. Thrombocytopenia and thrombocytosis
- u. Platelet dysfunction
- v. Congenital coagulation disorders
- w. Acquired coagulation disorders
- x. Hypercoagulable states
- y. Disorders of fibrinolysis
- z. Perinatal and developmental hematology
- aa. Anemia
- bb. Neutropenia
- cc. Thrombocytopenia
- dd. Bleeding diatheses
- ee. Leukocytosis
- ff. Splenomegaly and disorders of splenic function
- gg. Lymphadenopathy
- hh. Histiocytic disorders

Key knowledge of Haematopoietic Stem Cell Transplantation (HSCT)

1. Basic principles of autologous and allogeneic HSCT;
2. Indications for autologous and allogeneic HSCT;
3. Importance and interpretation of HLA typing;
4. Selection of potential donors (autologous, HLA-matched, mismatched and haploidentical family donors, unrelated donors) and stem cell sources (bone marrow, peripheral blood stem cell, cord blood);
5. Evaluation of donors and recipients;
6. Work effectively with BMT nurse coordinators, HKBMDR and stem cell laboratory for coordination of transplant recipient and donor management;
7. Principles and procedures of stem cell procurement, processing, cryopreservation and thawing, and infusion;
8. Selection and implementation of transplant preparative regimens and graft-versus-host disease (GVHD) prophylaxis;
9. Management of donor-recipient ABO incompatibility;
10. Diagnosis and management of the common complications of HSCT, including graft rejection, graft failure, engraftment syndrome, GVHD, infections and other common short-term and long-term complications;
11. Post-transplant immunization
12. Long-term follow-up for HSCT recipients



## **Method of Evaluation and Exit Assessment in PHO**

The application for subspecialty training should normally be submitted to the PHO Subspecialty Board at the end of the first year of Higher Training in General Paediatrics. The trainee admitted into PHO subspecialty training programme should undergo full-time subspecialty training.

In order for the training programme to achieve its goal and objectives, an evaluation process incorporating regular review by subspecialty trainers and trainee monitoring committee and exit assessment of the subspecialty trainees is established.

### **Regular Review by Subspecialty Trainers and Subspecialty Trainee Monitoring Committee**

Regular review by subspecialty trainer every 6 months will be required to allow for flexibility and early identification of potential problems or deficiencies. The overall performance of each subspecialty trainee is reviewed in annual assessment by the Subspecialty Board Trainee Monitoring Committee which comprises the Program Director and 2 appointed members from Subspecialty Board by Program Director through assessment of the portfolio, training log and a structured interview. This committee is asked to monitor the performance and assess the level of competence of each fellow through a detailed and structured interview with specific objectives to attain in different domains.

Trainee should keep a written record of patients seen by them, procedures conducted and follow-up in a logbook which should be kept up-to-date and endorsed by subspecialty trainer. The logbook should also contain information on educational activities, training received, problems encountered and feedback by trainers.

The trainee should attend and provide evidence of attendance at local, regional and/or international haematology, oncology or HSCT meetings or training courses at least once per year. At least one presentation (oral or poster presentations) at meetings are required during the 36 months PHO subspecialty training.

### **Final Exit Assessment**

The final Exit Assessment normally takes place once each year. The trainee has to submit 2 dissertations on scientific papers relevant to PHO for assessment. The 2 dissertations should include at least one as research study, and at least one is accepted for publication in an international or local journal upon completion of subspecialty training. The trainee should be the first author of these 2 dissertations. The trainee should attend a viva examination conducted by an Assessment Board. The viva examination is in the format of structured viva examination with adequate coverage of materials including the 4 key essential areas: (i) Leukemia / Lymphoma; (ii) Solid Tumors and Neuro-oncology; (iii) Haematopoietic Stem Cell Transplantation; (iv)

Haematology. The Assessment Board comprises at least 3 assessors appointed by PHO Subspecialty Training Director with an option of appointing an oversea external assessor who is PHO specialist in the field.

Trainees who successfully pass the regular review assessment and final exit assessment will be invited to apply for Fellowship in the subspecialty of Paediatric Haematology & Oncology of the Hong Kong College of Paediatricians.