



The Royal Australasian  
College of Physicians

# Medical Oncology

## Advanced Training Curriculum

*Paediatrics & Child Health Division*



**MOGA**



The Royal Australasian  
College of Physicians

# Physician Readiness for Expert Practice (PREP) Training Program

**Paediatric Medical Oncology Advanced Training Curriculum**

TO BE USED IN CONJUNCTION WITH:

**Basic Training Curriculum – Paediatrics and Child Health**  
**Professional Qualities Curriculum**



# ACKNOWLEDGEMENTS

Fellows, trainees and RACP staff have contributed to the development of this curriculum document.

The College specifically thanks those Fellows and trainees who have generously contributed to the development of these curriculum documents, through critical comments drawn from their knowledge and experience and the donation of their time and professional expertise.

The following Fellows and trainees, in particular, deserve specific mention for their contribution:

- Dr Peter Downie, FRACP
- Dr Chris Fraser, FRACP
- Dr Pratiti Bandopadhyay, FRACP

Development of the Paediatric Medical Oncology Curriculum content was overseen by the SAC in Medical Oncology.

The RACP gratefully acknowledges the contribution of the Medical Oncology Group of Australia and the New Zealand Society for Oncology to the development of this curriculum.

The process was managed by the Curriculum Development Unit within the College's Education Deanery, who designed the document, drafted content material, organised and facilitated writing workshops, developed resource materials, and formatted the final document.

# CONTACT DETAILS

## THE ROYAL AUSTRALASIAN COLLEGE OF PHYSICIANS

### AUSTRALIA

145 Macquarie Street  
Sydney  
NSW 2000  
Australia

Tel: (+61) (2) 9256 5444  
Fax: (+61) (2) 9252 3310

Email: [racp@racp.edu.au](mailto:racp@racp.edu.au)  
Website: [www.racp.edu.au](http://www.racp.edu.au)

### AOTEAROA NEW ZEALAND

Level 10  
3 Hunter Street  
Wellington 6011  
New Zealand

Tel: (+64) (4) 472 6713  
Fax: (+64) (4) 472 6718

Email: [racp@racp.org.nz](mailto:racp@racp.org.nz)  
Website: [www.racp.edu.au](http://www.racp.edu.au)

## COPYRIGHT

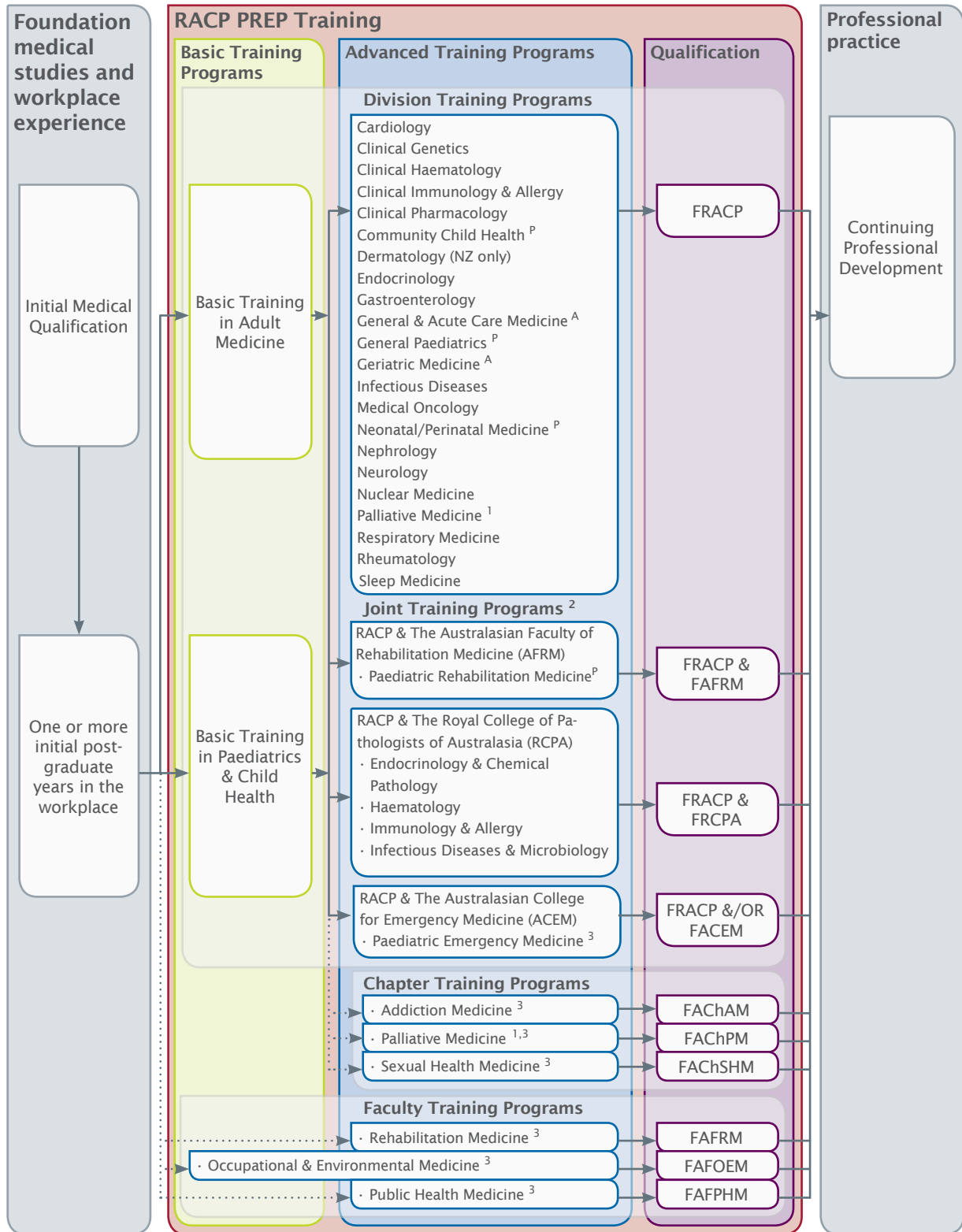
1st edition 2010 (revised 2013).

Please note: No Domains, Themes or Learning Objectives have been updated for this edition; design changes ONLY.

Copyright © 2013. The Royal Australasian College of Physicians (RACP). All rights reserved. Published December 2013.

This work is copyright. Apart from any fair use, for the purposes of study or research, it may not be reproduced in whole or in part, by any means electronic or mechanical, without written permission from The Royal Australasian College of Physicians

## RACP FELLOWSHIP TRAINING PATHWAYS AND THE CONTINUUM OF LEARNING



<sup>P</sup> Trainees must complete Basic Training in Paediatrics & Child Health to enter this program.

<sup>A</sup> Trainees must complete Basic Training in Adult Medicine to enter this program.

<sup>1</sup> Trainees who have entered Advanced Training in Palliative Medicine via a RACP Basic Training Program will be awarded FRACP upon completion and may subsequently be awarded FACHPM. Trainees who have NOT entered Advanced Training in Palliative Medicine via a RACP Basic Training Program will only be awarded FACHPM upon completion.

<sup>2</sup> The Child & Adolescent Psychiatry Joint Training Program with the Royal Australian and New Zealand College of Psychiatrists (RANZCP) is currently under review by the RACP and RANZCP and closed to new entrants at present.

<sup>3</sup> Alternative entry requirements exist for these training programs; please see the corresponding PREP Program Requirements Handbook for further information.

NB1: This diagram only depicts training programs that lead to Fellowship. Please see the RACP website for additional RACP training programs.

NB2: For further information on any of the above listed training programs, please see the corresponding PREP Program Requirements Handbook.



## OVERVIEW OF THE SPECIALTY

Paediatric medical oncology entails the science and clinical care of children with malignant cancers. It is a multidisciplinary specialty that requires proficiency in medical sciences, clinical medicine, diagnostic medicine, and pharmacology. There is also the need for an understanding of surgical oncology, radiation oncology, and psycho-oncology, including management of grief, palliative care, and bereavement. Paediatric medical oncology care involves not only the patient, the child or adolescent, but the child or adolescent's family. It is a clinical subspecialty underlined by the constant interface between science, ongoing research, and translation into clinical practice.

## CURRICULUM OVERVIEW

### Paediatric Medical Oncology – Advanced Training Curriculum

This curriculum outlines the broad concepts, related learning objectives and the associated theoretical knowledge, clinical skills, attitudes and behaviours required and commonly utilised by medical oncology paediatricians within Australia and New Zealand.

The purpose of Advanced Training is for trainees to build on the cognitive and practical skills acquired during Basic Training. At the completion of the Paediatric Medical Oncology Advanced Training Program, trainees should be competent to provide unsupervised comprehensive medical care in paediatric medical oncology, at consultant level.

Attaining competency in all aspects of this curriculum is expected to take three years of training. It is expected that all teaching, learning, and assessment associated with the Paediatric Medical Oncology Advanced 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 curricula should always be read in conjunction with the relevant College Training Handbook available on the College website.

### Professional Qualities Curriculum

The Professional Qualities Curriculum (PQC) outlines the range of concepts and specific learning objectives required by, and utilised by, all physicians or paediatricians, regardless of their specialty or area of expertise. It spans both the Basic and Advanced Training Programs and is also utilised as a key component of the Continuing Professional Development (CPD) program.

Together with the various Basic and Advanced Training Curricula, the PQC integrates and fully encompasses the diagnostic, clinical, and educative-based aspects of the physician's/paediatrician's daily practice.

Each of the concepts and objectives within the PQC will be taught, learnt and assessed within the context of everyday clinical practice. It is important, therefore, that they be aligned with, and fully integrated into, the learning objectives within this curriculum.

### EXPECTED OUTCOMES AT THE COMPLETION OF TRAINING

At the completion of the Paediatric Medical Oncology Advanced Training Program, as defined by this curriculum, it is expected that a new Fellow will have developed the clinical skills and have acquired the theoretical knowledge to practice as a paediatric medical oncologist. Specifically, it is expected that a new Fellow will be able to:

- diagnose and treat paediatric malignancies, including the principles of management of stem cell and bone marrow transplantation

- diagnose and treat complications arising from the treatment of paediatric malignancies
- function as an independent and competent clinician, with sound clinical skills and understand the principles and the interpretation of a wide range of diagnostic procedures, including haematology, histopathology, radiology, and molecular oncology
- explain the basic sciences, including all relevant aspects of biochemistry, biology, molecular cellular function, genetics, immunology, pathology, pharmacology, and pathophysiology of paediatric malignant diseases
- develop and apply appropriate communication and patient advocacy skills
- develop communication skills to allow empathic and effective communication with families of children diagnosed with malignant disease
- develop age specific communication skills based on a knowledge of child and adolescent developmental stages to facilitate effective communication with patients across the entire paediatric and adolescent age spectrum
- be aware of the impact of the diagnosis of childhood malignancies on growth and development
- understand principles of psycho-oncology, especially in relation to children and families affected by childhood cancer
- have an understanding of the long-term effects of therapy for children with cancer, and have experience in the long-term follow-up of these children
- develop skills in symptom management in children with palliative care needs
- obtain bone marrow samples for diagnostic purposes and perform lumbar punctures and intrathecal administration of chemotherapy
- be proficient in the methods of bone marrow harvest and understand the principles of peripheral blood stem cell apheresis, particularly with regard to prescription of mobilisation regimens and appropriate timing of collections
- diagnose and manage oncological emergencies, including tumour lysis syndrome, spinal cord compression, febrile neutropaenia, hyperleucocytosis, particularly in infants, and mediastinal compression or superior vena caval obstruction
- demonstrate understanding and competency in the supportive medical care of children on therapy for malignancies, including symptom management and nutritional requirements as part of medical supportive care
- demonstrate understanding of infectious complications in paediatric cancer patients
- describe the mode of action of chemotherapeutic agents, indications, adverse effects, and contraindications
- describe the principles of radiation oncology in childhood, and the challenges specific to treating children, with an emphasis on long-term morbidity
- understand the importance of and develop the skills to appropriately perform literature reviews to answer specific clinical questions
- commence ongoing continued professional development by attendance at appropriate national and international conferences and regular review of appropriate journals relevant to the field of paediatric medical oncology
- explain the importance of a multidisciplinary approach to the care of a child with suspected malignancy
- demonstrate an understanding of biomedical ethics in the investigation and care of paediatric oncology patients
- understand the importance of working within a multidisciplinary team
- demonstrate leadership within the context of the multidisciplinary team by being involved in education of other team members and allied health staff
- demonstrate understanding of clinical trials and translational oncology research
- participate in research related to paediatric oncology.



## CURRICULUM THEMES 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.

### Domains

The domains are the broad fields which group common or related areas of learning.

### Themes

The themes identify and link more specific aspects of learning into logical or related groups.

### Learning Objectives

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.

## LEARNING OBJECTIVES TABLES

<b>DOMAIN 1</b>	<b>FOUNDATIONS OF PAEDIATRIC MEDICAL ONCOLOGY</b>
<b>Theme 1.1</b>	The Biology of Cancer
<b>Learning Objective</b>	
<b>1.1.1</b>	Explain the biology and incidence of cancer
<b>Theme 1.2</b>	The Effects of Cancer on Growth and Development
<b>Learning Objectives</b>	
<b>1.2.1</b>	Explain how cancer affects young people and their families
<b>DOMAIN 2</b>	<b>PROFESSIONAL QUALITIES SPECIFIC TO PAEDIATRIC MEDICAL ONCOLOGY</b>
<b>Theme 2.1</b>	Professional Qualities
<b>Learning Objective</b>	
<b>2.1.1</b>	Describe the principles and conduct of oncology clinical trials and research
<b>2.1.2</b>	Apply written and verbal communication skills in paediatric medical oncology
<b>2.1.3</b>	Recognise the role of government and identify legal aspects in the provision of health care

<b>DOMAIN 3</b>	<b>BASIC PRINCIPLES IN THE MANAGEMENT OF CANCER</b>
<b>Theme 3.1</b>	Procedures and Investigations
<b>Learning Objective</b>	
<b>3.1.1</b>	Perform practical procedures and investigations to diagnose and treat patients with cancer
<b>Theme 3.2</b>	Treatment and General Management
<b>Learning Objectives</b>	
<b>3.2.1</b>	Explain the multidisciplinary approach to the management and treatment of cancer
<b>3.2.2</b>	Define and describe the aspects of supportive care for cancer symptoms and treatment side effects
<b>3.2.3</b>	Describe the therapeutic modalities in the management of cancer
<b>3.2.4</b>	Describe the pharmacological management of patients with cancer
<b>3.2.5</b>	Monitor and treat late effects of treatment for childhood cancer
<b>3.2.6</b>	Explain the long-term follow-up of children with cancer
<b>3.2.7</b>	Manage palliative and end-of-life care
<b>DOMAIN 4</b>	<b>SPECIFIC CANCERS – MULTIDISCIPLINARY MANAGEMENT AND TREATMENT</b>
<b>Theme 4.1</b>	Knowledge and Skills Common to the Management of all Cancer
<b>Learning Objectives</b>	
<b>4.1.1</b>	Diagnose, treat, and manage cancer
<b>Theme 4.2</b>	Specific Cancers
<b>Learning Objectives</b>	
<b>4.2.1</b>	Treat and manage leukaemias
<b>4.2.2</b>	Treat and manage Hodgkin’s lymphoma
<b>4.2.3</b>	Treat and manage non–Hodgkin’s lymphoma
<b>4.2.4</b>	Treat and manage haemopoietic stem cell transplantation
<b>4.2.5</b>	Treat and manage non-malignant haematological diseases
<b>4.2.6</b>	Treat and manage renal tumours
<b>4.2.7</b>	Treat and manage neuroblastoma
<b>4.2.8</b>	Treat and manage hepatic tumours
<b>4.2.9</b>	Treat and manage retinoblastoma

<b>4.2.10</b>	Treat and manage rare tumours
<b>4.2.11</b>	Treat and manage bone tumours
<b>4.2.12</b>	Treat and manage soft tissue sarcomas
<b>4.2.13</b>	Treat and manage central nervous system tumours
<b>4.2.14</b>	Treat and manage lymphoproliferative disorders and malignancies related to immunodeficiencies
<b>4.2.15</b>	Treat and manage myeloproliferative and myelodysplastic disorders
<b>4.2.16</b>	Treat and manage histiocytic disorders
<b>4.2.17</b>	Treat and manage germ cell tumours and endocrine tumours

<b>DOMAIN 1</b>	<b>FOUNDATIONS OF PAEDIATRIC MEDICAL ONCOLOGY</b>
<b>Theme 1.1</b>	The Biology of Cancer
<b>Learning Objective 1.1.1</b>	Explain the biology and incidence of cancer
<b>Knowledge</b>	
<ul style="list-style-type: none"> <li>describe the incidence and mortality rates for childhood cancer, including ethnic and geographical variability</li> <li>explain the aetiology of childhood cancer, including the facts and theories</li> <li>recognise normal and abnormal mechanisms of cellular growth control</li> <li>describe the genetic basis of malignant disease, e.g. neurofibromatosis type 1 (NF-1), Li-Fraumeni.</li> </ul>	

<b>DOMAIN 1</b>	<b>FOUNDATIONS OF PAEDIATRIC MEDICAL ONCOLOGY</b>	
<b>Theme 1.2</b>	The Effects of Cancer on Growth and Development	
<b>Learning Objective 1.2.1</b>	Explain how cancer affects young people and their families	
<b>Knowledge</b>	<b>Skills</b>	
<ul style="list-style-type: none"> <li>describe the impact of diagnosis and treatment, particularly radiotherapy, on a child's ability to learn at different ages</li> <li>recognise the needs of siblings of children with cancer</li> <li>recognise the expectations of social networks and peers</li> <li>outline the evidence for fertility preservation techniques for adolescents receiving treatment</li> <li>recognise coping mechanisms of patients and families within the context of cancer diagnosis</li> <li>recognise the psychosocial impact of cancer and indications for intervention.</li> </ul>	<ul style="list-style-type: none"> <li>identify risk factors for and patterns of abnormal development</li> <li>assess the educational needs of patients of all ages while on active treatment</li> <li>assess and manage the effects of recurrent or chronic illness, including growth, psychosocial, emotional, physical, and sexual development</li> <li>write a report concerning the impact of treatment to inform the process of developing statements for policy</li> <li>evaluate advocacy strategies for patients with educational difficulties as a result of diagnosis of cancer and treatment received</li> <li>discuss issues with patients, their families and other professionals, including risk taking behaviours, chronic illness, disability, genetic, and end-of-life issues</li> <li>refer to gynaecological surgeon for ovarian banking and andrological surgeon for sperm banking.</li> </ul>	

DOMAIN 2		PROFESSIONAL QUALITIES SPECIFIC TO PAEDIATRIC MEDICAL ONCOLOGY	
Theme 2.1		Professional Qualities	
Learning Objective 2.1.1		Describe the principles and conduct of oncology clinical trials and research	
Knowledge		Skills	
<ul style="list-style-type: none"> <li>describe national clinical guidelines and how they guide practice</li> <li>describe 'good clinical practice' in line with international directives for all aspects of the conduct of clinical trials</li> <li>explain the concept of a phase I, II, and III trials to patients and parents</li> <li>describe the difficulties around consent, e.g. gaining consent for a randomised clinical treatment trial with a family who have recently been given a potentially life threatening diagnosis</li> <li>recognise the role of clinical trials</li> <li>describe the evolution of current clinical trials and treatment outcomes</li> <li>explain the structure, aims, and functions of the Australian and New Zealand Children's Haematology and Oncology Group</li> <li>identify the issues around collaborative working, both nationally and internationally, in the development of clinical trials for childhood malignancy.</li> </ul>		<ul style="list-style-type: none"> <li>develop clinical guidelines</li> <li>participate in teaching and research on topics within the specialty and in related areas</li> <li>evaluate research in paediatrics and child health</li> <li>present information relevant to clinical practice to a range of audiences, including spoken presentations, written information, and training materials</li> <li>discuss the importance of tumour, DNA, and tissue banking for future research</li> <li>discuss clinical trials specifically in relation to adolescents and young adults</li> <li>participate in clinical and research special interest groups.</li> </ul>	

DOMAIN 2	PROFESSIONAL QUALITIES SPECIFIC TO PAEDIATRIC MEDICAL ONCOLOGY	
Theme 2.1	Professional Qualities	
Learning Objective 2.1.2	Apply written and verbal communication skills in paediatric medical oncology	
Knowledge	Skills	
<ul style="list-style-type: none"> <li>recognise the importance of directing communication to young people to encourage their participation in their care.</li> </ul>	<ul style="list-style-type: none"> <li>apply a wide range of communication skills specific to working with babies, children, young people, and their families.</li> <li>explain clinical information to children, young people, and their families so that consent is informed, and plan and progress of treatment is understood</li> <li>explain and share difficult or bad news, including end-of-life issues</li> <li>record consultations accurately and sensitively whilst maintaining a good rapport with patients and their family</li> <li>liaise with parent support and self help groups when necessary</li> <li>explain the risks and benefits of interventions such as surgery, high dose therapy (HDT), or entry into a phase 1/11 trial.</li> </ul>	



DOMAIN 2		PROFESSIONAL QUALITIES SPECIFIC TO PAEDIATRIC MEDICAL ONCOLOGY	
Theme 2.1		Professional Qualities	
Learning Objective 2.1.3		Recognise the role of government and identify legal aspects in the provision of health care	
Knowledge		Skills	
<ul style="list-style-type: none"> <li>recognise national and local regulatory bodies, particularly those involved in standards of professional behaviour, clinical practice, education, training, and assessment</li> <li>describe the duty of all professionals working with children to report concerns about child protection issues to social services</li> <li>recognise and follow key legal and ethical guidelines relating to confidentiality, consent to treatment, and the right to refuse treatment</li> <li>recognise when, in the interest of the patient, it may be necessary to break confidentiality.</li> </ul>		<ul style="list-style-type: none"> <li>explain how to respond to health service targets and participate in the development of services</li> <li>contribute to the implementation of national and local health policy initiatives</li> <li>perform an audit in a range of settings in partnership with all stakeholders to identify best practice</li> <li>evaluate local and national clinical guidelines and protocols and recognise the individual patient's needs when using them</li> <li>explain patient confidentiality and privacy issues, especially in regards to current national and local legislation</li> <li>use electronic communication media, for patient care, taking into consideration the principles of confidentiality outlined in the Data Protection Act</li> <li>write medico-legal reports as required about alleged abuse of children and young people for social services.</li> </ul>	

DOMAIN 3		BASIC PRINCIPLES IN THE MANAGEMENT OF CANCER	
Theme 3.1		Procedures and Investigations	
Learning Objective 3.1.1		Perform practical procedures and investigations to diagnose and treat patients with cancer	
Knowledge		Skills	
<ul style="list-style-type: none"> <li>describe indications for practical procedures and investigations</li> <li>explain contraindications and complications of procedures</li> <li>identify local and national guidelines for investigations or procedures, including sedation and pain relief for practical procedures</li> <li>recognise relevant anatomical markers for invasive procedures</li> <li>recognise safety issues for patients and staff in relation to investigations of body fluids and radiation</li> <li>explain national and local guidance for obtaining consent for post-mortem</li> <li>explain common age appropriate normal ranges or appearances</li> <li>explain the role of complex investigations e.g. CT and MRI scans including their diagnostic potential and complications.</li> </ul>		<ul style="list-style-type: none"> <li>order and interpret investigations</li> <li>recognise abnormal results of commonly used radiological investigations</li> <li>recognise complications of procedures and respond appropriately</li> <li>obtain informed consent</li> <li>perform the following diagnostic procedures independently: <ul style="list-style-type: none"> <li>collection of blood from central lines</li> <li>bone marrow aspirates and trephines</li> <li>skin biopsies</li> <li>bone marrow harvests</li> <li>peripheral arterial cannulation</li> <li>venesection</li> <li>capillary blood sampling</li> <li>suprapubic aspiration of urine</li> <li>urethral catheterisation</li> <li>routine testing of urine</li> <li>electrocardiogram</li> <li>lumbar puncture and intrathecal chemotherapy administration</li> <li>noninvasive blood pressure measurement.</li> </ul> </li> </ul>	

<b>DOMAIN 3</b>	<b>BASIC PRINCIPLES IN THE MANAGEMENT OF CANCER</b>	
<b>Theme 3.2</b>	Treatment and General Management	
<b>Learning Objective 3.2.1</b>	Explain the multidisciplinary approach to the management and treatment of cancer	
<b>Knowledge</b>	<b>Skills</b>	
<ul style="list-style-type: none"> <li>recognise the relationship between local health, education, and social service provision</li> <li>identify agencies that can provide general and condition specific support for coping with health problems</li> <li>recognise the importance of a multidisciplinary approach to a patient with a suspected malignancy</li> <li>describe the issues around developing and sustaining effective and safe shared care of patients within a regional service.</li> </ul>	<ul style="list-style-type: none"> <li>work in a multidisciplinary team and with colleagues from a wide range of professional groups</li> <li>lead a multidisciplinary team, for example by representing the health needs of a patient and their family at a discharge meeting, and recognise when it may be inappropriate to do so</li> <li>apply a multidisciplinary approach to the nutritional assessment of patients receiving treatment for cancer</li> <li>assess the psychosocial health of a patient while respecting confidentiality.</li> </ul>	

DOMAIN 3	BASIC PRINCIPLES IN THE MANAGEMENT OF CANCER	
Theme 3.2	Treatment and General Management	
Learning Objective 3.2.2	Define and describe the aspects of supportive care for cancer symptoms and treatment side effects	
Knowledge	Skills	
<ul style="list-style-type: none"> <li>• explain the contribution of nutrition to the tolerance of chemotherapy and be familiar with the evidence for nutritional intervention</li> <li>• recognise the impact of mucositis on oral intake and strategies to overcome this, including enteric supplementation with nasogastric tube, parenteral nutrition, or appetite stimulant</li> <li>• describe the management of oncologic emergencies in paediatrics</li> <li>• describe the management of infectious complications of children with cancer</li> <li>• describe the management of nausea and vomiting in childhood cancer</li> <li>• outline diseases which can result in spinal cord compression</li> <li>• explain the principles of school intervention, including need for integration into the classroom, and regard this as integral part of treatment process</li> <li>• describe the legal protection of educational rights of the child.</li> </ul>	<ul style="list-style-type: none"> <li>• manage febrile neutropenia, including management after the failure of first line antibiotic therapy</li> <li>• investigate and manage bacterial, fungal, and viral infections in an immunocompromised patient</li> <li>• manage respiratory symptoms, pain, seizures, constipation, urinary retention, vomiting, agitation, and nutrition.</li> <li>• manage tumour lysis syndrome, the mediastinal mass, pleural and pericardial effusions</li> <li>• use diagnostic studies that are appropriate for the management of childhood oncologic emergencies</li> <li>• manage haemorrhagic cystitis and urinary obstruction, including appropriate interventions</li> <li>• develop communication and understanding of potential barriers to peer and social interaction, such as amputation, hair loss, weight gain, or loss etc</li> <li>• recognise factors affecting ongoing education, such as possible neuropsychological side effects of treatment, vision and hearing impairments, fatigue, mood changes, and changes in fine motor coordination</li> <li>• develop communication links with appropriate school supports, and help develop an education plan.</li> </ul>	

DOMAIN 3		BASIC PRINCIPLES IN THE MANAGEMENT OF CANCER	
Theme 3.2		Treatment and General Management	
Learning Objective 3.2.3		Describe the therapeutic modalities in the management of cancer	
Knowledge		Skills	
<ul style="list-style-type: none"> <li>describe the biological and emerging novel therapies to manage paediatric malignancy.</li> </ul>		<ul style="list-style-type: none"> <li>formulate a symptom control plan for pain management, recognising the different patterns of pain and their therapeutic interventions, including non pharmaceutical approaches</li> <li>manage anaphylaxis</li> <li>manage ascites</li> <li>perform the following therapeutic procedures independently:               <ul style="list-style-type: none"> <li>cardiovascular resuscitation in sepsis</li> <li>intra-dermal, subcutaneous, intramuscular, and intravenous injections</li> <li>percutaneous long-line insertion</li> <li>bag, valve, and mask ventilation</li> <li>needle thoracocentesis for pleural effusion or pneumothorax and tracheal intubation</li> <li>intubation of newborn infants of most gestations</li> <li>external chest compression</li> <li>insertion of intraosseous needle.</li> </ul> </li> </ul>	

DOMAIN 3		BASIC PRINCIPLES IN THE MANAGEMENT OF CANCER	
Theme 3.2		Treatment and General Management	
Learning Objective 3.2.4		Describe the pharmacological management of patients with cancer	
Knowledge		Skills	
<ul style="list-style-type: none"> <li>describe the pharmacological basis for treatments, including analgesics</li> <li>describe the approved indications and justification for prescribing drugs in common paediatric problems</li> <li>explain the pharmacokinetics and pharmacodynamics of commonly prescribed drugs</li> <li>recognise the roles of the regulatory agencies involved in drug use, monitoring and licensing, e.g. the National Institute of Clinical Excellence, the Committee on Safety of Medicines, the Medicines and Healthcare products Regulatory Agency, and Hospital Formulary Committees</li> <li>recognise the drug interactions of commonly used drugs</li> <li>explain how to obtain consent for the administration of drugs</li> <li>use local and national guidelines for the relief of pain</li> <li>recognise and follow local policies for intrathecal cytotoxic therapy</li> <li>explain potential adverse side effects.</li> </ul>		<ul style="list-style-type: none"> <li>calculate drugs accurately according to specific dose for weight, or age/weight range, or on a specific dose/surface area basis</li> <li>manage errors of prescription or administration and discuss with parents</li> <li>prescribe safely and supervise prescription for newborns, and children of all ages</li> <li>advise on and supervise safe prescription of intravenous fluids to medical and surgical patients</li> <li>manage acute drug reactions to chemotherapy and the extravasation of chemotherapy agents</li> <li>prescribe and administer intrathecal drugs according to local and national policies</li> <li>prescribe, handle, and administer chemotherapy, using an electronic prescribing package where available.</li> </ul>	



DOMAIN 3		BASIC PRINCIPLES IN THE MANAGEMENT OF CANCER	
Theme 3.2		Treatment and General Management	
Learning Objective 3.2.5		Monitor and treat late effects of treatment for childhood cancer	
Knowledge		Skills	
<ul style="list-style-type: none"> <li>explain the late effects of therapy, including endocrine consequences, major organ toxicities, and their causative agent</li> </ul> <p><b>Long-term complications</b></p> <ul style="list-style-type: none"> <li>recognise long-term and late complications of each treatment modality employed</li> <li>explain the risk of treatment induced cancers, including acute myeloid leukaemia after chemotherapy and radiation induced sarcomas</li> <li>explain endocrine dysfunctions, including: <ul style="list-style-type: none"> <li>hypothyroidism after neck radiation</li> <li>sterility with chemotherapy</li> <li>metabolic syndrome post chemotherapy</li> </ul> </li> <li>discuss chemoprevention measures</li> <li>discuss testing and intervals for follow-up</li> </ul> <p><b>Genetic counselling</b></p> <ul style="list-style-type: none"> <li>recognise the genetic factors which increase risk of cancer in the patient and the patient's family</li> <li>outline the principles for genetic screening and counselling</li> </ul> <p><b>Health maintenance</b></p> <ul style="list-style-type: none"> <li>identify risk factors for subsequent malignancy including: <ul style="list-style-type: none"> <li>diet</li> <li>smoking</li> <li>alcohol</li> <li>sun exposure</li> </ul> </li> <li>recognise the principles of counselling.</li> </ul>		<ul style="list-style-type: none"> <li>counsel parents and where appropriate (i.e. age-related) patients regarding possible long-term and late complications of treatment and risk factors for subsequent malignancy</li> <li>assess increased risk of cancer in the patient and the patient's family.</li> </ul>	

<b>DOMAIN 3</b>	<b>BASIC PRINCIPLES IN THE MANAGEMENT OF CANCER</b>	
<b>Theme 3.2</b>	Treatment and General Management	
<b>Learning Objective 3.2.6</b>	Explain the long-term follow-up of children with cancer	
<b>Knowledge</b>	<b>Skills</b>	
<ul style="list-style-type: none"> <li>recognise the long-term complications of surgery, chemotherapy, and radiation therapy in childhood</li> <li>describe the tests used in neuropsychological testing and the role of testing in survivors of childhood cancer</li> <li>outline the development of secondary malignancies.</li> </ul>	<ul style="list-style-type: none"> <li>manage long-term common acute and chronic cases, with multidisciplinary and multiagency teams, subspecialists, or networks</li> <li>recognise and manage complications from therapy</li> <li>organise a long-term follow-up program and develop strategies for the surveillance of survivors using national guidelines</li> <li>counsel survivors in regards to mental health, and other issues such as fertility.</li> </ul>	

DOMAIN 3		BASIC PRINCIPLES IN THE MANAGEMENT OF CANCER	
Theme 3.2		Treatment and General Management	
Learning Objective 3.2.7		Manage palliative and end-of-life care	
Knowledge		Skills	
<ul style="list-style-type: none"> <li>explain principles of palliative and end-of-life care</li> <li>recognise palliative care as an integrated part of medical oncology that has a multidisciplinary dimension</li> <li>describe palliative therapy</li> <li>be aware of legislation regarding reporting of paediatric death to the coroner, and be proficient in the certification of death</li> </ul> <p><b>Pain management</b></p> <ul style="list-style-type: none"> <li>outline the World Health Organisation pain ladder</li> <li>describe the pharmacology and toxicity of the opiate narcotics and other analgesics</li> </ul> <p><b>Other symptoms</b></p> <ul style="list-style-type: none"> <li>explain palliative measures for other symptoms including: <ul style="list-style-type: none"> <li>respiratory tract</li> <li>gastrointestinal tract</li> <li>neurological symptoms</li> <li>cutaneous and mucosal symptoms</li> <li>anorexia</li> <li>cachexia.</li> </ul> </li> </ul>		<ul style="list-style-type: none"> <li>determine when palliative care is indicated</li> <li>implement palliative and end-of-life care in clinical practice</li> <li>assess location and severity of pain</li> <li>manage cancer pain with the available modalities and recognise when a referral for an invasive palliative intervention is indicated</li> <li>select palliative measures for other symptoms</li> <li>discuss palliative care with patients and families</li> <li>discuss end-of-life/not for CPR issues with patients and their carers/family</li> <li>choose a multidisciplinary team approach to cancer treatment and palliation of symptoms and side effects</li> <li>recognise the need to make referrals to other health care professionals</li> <li>provide honest and comprehensive information to patients</li> <li>explain information clearly using appropriate language</li> <li>listen carefully and actively to the patient's concerns, ideas, and expectations</li> <li>verify patient's and families understanding of information provided</li> <li>recognise the range of emotions displayed by a patient and families, taking into consideration cultural and ethnic variations</li> <li>exhibit consideration of the patient's age, status, cultural, and social circumstances when determining treatment.</li> </ul>	

DOMAIN 4		SPECIFIC CANCERS – MULTIDISCIPLINARY MANAGEMENT AND TREATMENT	
Theme 4.1		Knowledge and Skills Common to the Management of Cancer	
Learning Objective 4.1.1		Diagnose, treat, and manage cancer	
Knowledge		Skills	
<ul style="list-style-type: none"> <li>• explain the features and clinical presentations of childhood malignancy</li> <li>• describe the epidemiology of cancer in children and young people</li> <li>• describe the role of biological factors as diagnostic and prognostic aids, e.g. BCR/ABL and N-Myc translocations</li> <li>• describe the principles and strategies of treatment for staging solid tumours according to the current national and international standards</li> <li>• describe the principles of biopsy, definitive surgery, and optimal handling of tissue for diagnosis and biological studies</li> <li>• explain the principles of medical supportive care, including nutrition, blood product support, and management of acute side effects</li> <li>• describe the principles and application of HDT and bone marrow transplantation</li> <li>• identify techniques for bone marrow support, including growth factors</li> <li>• describe basic radiobiology and planning techniques used in the delivery of radiotherapy</li> <li>• recognise the acute toxicity of cancer treatment, including individual drugs and radiotherapy</li> <li>• explain the principles of cancer treatment with chemotherapy and the rationale of combination chemotherapy regimens</li> <li>• recognise the principles of less commonly used radiotherapy techniques, including brachytherapy, proton therapy, and targeted therapy</li> <li>• describe the objectives of paediatric follow-up.</li> </ul>		<ul style="list-style-type: none"> <li>• recognise the breadth of different presentations of common disorders</li> <li>• recognise the features of undifferentiated illness which suggest serious or unusual pathology and initiate the clinical response</li> <li>• recognise and manage the diseases and host characteristics which make certain presentations life threatening</li> <li>• identify when more than one condition or disorder may be present, including both physical and psychological problems</li> <li>• explain the diagnosis and prognosis to patients and their families, including the ‘most likely’ diagnosis</li> <li>• conduct investigations and formulate a management plan</li> <li>• assess and manage comorbidities associated with the range of paediatric presentations</li> <li>• interpret developmental levels and possible physical signs when patients are unable to cooperate with formal assessments</li> <li>• recognise and formulate a management plan for oncological emergencies, including septic shock, tumour lysis, superior vena cava (SVC) obstruction, spinal cord compression, and raised intracranial pressure (ICP)</li> <li>• review and modify a management plan</li> <li>• recognise when to request help from senior colleagues or other services.</li> </ul>	

DOMAIN 4	SPECIFIC CANCERS – MULTIDISCIPLINARY MANAGEMENT AND TREATMENT
Theme 4.2	Specific Cancers
Learning Objective 4.2.1	Treat and manage leukaemias
Knowledge	Skills
<ul style="list-style-type: none"> <li>describe the aetiology and genetic associations of infant and childhood leukaemias and myelodysplastic syndrome (MDS)</li> <li>recognise constitutional and genetic conditions that predispose to the development of leukaemia</li> <li>explain the incidence of acute lymphoblastic leukaemia (ALL) and acute myeloid lymphoma (AML) and the peak age at which they occur</li> <li>describe the diagnostic investigations in patients with leukaemia and MDS</li> <li>explain the prognostic factors in childhood leukaemia and their implications on risk stratification</li> <li>identify cytogenetic and molecular abnormalities associated with infant leukaemias</li> <li>describe current treatment trial protocols for childhood and infant leukaemias, ALL and acute AML, including refractory and relapsed leukaemia</li> <li>describe the role of and indications for bone marrow transplant in infant and childhood leukaemias</li> <li>recognise the current role of radiotherapy in leukaemia treatment and its complications</li> <li>recognise the role of immunotherapy for leukaemia</li> <li>identify the prognostic factors associated with relapsed leukaemia</li> <li>explain clinical, laboratory, and prognostic features of: <ul style="list-style-type: none"> <li>chronic myeloid leukaemia</li> <li>juvenile myelomonocytic leukaemia</li> <li>myelodysplasias.</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>perform a diagnostic work up on a patient with suspected leukaemia</li> <li>perform a bone marrow aspiration and interpret the results</li> <li>recognise and treat oncological emergencies associated with newly diagnosed leukaemia, including: <ul style="list-style-type: none"> <li>hyperviscosity</li> <li>tumour lysis syndrome</li> <li>mediastinal mass causing airway or SVC obstruction</li> <li>coagulopathy and disseminated intravascular coagulation (DIC)</li> <li>infections</li> <li>thrombosis</li> </ul> </li> <li>manage the risk stratification of patients diagnosed with leukaemia, and review of prognosis dependent on molecular testing</li> <li>manage patients with leukaemia and explain chemotherapy regimens</li> <li>manage the long-term follow-up of patients who have completed treatment for leukaemia</li> <li>describe the role, conditioning regimes, and supportive care of bone marrow transplantation in leukaemia, myelodysplasia, and chronic myeloid leukaemia</li> <li>manage rarer forms of childhood leukaemia</li> <li>manage testicular, CNS, and bone marrow relapse of leukaemia</li> <li>monitor response to treatment, including minimal residual disease (MRD) with recognition of its limitations.</li> </ul>

DOMAIN 4		SPECIFIC CANCERS – MULTIDISCIPLINARY MANAGEMENT AND TREATMENT	
Theme 4.2		Specific Cancers	
Learning Objective 4.2.2		Treat and manage Hodgkin’s lymphoma	
Knowledge		Skills	
<ul style="list-style-type: none"> <li>describe the epidemiologic, clinical, and laboratory features of Hodgkin’s lymphoma</li> <li>recognise the histological subtypes of Hodgkin’s lymphoma, their incidence, and the effect of this on their prognosis</li> <li>explain the clinical presentation and pattern of spread</li> <li>describe Ann-Arbor staging system for Hodgkin’s lymphoma</li> <li>explain the laboratory parameters that may be seen in patients with Hodgkin’s lymphoma at the time of diagnosis</li> <li>describe how to image a patient to determine the extent of primary disease and metastatic spread</li> <li>identify advantages and limitations of CT, MRI, and radionuclide scans in staging a patient</li> <li>describe current treatment strategies for Hodgkin’s lymphoma, including the role of radiotherapy.</li> </ul>		<ul style="list-style-type: none"> <li>stage a patient with Hodgkin’s lymphoma, and recognise the different pathological subtypes and prognosis</li> <li>manage patients with Hodgkin’s lymphoma using a multimodality approach with surgery and chemotherapy, and consider the need for radiation therapy</li> <li>identify how functional imaging with FDG-PET (fluorodeoxyglucose positron emission tomography) may be important in the assessment of response and determination of the role of radiotherapy</li> <li>recognise the complications and late effects of chemotherapy and radiotherapy including cardiac and lung function, increased risk of breast cancer in those receiving mediastinal radiation at a young age, and risks of infertility.</li> </ul>	



<b>DOMAIN 4</b>		<b>SPECIFIC CANCERS – MULTIDISCIPLINARY MANAGEMENT AND TREATMENT</b>	
<b>Theme 4.2</b>		Specific Cancers	
<b>Learning Objective 4.2.3</b>		Treat and manage non-Hodgkin's lymphoma	
<b>Knowledge</b>		<b>Skills</b>	
<ul style="list-style-type: none"> <li>• identify the association of Epstein-Barr virus (EBV) and HIV with non-Hodgkin's lymphoma (NHL)</li> <li>• describe cytogenetic and molecular genetic abnormalities</li> <li>• describe the prognostic features and prognosis of NHL according to stage and histology and immunophenotype</li> <li>• describe current treatment strategies according to immunophenotype and pathological subtype</li> <li>• recognise the role of immunotherapy in lymphomas.</li> </ul>		<ul style="list-style-type: none"> <li>• recognise the histological subtypes of NHL in children and adolescents</li> <li>• manage the acute presentations of NHL, including SVC obstruction, airway compression, spinal cord compression, and tumour lysis</li> <li>• distinguish between stage IV NHL and acute leukaemia based on the degree of bone marrow involvement</li> <li>• diagnose NHL based on plural effusion or ascitic fluid</li> <li>• stage patients with NHL</li> <li>• treat NHL with chemotherapy and other modalities if required.</li> </ul>	

DOMAIN 4	SPECIFIC CANCERS – MULTIDISCIPLINARY MANAGEMENT AND TREATMENT	
Theme 4.2	Specific Cancers	
Learning Objective 4.2.4	Treat and manage haemopoietic stem cell transplantation	
Knowledge	Skills	
<ul style="list-style-type: none"> <li>• explain the role of HDT with autologous stem cell rescue in the management of malignant disorders</li> <li>• describe the indications, both malignant and non-malignant, for allogeneic haemopoietic stem cell transplantation (HSCT), including the indications for HSCT from other than a matched sibling donor</li> <li>• identify the advantages of allogeneic HSCT and donor lymphocyte infusion in some malignant disorders</li> <li>• recognise the role of allogeneic HSCT in the treatment of leukaemia</li> <li>• explain the principles of human leucocyte antigen (HLA) typing and donor selection, including the potential sources of HSCT, HSCT collection, and cryopreservation</li> <li>• describe the complications of HSCT and their management, including graft-vs.-host disease, veno-occlusive disease, and graft failure</li> <li>• describe commonly used chemotherapy conditioning regimens used in HSCT and the short and long-term side effects</li> <li>• recognise the role of total body irradiation (TBI) in HSCT, including its administration, and short- and long-term side effects</li> <li>• explain the principles of immunosuppression, and the types of immunosuppressive agents used in HSCT</li> <li>• describe the consequences of myelosuppression and immunosuppression post-HSCT, including the need for infection prophylaxis.</li> </ul>	<ul style="list-style-type: none"> <li>• perform bone marrow harvests for transplantation</li> <li>• discuss the process of peripheral blood stem cell collections with families and obtain informed consent</li> <li>• provide conditioning regimens, peri-transplant care, and supportive care for patients undergoing stem cell transplantation</li> <li>• discuss the pharmacology of the commonly used immunosuppressants</li> <li>• recognise the late effects of HSCT in children, including growth, fertility, and second malignancy.</li> </ul>	

DOMAIN 4		SPECIFIC CANCERS – MULTIDISCIPLINARY MANAGEMENT AND TREATMENT	
Theme 4.2		Specific Cancers	
Learning Objective 4.2.5		Treat and manage non-malignant haematological diseases	
Knowledge		Skills	
<ul style="list-style-type: none"> <li>describe the management of patients with haemophilia or disorders such as Von Willebrand's disease</li> <li>describe the management of patients with acquired aplastic anaemia</li> <li>describe the management of patients with inherited bone marrow failure syndromes</li> <li>describe the management of patients with paroxysmal nocturnal haemoglobinuria</li> <li>explain the importance of prompt treatment of bleeding in a haemophiliac patient, particularly the close monitoring of head injuries in accordance with local protocols</li> <li>identify the main risk factors for thrombosis</li> <li>investigate and manage thrombosis in association with intravenous catheters</li> <li>describe the therapeutic options available to manage thrombosis and risks associated with anticoagulants</li> <li>describe the clinical indications for blood product support, including the choice of blood products and irradiated blood products</li> <li>recognise the hazards of blood transfusion, including transfusion transmitted infection and transfusion reactions</li> <li>describe the differential diagnosis and initial management of cytopenias, including idiopathic thrombocytopenic purpura (ITP)</li> <li>explain the clinical presentation of sickle cell disease and the acute management of sickle bone crisis</li> <li>recognise splenic sequestration and sickle chest syndrome with the need for prompt intervention</li> <li>recognise central nervous system (CNS) complications of sickle cell disease.</li> </ul>		<ul style="list-style-type: none"> <li>interpret blood indices, reticulocytes, ferritin, B12, and folate</li> <li>interpret a coagulation screen and identify further tests required, particularly in relation to DIC</li> <li>perform the administration of blood products, especially to immunocompromised patients</li> <li>manage blood transfusion reactions</li> <li>recognise the clinical presentation of haemolysis and initiate the laboratory evaluation</li> <li>diagnose and manage haemoglobinopathies and common causes of anaemia</li> <li>perform a diagnostic work up of a patient with isolated anaemia, leukopenia, or thrombocytopenia</li> <li>use transfusion programs and explain the principles of iron chelation therapy</li> <li>identify and manage bone marrow failure syndromes, e.g. Fanconi's anaemia and Blackfan-Diamond anaemia</li> <li>identify the clinical presentation and laboratory features of the thalassaemias</li> <li>interpret laboratory investigations of haemolysis</li> <li>manage haemolytic anaemias, both acquired, such as antibody mediated, or congenital, such as hereditary spherocytosis</li> <li>manage haemoglobinopathies, including thalassaemia.</li> </ul>	

DOMAIN 4		SPECIFIC CANCERS – MULTIDISCIPLINARY MANAGEMENT AND TREATMENT	
Theme 4.2		Specific Cancers	
Learning Objective 4.2.6		Treat and manage renal tumours	
Knowledge		Skills	
<ul style="list-style-type: none"> <li>describe the incidence of Wilm’s tumour</li> <li>describe the congenital anomalies associated with Wilm’s tumour and the current strategies for screening</li> <li>recognise the pathological subtypes of renal tumours, including nephroblastomatosis, Wilm’s tumour, clear cell sarcoma of the kidney, mesoblastic nephroma, and rhabdoid tumour of the kidney</li> <li>explain the relationship between the histology of Wilm’s tumour and prognosis, including the prognostic significance of histology after chemotherapy</li> <li>identify the cytogenetic and molecular aspects of Wilm’s tumour</li> <li>describe how to stage Wilm’s tumour pre- and post-surgery</li> <li>recognise the principles of treatment for all stages of Wilm’s tumour according to North American and European protocols</li> <li>describe the principles of treating bilateral Wilm’s tumour</li> <li>explain the complications of Wilm’s tumour, its treatment and late effects of treatment</li> <li>recognise the significance of nephroblastomatosis in Wilm’s tumour.</li> </ul>		<ul style="list-style-type: none"> <li>explain the differential diagnosis of a renal mass</li> <li>explain the upfront staging of patients diagnosed with renal tumours</li> <li>use therapeutic modalities including chemotherapy, surgery, and radiation therapy</li> <li>manage potential bleeding diathesis as part of primary investigation and biopsy of Wilm’s tumour</li> <li>manage hypertension secondary to a renal mass</li> <li>manage patients with the following conditions: <ul style="list-style-type: none"> <li>recurrent Wilm’s tumour</li> <li>mesoblastic nephroma</li> <li>rhabdoid tumour of the kidney, including staging and investigation for primary tumours in the posterior fossa</li> <li>clear cell sarcoma of the kidney</li> <li>mesoblastic nephroma</li> </ul> </li> <li>manage clear cell sarcoma of the kidney, explaining the current management principles and timing of radiation therapy</li> <li>manage rhabdoid tumours of the kidney, considering age at presentation and staging investigations unique to this tumour.</li> </ul>	

<b>DOMAIN 4</b>		<b>SPECIFIC CANCERS – MULTIDISCIPLINARY MANAGEMENT AND TREATMENT</b>	
<b>Theme 4.2</b>		Specific Cancers	
<b>Learning Objective 4.2.7</b>		Treat and manage neuroblastoma	
<b>Knowledge</b>		<b>Skills</b>	
<ul style="list-style-type: none"> <li>describe prognostic factors and prognosis according to age and stage</li> <li>describe the staging systems and biology of neuroblastoma (NBL)</li> <li>explain genetic variables which have significance for the prognosis, such as MYCN amplification</li> <li>describe current international treatment strategies</li> <li>explain the side-effects of treatment and the risks associated with HDT, for example veno-occlusive disease (VOD)</li> <li>describe the principles of managing relapsed NBL.</li> </ul>		<ul style="list-style-type: none"> <li>recognise clinical presentation of NBL by age and by anatomic site, with and without metastases including stage IV</li> <li>manage the clinical problems associated with NBL, including hypertension, spinal cord compression, Horner’s syndrome, and abdominal mass</li> <li>recognise and evaluate laboratory findings in NBL, including urinary catecholamines, neurone specific enolase, ferritin and lactate dehydrogenase (LDH), and MYCN amplification</li> <li>outline the Shimada scoring system</li> <li>identify NBL cells in bone marrow</li> <li>use radiological investigations to diagnose and stage NBL.</li> </ul>	

<b>DOMAIN 4</b>		<b>SPECIFIC CANCERS – MULTIDISCIPLINARY MANAGEMENT AND TREATMENT</b>	
<b>Theme 4.2</b>		Specific Cancers	
<b>Learning Objective 4.2.8</b>		Treat and manage hepatic tumours	
<b>Knowledge</b>		<b>Skills</b>	
<ul style="list-style-type: none"> <li>describe common paediatric liver tumours, including hepatoblastoma, and sarcoma</li> <li>identify rarer presentations of tumours such as hepatocellular carcinoma and lymphomas</li> <li>recognise the importance of alpha fetoprotein level in diagnosis, response assessment and screening</li> <li>assess the curative role of surgery in localised disease and the role of systemic chemotherapy</li> <li>identify the role of hepatic transplantation in liver tumours.</li> </ul>		<ul style="list-style-type: none"> <li>identify the clinical presentation of liver tumours and the clinical manifestations</li> <li>recognise syndromes that increase the risk of hepatic tumours</li> <li>manage the clinical problems associated with hepatoblastoma</li> <li>explain laboratory findings in hepatoblastoma and recognise any prognostic significance they might have</li> <li>use radiological investigations to diagnose and stage hepatoblastoma, including the ability to stage the pretext</li> <li>apply surveillance methods for recurrence and late effects of therapy.</li> </ul>	

<b>DOMAIN 4</b>	<b>SPECIFIC CANCERS – MULTIDISCIPLINARY MANAGEMENT AND TREATMENT</b>	
<b>Theme 4.2</b>	Specific Cancers	
<b>Learning Objective 4.2.9</b>	Treat and manage retinoblastoma	
<b>Knowledge</b>	<b>Skills</b>	
<ul style="list-style-type: none"> <li>explain the inheritance pattern of bilateral retinoblastoma</li> <li>describe the epidemiologic, genetic, and clinical features of unilateral and bilateral retinoblastoma</li> <li>identify common metastatic sites of retinoblastoma</li> <li>describe the staging of retinoblastoma according to the intraocular extent of the tumour</li> <li>explain the role of surgery, irradiation, chemotherapy, and photocoagulation in the treatment of retinoblastoma.</li> </ul>	<ul style="list-style-type: none"> <li>recognise the clinical presentation of retinoblastoma and the clinical manifestations of trilateral retinoblastoma</li> <li>use imaging modalities to determine the extent and metastatic spread of retinoblastoma</li> <li>conduct screening and follow-up of parents and siblings of patients diagnosed with retinoblastoma</li> <li>explain interventions, including surgery, chemotherapy, and radiation therapy</li> <li>recognise prognostic features and prognosis of retinoblastoma according to stage and histology</li> <li>identify the complications and late effects of retinoblastoma, including the risk of secondary malignancy in unilateral or bilateral retinoblastoma.</li> </ul>	

<b>DOMAIN 4</b>	<b>SPECIFIC CANCERS – MULTIDISCIPLINARY MANAGEMENT AND TREATMENT</b>	
<b>Theme 4.2</b>	Specific Cancers	
<b>Learning Objective 4.2.10</b>	Treat and manage rare tumours	
<b>Knowledge</b>	<b>Skills</b>	
<ul style="list-style-type: none"> <li>explain the importance of wide consultation, including with colleagues in adult specialties when managing rare tumours in childhood</li> <li>describe the principles of treatment in adrenocortical tumours, malignant melanoma, nasopharyngeal carcinoma and thyroid carcinoma, and other rare tumours.</li> </ul>	<ul style="list-style-type: none"> <li>liaise with colleagues and recognise the importance of a multidisciplinary team approach when considering the diagnosis of a rare tumour in childhood.</li> </ul>	

DOMAIN 4		SPECIFIC CANCERS – MULTIDISCIPLINARY MANAGEMENT AND TREATMENT	
Theme 4.2		Specific Cancers	
Learning Objective 4.2.11		Treat and manage bone tumours	
Knowledge		Skills	
<ul style="list-style-type: none"> <li>describe the predisposing factors and potential metastatic sites associated with osteosarcoma and Ewing’s tumours</li> <li>recognise the different pathologic subtypes of osteosarcoma and their effect on prognosis</li> <li>identify the different molecular subtypes of the Ewing’s family of tumours and their effect on prognosis</li> <li>explain the differential diagnoses for plain x-ray appearances of a suspected bone tumour</li> <li>explain the role of neoadjuvant chemotherapy and consolidation post-operatively in the management of bone tumours</li> <li>recognise the historical development of bone tumour management via serial clinical trials</li> <li>describe the relevance of histological margins at resection and possible indications for further surgery or adjuvant radiotherapy</li> <li>recognise the relevant prognostic indicators in different bone tumours, such as site, tumour volume, and histopathological response to treatment</li> <li>explain the rehabilitation requirements for limb sparing, joint sparing surgery, and amputation</li> <li>describe the growth requirements and post-operative management for prosthetic insertions</li> <li>describe the late effects of bone tumour multi-modality management, including the risk of secondary malignancies.</li> </ul>		<ul style="list-style-type: none"> <li>participate as a member of the bone and soft tissue sarcoma tumour multidisciplinary team in the clarification of diagnoses, staging, and treatment planning</li> <li>apply imaging modalities to elicit potential metastatic sites, including imaging the whole region above a primary limb site to look for skip metastases</li> <li>recognise current staging systems for patients with bone tumours</li> <li>use multimodal therapies used to treat bone tumours, including surgery, chemotherapy, and radiation therapy</li> <li>conduct long-term follow-up of patients treated for bone tumours</li> <li>assess the role and limitations of surgery, including the use of prostheses liaison with site-specialised sarcoma orthopaedic oncologic surgeons.</li> </ul>	

DOMAIN 4		SPECIFIC CANCERS – MULTIDISCIPLINARY MANAGEMENT AND TREATMENT	
Theme 4.2		Specific Cancers	
Learning Objective 4.2.12		Treat and manage soft tissue sarcomas	
Knowledge		Skills	
<ul style="list-style-type: none"> <li>describe cytogenetic and molecular genetic abnormalities associated with soft tissue sarcomas</li> <li>explain the histological subtypes of soft tissue sarcomas relative to prognosis and patterns of presentation and spread</li> <li>discuss the role of surgery, chemotherapy, and radiotherapy in the treatment of soft tissue sarcomas and current international treatment strategies</li> <li>describe the prognostic features of soft tissue sarcomas</li> <li>describe the prognosis of rhabdomyosarcoma according to stage, histology, and anatomic site of the primary tumour.</li> </ul>		<ul style="list-style-type: none"> <li>recognise the clinical presentation of rhabdomyosarcoma affecting:               <ul style="list-style-type: none"> <li>head and neck, parameningeal vs. non-parameningeal</li> <li>nasopharyngeal</li> <li>orbital</li> <li>pelvic and extremities</li> </ul> </li> <li>recognise the different subtypes of rhabdomyosarcoma, sites of primary disease at different ages, and the effects on prognosis</li> <li>identify the molecular basis of rhabdomyosarcoma, the common translocations and their prognosis</li> <li>stage patients with soft tissue sarcomas</li> <li>manage multimodal with therapies, including surgery, chemotherapy, and radiation therapy</li> <li>explain the principles of local control.</li> </ul>	



DOMAIN 4	SPECIFIC CANCERS – MULTIDISCIPLINARY MANAGEMENT AND TREATMENT
Theme 4.2	Specific Cancers
Learning Objective 4.2.13	Treat and manage central nervous system tumours
Knowledge	Skills
<ul style="list-style-type: none"> <li>describe the epidemiology of CNS tumours</li> <li>explain cytogenetic and molecular genetic abnormalities associated with CNS tumours</li> <li>recognise the association between brain tumours and heritable syndromes</li> <li>recognise neuropathological subtypes and grading of brain tumours and their relation to tumour site, pattern of spread, and prognosis</li> <li>describe neuro-imaging modalities, including positron emission tomography (PET)</li> <li>recognise the importance of staging in treatment and prognosis, including the use of cerebrospinal fluid (CSF) cytology and serum and CSF tumour markers</li> <li>explain the role of surgery, irradiation, and chemotherapy in the treatment of CNS tumours</li> <li>describe chemotherapy agents and delivery techniques in relation to the blood brain barrier</li> <li>describe the basics of radiobiology in relation to the effect of differing particles (photons vs. protons), fractionation and dose on normal brain, and spinal and tumour tissue</li> <li>explain radiotherapy planning techniques, including planning volumes and delivery techniques</li> <li>recognise the complications and late effects of brain tumours arising from the tumour, surgery, and radiotherapy, and chemotherapy related to patient's age and stage of development</li> <li>identify potential neurological, endocrinological, cognitive, behavioural, and social sequelae of CNS tumours and their treatment</li> <li>recognise secondary malignancies associated with treatment of CNS tumours including the management of a brain tumour as a second malignancy.</li> </ul>	<ul style="list-style-type: none"> <li>identify the different clinical presentations of CNS tumours according to age, anatomical position, and presence of raised intracranial pressure</li> <li>interpret neuro-images</li> <li>work within the framework of a neuro-oncology multidisciplinary team in planning a safe initial diagnostic workup of a patient with a CNS tumour and in planning therapy</li> <li>apply a multidisciplinary team approach to rehabilitation, including: <ul style="list-style-type: none"> <li>physical therapy</li> <li>speech and language</li> <li>special senses, vision and hearing impairment</li> <li>education, knowledge of special educational need provision</li> <li>dietetics, management of obesity and failure to thrive</li> <li>endocrine, assessment and replacement</li> <li>psychosocial care</li> </ul> </li> <li>identify and use modalities to determine the extent and metastatic spread of CNS tumours</li> <li>monitor the response to treatment of CNS tumours using clinical, imaging, biochemical, and histological markers.</li> </ul>

<b>DOMAIN 4</b>	<b>SPECIFIC CANCERS – MULTIDISCIPLINARY MANAGEMENT AND TREATMENT</b>	
<b>Theme 4.2</b>	Specific Cancers	
<b>Learning Objective 4.2.14</b>	Treat and manage lymphoproliferative disorders and malignancies related to immunodeficiencies	
<b>Knowledge</b>	<b>Skills</b>	
<ul style="list-style-type: none"> <li>describe inherited lymphoproliferative disorders</li> <li>explain inherited immunodeficiencies, including the genetics and risks to siblings, such as seen in Wiskott-Aldrich syndrome, ataxia-telangiectasia, x-linked lymphoproliferative syndrome (XLP), severe combined immunodeficiency (SCID), combined immunodeficiency, chronic granulomatous disease (CGD) etc</li> <li>describe the risk factors for development of lymphoproliferative disorders following solid organ and bone marrow transplantation</li> <li>identify viral induced immunodeficiencies including those attributed to HIV and EBV</li> <li>outline the molecular and biologic aspects of lymphoproliferative disorders.</li> </ul>	<ul style="list-style-type: none"> <li>use investigations for diagnosis and sibling screening</li> <li>assess the investigations and surveillance needed for post-transplant patients</li> <li>recognise potential of prophylaxis where appropriate.</li> </ul>	

<b>DOMAIN 4</b>	<b>SPECIFIC CANCERS – MULTIDISCIPLINARY MANAGEMENT AND TREATMENT</b>	
<b>Theme 4.2</b>	Specific Cancers	
<b>Learning Objective 4.2.15</b>	Treat and manage myeloproliferative and myelodysplastic disorders	
<b>Knowledge</b>	<b>Skills</b>	
<ul style="list-style-type: none"> <li>describe the oncogenic proteins and regulation of haematopoiesis</li> <li>recognise and explain MDS of childhood, including refractory anaemia with excess blasts (RAEB), refractory anaemia with excess blasts in transformation (RAEB-T), chronic myelogenous leukaemia (CML), juvenile myelomonocytic leukaemia (MML).</li> </ul>	<ul style="list-style-type: none"> <li>recognise the clinical presentations and assess patients with MDS</li> <li>use investigations such as chromosome analysis and specific gene testing</li> <li>manage transient myeloproliferative states associated with trisomy 21, especially in the newborn period</li> <li>conduct ongoing surveillance for specific patient groups such as trisomy 21.</li> </ul>	

<b>DOMAIN 4</b>	<b>SPECIFIC CANCERS – MULTIDISCIPLINARY MANAGEMENT AND TREATMENT</b>	
<b>Theme 4.2</b>	Specific Cancers	
<b>Learning Objective 4.2.16</b>	Treat and manage histiocytic disorders	
<b>Knowledge</b>	<b>Skills</b>	
<ul style="list-style-type: none"> <li>describe the biology of this group of disorders, including awareness of the spectrum of diseases from benign disease with a very good prognosis to malignant disease.</li> </ul>	<ul style="list-style-type: none"> <li>manage the staging of diseases</li> <li>manage these diseases, including endocrine and other systems complications which can occur</li> <li>recognise complications of the illness, such as diabetes insipidus with posterior pituitary involvement and potential neurocognitive side effects with CNS involvement</li> <li>surveillance for recurrence and effects of therapy.</li> </ul>	

<b>DOMAIN 4</b>	<b>SPECIFIC CANCERS – MULTIDISCIPLINARY MANAGEMENT AND TREATMENT</b>	
<b>Theme 4.2</b>	Specific Cancers	
<b>Learning Objective 4.2.17</b>	Treat and manage germ cell tumours and endocrine tumours	
<b>Knowledge</b>	<b>Skills</b>	
<ul style="list-style-type: none"> <li>describe the pathogenesis, biology, and clinical course of germ cell tumours</li> <li>explain relevance of tumour markers in relation to biology.</li> </ul>	<ul style="list-style-type: none"> <li>recognise the clinical presentation of germ cell tumours and the clinical manifestations</li> <li>recognise syndromes, especially genetic mutations, that increase the risk of germ cell tumours</li> <li>manage the clinical problems associated with germ cell tumours, including recognition that they are midline tumours and can have mixed histology with both benign and malignant elements</li> <li>recognise laboratory findings in germ cell tumours such as tumour markers beta human chorionic gonadotropin (bHCG) and alpha fetoprotein</li> <li>use radiological investigations to diagnose and stage germ cell tumours</li> <li>recognise the importance and relevance of tumour markers in the diagnostic work up and subsequent surveillance of germ cell tumours</li> <li>explain the prognosis</li> <li>provide surveillance for recurrence and late effects of therapy.</li> </ul>	

## ACRONYMS AND INITIALISMS

<b>ALL</b>	acute lymphoblastic leukaemia
<b>AML</b>	acute myeloid lymphoma
<b>BCR/ABL</b>	breakpoint cluster region/Abelson
<b>βHCG</b>	beta-human chorionic gonadotropin
<b>CGD</b>	chronic granulomatous disease
<b>CML</b>	chronic myelogenous leukaemia
<b>CNS</b>	central nervous system
<b>CPR</b>	cardiopulmonary resuscitation
<b>CSF</b>	cerebrospinal fluid
<b>CT</b>	computed tomography
<b>DIC</b>	disseminated intravascular coagulation
<b>EBV</b>	Epstein-Barr virus
<b>FDG-PET</b>	fluorodeoxyglucose positron emission tomography
<b>HDT</b>	high dose therapy
<b>HLA</b>	human leucocyte antigen
<b>HSCT</b>	haemopoietic stem cell transplantation
<b>ICP</b>	intracranial pressure
<b>ITP</b>	idiopathic thrombocytopenic purpura
<b>LDH</b>	lactate dehydrogenase
<b>MDS</b>	myelodysplastic syndrome
<b>MML</b>	myelomonocytic leukaemia
<b>MRD</b>	minimal residual disease
<b>MRI</b>	magnetic resonance imaging
<b>MYCN</b>	v-myc myelocytomatosis viral related oncogene, neuroblastoma derived (avian)
<b>NBL</b>	neuroblastoma
<b>NF-1</b>	neurofibromatosis type 1
<b>NHL</b>	non-Hodgkin's lymphoma
<b>PET</b>	positron emission tomography
<b>RAEB</b>	refractory anaemia with excess blasts

<b>RAEB-T</b>	refractory anaemia with excess blasts in transformation
<b>SCID</b>	severe combined immunodeficiency
<b>SVC</b>	superior vena cava
<b>TBI</b>	total body irradiation
<b>VOD</b>	veno-occlusive disease
<b>XLP</b>	x-linked lymphoproliferative syndrome