



# CURRICULUM

MD Radiotherapy (Clinical Oncology)

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**Program Director – Muhammad Jawaid A. Mallick, MD**

**Program Coordinator – Aziz A. Siddiqui**

**Department of Oncology**  
**Ziauddin University Karachi**

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## INTRODUCTION

### MD Programme in Radiotherapy (Clinical Oncology)

Subsequent to the approval granted by Pakistan Medical and Dental College Karachi, it has been decided to start MD programmes in the field of radiotherapy at the Department of Oncology, Ziauddin University, Karachi. A comprehensive Residency Training Programme in Radiotherapy (Clinical Oncology) has been designed to graduate well trained oncologists with high professional competence in modern diagnostic and therapeutic approach in the management of oncological diseases. The specialty of radiotherapy (clinical oncology) involves all aspects of the management of patients with malignant disease, from diagnosis through treatment with both radiotherapy and systemic therapies to management and symptom control in advanced and recurrent disease.

The four-year scheme residency training programme shall fulfill the following objectives:

- To produce well-qualified clinical oncologists and radiotherapist to meet the need of increasing demand of oncological services.
- To provide comprehensive teaching and training in all subjects related to clinical oncology and radiotherapy and oncologically-related diseases.
- To provide a structure overview of the theory and practice of clinical oncology including the principles of surgical oncology, medical oncology and radiation oncology. The emphasis will be placed on multi-disciplinary approaches to patient management using the Hospital's specialized unit structure.

The syllabus is stated in general terms as the relevant topics are continually advancing and candidates and faculty will be required to keep themselves aware of new developments. In the first 2 years, it is planned to offer a minimum of 175 hours of instruction including lectures, tutorials and practicals, according to the following distribution:

Cancer Biology and Radiobiology	15 Hrs.
Clinical Pharmacology	20 Hrs.
Medical Statistics	15 Hrs.
Oncological Science	120 Hrs.
Physics	54 Hrs.

For clinical oncology experience for the next 2 years, the candidates will be rotated in other relevant departments and certain other reputed facilities of the country.

### **Eligibility Criteria**

A candidate will be eligible for induction into the programme provided the following conditions are fulfilled:

- Should possess degree of MBBS or equivalent from a recognized university with one year house job experience.
- Should hold valid registration with PMDC.
- Has passed Selection Examination and cleared Interview.
- Has agreed to accept full-time on-the-job training.
- Shall abide by the rules and regulations of this University.

### **Evaluation**

- The examination will be held at the end of four years training programme consisting of theory, clinical examination and defense of thesis.
- The candidate will be eligible to take final examination provided his thesis is accepted and one paper and one review article is published in PMDC approved Journal.
- The candidate will be permitted one Final Examination and 2 Re-sit Examination.

### **MD Training In Radiotherapy (Clinical Oncology)**

The 4-year training program in clinical oncology will include a minimum of 2 years full-time clinical training in the diagnosis and management of a broad spectrum of neoplastic diseases. Full-time clinical training means that at least 80% of the trainee's professional time and effort during a standard working week is dedicated to clinical activities (patient care or education). These may include the primary care of cancer patients, supervision of cancer patients on the general medical service or in designated medical oncology in-patient units, oncologic consultations and consultation rounds, oncology ambulatory care, scheduled clinical conferences, performance of procedures on patients, review of imaging, pathology, and other diagnostic materials, other direct patient care, attending national and international scientific meetings, and reading relevant literature.

Clinical activities may also include research involving patient contact, care, and treatment. Research experience for 1 or more years, including international training, will be strongly encouraged, especially for the oncologists who want an academic career.



## **Educational set-up**

### **Programme leader**

The programme leader fully committed to the training programme and related activities are based at the primary training site of the clinical oncology programme.

The trainee will be required to maintain a record of training. The programme leader will countersign it, as appropriate, to confirm the satisfactory fulfillment of the required training experience and the acquisition of the competencies that are cumulated in the specialty curriculum. It will remain the property of the trainee and must be signed at the annual assessments. The assessment of the trainee will be based on the standard format of annual reviews.

### **Faculty**

#### **Faculty members**

The clinical oncology programme faculty will include a minimum of three full-time qualified teaching faculty members, including the program leader. All the faculty members will be certified in clinical oncology (radiotherapy) or possess equivalent qualifications, and each of them will devote substantial time (at least 10 hours per week) to teaching, research, administration, and/or the critical evaluation of the performance, progress, and competence of the trainees.

#### **Faculty standards**

The teaching staff will demonstrate an interest in teaching, and set an example for trainees by documented engagement in the following pursuits: actively sharing in a medical oncology clinical practice; continuing his/her own medical education; active membership in regional, national and international scientific societies; active participation in research; and presentation and publication of scientific studies.

### **Educational programme**

The educational programme in clinical oncology will be organized to provide training and experience at a level high enough for the trainee to acquire the competency of a specialist in the field. The programme will emphasize self-instruction, development of critical analysis of clinical problems, and the ability to make appropriate decisions. Appropriate supervision of the trainees will be provided for the duration of their educational experience.

**Educational environment**

The training programmes will provide an intellectual environment for acquisition of the knowledge, skills, clinical judgment, and attitudes essential to the practice of clinical oncology.

**Professionalism—ethics**

Professionalism will be fostered during Radiotherapy (Clinical Oncology) training. In addition to mastering the comprehensive clinical and technical skills of the consultant clinical oncologist, trainees are expected to maintain the values of professionalism. These values include placing the needs of one's patient ahead of one's self-interest, being responsive to the needs of society, and maintaining a commitment to scholarship and high standards of related research. Trainees, therefore, will be encouraged to participate in professional organizations, community programmes, and institutional committees.

**Responsibility**

Lines of responsibility will be clearly delineated for the trainees in Radiotherapy (clinical oncology).

**Available Institutional facilities****Clinical setting**

The clinical setting includes opportunities to observe and manage patients with a wide variety of neoplastic diseases on an in-patient and out-patient basis. The trainee will have the opportunity to assume the continuing responsibility for both acute and chronically ill patients in order to learn the natural history of cancer, the extent of the effectiveness of the various therapeutic programmes, and how to impart information to the patient, including bad news.

**Hospital facilities**

Modern in-patient, ambulatory care, and laboratory facilities necessary for the overall educational programmes are available and functioning. Adequate pathology services, modern diagnostic radiology services, resources for nuclear medicine imaging, blood banking and blood therapy facilities, and facilities for clinical pharmacology and tumor immunology are available at the training site. A general surgical service and its support are also available, in addition to access to radiation therapy. The program also includes attendance at a multidisciplinary tumor conference, and clinical cancer protocol studies applied according to the guidelines for good clinical practice.

### **Update of skills and knowledge**

Having obtained certification in clinical oncology, the specialist is expected to update the acquired skills and knowledge by participating in Continuing Medical Education programmes such as courses, symposia or self-learning processes on a regular basis.

### **Perception of other specialties**

The support of oncology nursing, pharmacy, rehabilitation medicine, palliative care medicine, and dietetic and psychosocial services are available so that the trainee can perceive the role of other specialties in the total care of the cancer patient.

### **The Curriculum**

#### **Basic scientific principles**

As a foundation for treating malignant disease, the trainee is required to understand the biology of cancer, principles of therapy, and proper conduct and interpretation of clinical research.

#### **Cancer biology**

Trainees will be familiarized with the biology of normal cells and the basic processes of carcinogenesis. They will be imparted an in-depth understanding of gene structure, organization, expression, and regulation, understanding of the cell cycle, its control by oncogenesis, its interaction with therapy, tumor cell kinetics, proliferation, and programmed cell death, and the balance between cell death and cell proliferation, molecular techniques, such as polymerase chain reaction, chromosomal analyses, and other techniques of molecular and tumor cell biology.

#### **Tumor immunology**

The trainee will be imparted basic knowledge of the cellular and humoral components of the immune system and the regulatory action of cytokines on the immune system, the inter-relationship between tumor and host immune systems, including tumor antigenicity; immune mediated antitumor cytotoxicity, and the direct effect of cytokines on tumors.

#### **Etiology, epidemiology, screening, and prevention**

Training will include an understanding of the etiology of genetic and environmental factors in oncogenesis, a basic knowledge in epidemiologic factors and descriptors of disease, the basic principles of screening and risk assessment, the sensitivity and specificity of the test employed and the cost-benefit ratio, the principles and

indications for genetic screening and counseling and the value of prevention in cancer development and what primary, secondary, and tertiary preventive measures may be taken to prevent cancer development.

#### **Clinical research including statistics**

Trainees will be provided an education in the design and conduct of clinical trials. They will be given an exposure to the development and conduct of these trials through international cooperative groups or in-house protocols, including clinical trial design, phase I–II–III trials; review of the ethical, regulatory, and legal issues involved in study design; criteria for defining response to therapy; tools used to assess quality of life; basics of statistics, including statistical methods, requirements for patient numbers in designing studies, and proper interpretation of data; toxicity assessment and grading; role and functioning of the institutional review board and ethical committees; experience obtaining informed consent from patients; government regulatory mechanisms of surveillance; instruction in grant writing and information about mechanisms of support for clinical research; cost of therapy and the cost-effectiveness of therapy; instruction in preparing abstracts, oral and visual presentations, writing articles; and critically evaluating the scientific value of published articles and their influence on daily clinical practice.

#### **Basic principles in the management and treatment of malignant diseases**

The management of malignant diseases requires the expertise of many different medical subspecialties, and the majority of patients with malignant diseases are best managed in a multidisciplinary approach with integration of the various subspecialties because of increasing complexity of modern treatment. The trainee will be required to recognize the contributions of each of these subspecialties in making the diagnosis, assessing disease stage, and treating the underlying disease and its complications. The trainees will interact with each of these disciplines in order to gain an appreciation of the benefits and limitations of each modality. Participation of the trainees in interdisciplinary meetings will be encouraged. They will be made capable of assessing the patient's comorbid medical conditions that may affect the toxicity and efficacy of treatment, in order to formulate a treatment plan and be aware of the special conditions that influence the treatment of the growing population of elderly patients with malignant disorders.

#### **Pathology/laboratory medicine/molecular biology**

Since the definite diagnosis of cancer is based on a cytology or biopsy, the trainees will have the opportunity to review biopsy material and surgical specimens with a pathologist and appreciate the role of the pathologist in confirming the diagnosis of cancer and in determining the severity and extent of disease. Trainees will familiarize themselves with newer pathologic techniques, the contribution of these techniques to the staging and

management of patients, the utility of markers (serum tumor markers, cell membrane markers, DNA markers) and recognize their limitations.

### **Staging procedures**

Trainees should know the tumor–node–metastasis staging system and how to stage a cancer patient. They should know the indications for clinical, radiographic, and nuclear medicine imaging procedures in the diagnosis, staging, and follow-up of patients with malignant diseases. They should learn to assess response to treatment using these tests.

### **Therapy**

#### ***Surgery***

By interacting with surgeons, the trainee will develop an understanding of the indications and contraindications of surgery. They will familiarize with the role of surgery in the staging, cure, and palliation of patients with malignant diseases. The trainee should become familiar with the indications of organ preservation and the sequencing of surgery with other treatment modalities. They should recognize the risks and benefits of surgery as a definitive treatment and as an adjunct to radiotherapy and/or anticancer agents. In addition, the trainees should be aware of postoperative complications.

#### ***Radiation oncology***

The trainee will learn the principles of radiation biology and the indications of radiation therapy as a curative and palliative modality, the principles of treatment planning and dosimetry and the acute and late effects of radiation therapy. The trainee should know when radiation therapy should be sequenced with surgery and/or anticancer agents.

#### ***Anticancer agents***

Trainees should be familiar with the indications and goals of useful treatment with anticancer agents in primary and recurrent malignant disorders. They should know the usefulness of these agents in the neo-adjuvant, concomitant, and adjuvant setting. They should know the indications of anticancer agents as a radiation sensitizer. They should know the importance of dosing and treatment delay of specific anticancer agents. They should be able to assess a patient's comorbid medical conditions in order to determine the risk/benefit ratio of treatment with anticancer agents for that individual patient. Knowledge of the pharmacokinetics, pharmacogenomics, and pharmacology of the various agents should be obtained. Trainees should know the

toxicity profile of each anticancer agent, including long-term hazards, how to adapt the dose and treatment schedule according to the individual patient in case of organ dysfunction, and how to handle these complications.

#### *Biologic therapy*

Trainees will be familiarized with the activities and indications for biologic therapy, including cytokines and hematopoietic growth factors. Knowledge will be imparted on the spectrum of specific side effects and their management and therapeutic combinations with chemotherapy and basic concepts of targeted molecular therapies, such as monoclonal antibodies, tumor vaccines, cellular therapy, and gene-directed therapy.

#### *Supportive and palliative measurements*

Trainees should know what supportive therapy during anticancer therapy is, and should be able to use supportive therapy. They should know the indications of the different supportive treatments and their limitations and side-effects. Trainees should know what palliative therapy is and should be able to determine when palliative care is indicated. They should know what palliative care and end-of-life care is and how to implement this in their clinical practice. They should know that palliative care is an integrated part of medical oncology, and that it has a multidisciplinary dimension.

#### *Supportive measures:*

*Nausea and vomiting.* The trainee should know the various etiologies of nausea and vomiting in patients with malignancies, and recognize the mechanism of action and pharmacology of anti-emetic agents and how to use them in daily clinical practice

*Infections and neutropenia.* The trainee should know the principles of diagnosis and management of infections and neutropenic fever in all types of cancer patients. They should know how to treat and prevent infections. They should know the indications of the use of hematologic growth factors.

*Anemia.* The trainee should know the indications and complications of red blood cell transfusions. They should be aware of the options regarding preparation and administration of these products. They should know the appropriate use of erythropoietin.

*Thrombocytopenia.* The trainee should know the indications and complications of platelet transfusions. They should be aware of the options regarding preparation and administration of these products.

*Marrow and peripheral-blood progenitor cells.* Trainees should be familiar with the methods for marrow and peripheral-blood progenitor cells procurement and cryopreservation.

*Organ protection.* The trainee should be familiar with the use of organ-protective measurements and treatments. They should know the indications and side-effects of different organ-protective agents. They should know the techniques of gonad preservation to ensure the fertility of the patient (cryopreservation techniques).

*Mucositis.* The trainee should be able to distinguish mucositis, which is infectious, from that caused by anticancer agents. They should be aware of the need for pain medication and topical anesthetics as palliation.

*Malignant effusions.* The trainee should know the signs, symptoms, and treatments and their indication of ascites and pleural and pericardial effusions. They should be able to treat effusions by paracentesis

*Extravasation.* Trainees should know that prevention is the most important factor in extravasation. They should be able to diagnose and treat extravasation.

*Oncologic emergencies.* Trainees should recognize the clinical presentations that require immediate intervention (e.g., spinal cord compression, pericardial tamponade). For patients in whom a diagnosis of cancer is suspected, the trainee should know the proper approach for obtaining a tissue diagnosis. They should know what therapy is required in the acute and chronic setting.

*Paraneoplastic syndromes.* Trainees should recognize the “remote effects” of malignancy, potentially manifested in every organ system. They should recognize which malignancies are most commonly associated with the individual syndromes. Trainees should know the appropriate management of each syndrome.

*Nutritional support.* Trainees should know the indications for and complications of enteral and parenteral support.

Palliative care and end-of-life care:

*Pain.* Trainees should be adept in their ability to assess location and severity of pain. They should have a working knowledge of the World Health Organization pain ladder and an understanding of the pharmacology and toxicity of the opiate narcotics and other analgesics. They should be able to manage cancer pain with the available modalities and recognize when referral for an invasive palliative intervention is indicated.



*Other symptoms.* Trainees should be able to palliate other symptoms (respiratory tract, gastrointestinal tract, neurologic symptoms, cutaneous and mucosal symptoms, anorexia and cachexia, dehydration). They should know how to handle end of life symptoms.

Communication. The trainees should be able to communicate with the patient and his family. They should be able to break bad news and act adequately in difficult situations. The trainees should learn to communicate and work together with other professional health care professionals in a team (e.g., nurses, social workers, psychologists).

#### Rehabilitation

The trainee should recognize the role of physical therapy, particularly in the postoperative setting. Trainees should recognize the role of occupational therapy, speech therapy, and swallowing therapy.

#### Management and treatment of individual cancers

Having understood the general principles of treatment, the trainee will be instructed in the care of individual cancer types and the unique considerations for each malignant disease. For each specific disease, the trainee will learn the epidemiology, pathophysiology, genetics, signs and symptoms, diagnostic work-up, treatment, and follow-up. The trainee should be able to communicate and discuss these topics with the patients. For each tumor, specific items may be more important. They are stated below.

#### Head and neck cancers

Trainees should know how a proper head and neck examination is performed. They should know the risk factors for head and neck cancers and natural histories of the individual primary tumor sites. Staging of head and neck cancers should be emphasized as the proper evaluation for therapeutic recommendations. Panendoscopy is needed for staging. Trainees should recognize that staging is the basis for selecting surgery and or radiation therapy as definitive treatment. They should be aware of the role of chemotherapy and palliation of advanced disease. They should recognize when organ preservation may be an option. They should be aware of the long-term management of these patients and of risks of second malignancies.

#### Lung cancer and mesothelioma

The trainees should be aware of the risk factors for developing lung cancer or mesothelioma.

### **Small-cell lung cancer**

Trainees should be familiar with the multimodality approach to limited-stage disease and the role of chemotherapy in patients with advanced disease. They should know the indications for central nervous system treatment.

### **Non-small-cell lung cancer**

Trainees should be familiar with criteria of inoperability and the surgical and nonsurgical staging of patients with localized disease. They should be familiar with the value of surgery, chemotherapy, and radiation therapy in localized disease, often given as combined modality treatment, and the role of chemotherapy and/or radiation therapy in the palliation of advanced disease.

### **Mesothelioma**

Trainees should be familiar with the risk factors for mesothelioma, criteria for operability, and the value of chemotherapy.

### **Gastrointestinal cancers**

#### **Esophageal cancer**

Trainees should appreciate the risk factors for esophageal cancer. They should know the indications for endoscopy in the diagnosis and staging of the disease. Trainees should learn the indications for nutritional support. They should recognize the importance of combined modality therapy, as well as the role of palliative chemotherapy and other supportive care measures.

#### **Gastric cancer**

Trainees should recognize unique risk factors for gastric cancer. They should understand major surgical approaches to the disease and recognize the potentially curative role of surgery and the relative roles of combined modality therapy, as well as the role of palliative chemotherapy and other supportive measures.

#### **Colon cancer**

Trainees should appreciate the importance of surgical staging and recognize the indications for adjuvant therapies in colon and rectal cancers and the role of chemotherapy in advanced metastatic disease. They should recognize heritable types of colon cancer and the differences in their patterns of spread and their management. They should understand risk factors and rationale for screening for colorectal cancer, as well as its chemoprevention, and should appreciate the role of genetic testing.

### **Anal cancer**

Trainees should recognize the association of human papilloma virus and anal cancer. They should appreciate the role of combined modality therapy in organ preservation.

### **Hepatobiliary cancers**

Trainees should understand the epidemiology and risk factors for hepatobiliary cancers. They should learn the importance of alpha-fetoprotein in diagnosis, response assessment, and screening. They should know the indications for the curative role of surgery in localized disease and the role of systemic and intra-arterial chemotherapy.

### **Pancreatic cancer**

Trainees should appreciate the risk factors for the development of pancreatic cancer. They should know the unique genetic aspects of pancreatic cancer and be familiar with the roles of endoscopy and molecular diagnosis in pancreatic cancer. They should know that surgery has a curative role in rare patients and may provide palliation in others. Also they should recognize the palliative role of chemotherapy in advanced disease.

### **Genitourinary cancers**

#### **Renal cell cancer**

Trainees should understand the diagnostic aspects of renal cell cancer and be familiar with paraneoplastic aspects of the disease. They should appreciate the curative role of surgery in localized disease and the value of biologic therapies in the palliation of advanced disease.

#### **Urothelial cancers**

Trainees should know the risk factors of urothelial cancers, the differences between localized and invasive disease, and the propensity for transitional-cell carcinoma to recur. They should recognize the role of urine cytology and cystoscopy in the staging and follow-up of patients. They should know the role of intravesical therapy in the management of superficial bladder cancer, as well as the role of surgery in early-stage invasive

cancers. They should appreciate the value of combined modality therapy in localized and urothelial disease and the management of metastatic transitional-cell carcinoma.

#### **Penile cancer**

Trainees should appreciate the role of human papilloma virus in the etiology of penile cancers. They should know the potentially curative role of combined modality treatment.

#### **Prostate cancer**

Trainees should understand the epidemiology and screening of prostate cancer, including the indications for prostate-specific antigen in screening and follow-up of patients with prostate cancer. They should appreciate the importance of histologic grading. They should recognize the role of observation, surgery, or radiation therapy in the management of early stage disease, and the application of hormone therapy and chemotherapy in advanced disease.

#### **Germ cell tumors**

The trainees should be able to classify patients according to the International Germ Cell Collaborative Group classification. Trainees should know the utility of tumor markers in the diagnosis, prognosis, and follow-up of patients. They should know the roles of surgery, radiotherapy, and chemotherapy. They should know that combination chemotherapy is curative in advanced disease.

#### **Gynecologic malignancies**

##### **Ovarian cancer**

Trainees should recognize that a predisposition of ovarian cancer is heritable. They should understand the role of appropriate surgical procedures in the initial staging and initial treatment of patients and subsequent systemic treatment. They should appreciate the indications for chemotherapy in localized and advanced disease.

##### **Uterine cancer**

Trainees should recognize the role of hormones and hormonal therapies in the etiology of endometrial cancers. They should know the curative role of surgery in early-stage disease and the value of radiation therapy in the multidisciplinary approach of more advanced disease. They should also recognize the role of chemotherapy and hormone therapy in the management of both local and metastatic disease.

##### **Cervical cancer**

Trainees should recognize unique risk factors for cervical cancer. They should recognize that staging is the basis for selecting surgery and/or radiation therapy as curative surgery. They should appreciate the role of

chemotherapy in the management of both local disease combined with radiotherapy and in the treatment of advanced disease.

### **Vulvar and vaginal cancers**

Trainees should know about the induction of clear-cell carcinoma of the vagina in women whose mothers received diethylstilbestrol during pregnancy. They should understand proper surveillance and management of these individuals. Trainees should recognize the curative role of surgery in early-stage disease and the need for combination therapy in advanced disease.

### **Breast cancer**

Trainees should have a working knowledge in the interpretation of a mammogram, ultrasound, and magnetic resonance imaging scan of the breast. They should recognize the pathologic and prognostic features that assist in determining the indications for therapy, including how to manage preneoplastic lesions. They should understand the issues that affect the choice of primary treatments, including the value of determination of receptors. They should appreciate the benefits of hormone therapy and or chemotherapy in advanced disease and know the indications for adjuvant therapy. The role of elective chemotherapy regimens should be reviewed and understood. They should recognize the importance of family history and the role for genetic testing and counseling.

### **Sarcomas**

#### **Bone sarcomas**

The trainee should recognize the predisposing situation and condition in the development of primary bone sarcomas. They should appreciate the pathologic spectrum of these lesions and know indications and considerations for limb preservation and therapy for specific tumors.

#### **Soft tissue sarcomas**

The trainees should know the appropriate surgery for initial diagnosis and the indications for limb preservation. They should recognize the roles of chemotherapy, surgery, and radiation therapy, including the specific medical treatment available for gastrointestinal tumors.

## **Skin cancers**

### **Melanoma**

Trainees should have an appreciation for the risk factors and varied clinical appearance of primary melanomas and its precursor lesions, such as dysplastic nevus. They should be able to recognize skin lesions that are benign from those that are potentially malignant. They should know the value of tumor depth and other prognostic factors in assessing prognosis. They should know what surgical procedure is required in making the diagnosis and curative resection. They should be aware of the indications for biologic therapies in the adjuvant setting and the potential risks and benefits of chemotherapy and in advanced disease. Trainees should have a working knowledge in the primary prevention of melanoma as well as the recognition and counseling of patients at high risk for developing melanoma.

### **Basal cell and squamous cell cancers**

Trainees should recognize the clinical appearance of these lesions and appreciate that their occurrence is associated with sun exposure and may be a long-term complication of cancer therapy.

### **Endocrine cancers**

Trainees should know the specific diagnostic work-up and treatment of endocrine cancers. They should know that endocrine cancer may be part of a cancer syndrome due to specific genetic defects. They should know the role of anticancer drugs in the different endocrine cancers.

### **Central nervous system malignancies**

The trainee should be aware of the roles for surgery, radiation therapy, and chemotherapy in primary and metastatic disease involving the central nervous system.

### **Carcinoma of unknown primary site**

The trainee should learn the importance of the tumor histopathology, pathologic analysis, and tumor markers in directing the work-up. In particular, they should recognize the settings in which treatment may affect survival, and when it is palliative.

## **Hematologic malignancies**

### **Leukemia**

The trainee should be familiar with all the pathologic and molecular biologic techniques (cytogenetics, immunophenotyping, polymerase chain reaction) used in the diagnosis of leukemia. They should be familiar with the

current treatment recommendations and their applications for acute lymphoblastic and myeloid leukemia in both the standard adult population and the elderly.

#### **Acute leukemias and myelodysplasia:**

Trainees should be familiar with the risk factors for developing leukemia: They should know the French-American-British classification and its implications for treatment and prognosis. They should appreciate the potential use of marrow transplantation in patients with leukemia and the value of differentiation therapy.

#### **Chronic leukemias**

Trainees should be able to distinguish the chronic leukemias on peripheral-blood smear. Trainees should understand the current therapeutic approaches in the treatment of the chronic leukemias in addition to understanding the expectations of treatment. They should be aware of the indications for marrow transplantation.

#### **Lymphomas**

Trainees should be familiar with the Ann Arbor Staging and World Health Organization classification as well as its strengths, limitations, and current initiatives to improve upon the staging classification.

#### **Hodgkin's disease**

Trainees should be experienced with the staging of Hodgkin's disease and the indications for surgical staging. They should be familiar with the curative role of radiation therapy in early stage disease. They should know the indications for chemotherapy in stages II, III, and IV. Trainees should be aware of the long-term complications of treatment and know what is entailed in the follow-up of patients. They should appreciate the indications for marrow transplantation in patients with relapsed or refractory disease.

#### **Non-Hodgkin's lymphoma**

Trainees should be aware of the association of lymphomas with HIV and immunosuppression. They should be familiar with the Revised European-American Lymphoma classification and the International Prognostic Factors. They should recognize the curative role of chemotherapy and the value of marrow transplantation in relapsed or refractory disease. They should understand different types of low-grade lymphomas and appreciate when treatment is indicated and when observation is appropriate. They should appreciate the roles of radiation therapy, surgery, and chemotherapy, including monoclonal antibodies in staging and treatment of intermediate



grade non-Hodgkin's lymphomas. They should know the challenge and unique clinical properties of high-grade lymphomas and the role for intensive treatment of this subgroup.

### **Cutaneous T-cell lymphoma**

Trainees should recognize the clinical appearance of patients at different stages of the disease. They should be aware of the value of immunophenotyping in the diagnosis. They should appreciate the roles of psoralen and ultraviolet A, radiation therapy, and topical chemotherapy in the initial management of patients. They should be aware of the palliative roles of chemotherapy, biologic agents, and radiation therapy in advanced or refractory disease.

### **Plasma cell dyscrasias**

Trainees should know how to distinguish the plasma cell dyscrasias: monoclonal gammopathy of unknown significance, Waldenstroms, macroglobulinemia, plasmacytoma, multiple myeloma, POEMS (polyneuropathy, organomegaly, endocrinopathy, monoclonal protein, skin changes), and plasma cell leukemia. They should know the indications for treatment in each instance.

### **AIDS-associated malignancies**

The trainee should be familiar with association of central nervous system tumors with immunosuppression and AIDS. The trainee should recognize the increased incidence of malignancy in the HIV-positive population. They should know the indications for treatment of those cancers and be aware of the potential of increased toxicities attributable to concurrent medical problems. Trainees should know the appropriate prophylaxis and treatment for common opportunistic infections.

### **Other Aspects**

#### **Psychosocial aspects of cancer**

- Trainees should know the psychosocial influence of cancer. They should be aware of available resources and recognize when intervention is indicated at all stages of disease.
- The trainee should know the cultural issues that impact on the management of disease.
- They should appreciate the spiritual conflicts associated with the diagnosis and treatment of cancer.
- Trainees should learn to recognize adaptive and maladaptive behavior in coping with disease.
- They should recognize acceptable coping mechanisms by patients and families within the context of the cancer diagnosis.
- Trainees should have an awareness of the issues involved in end-of-life care.

- The trainee should recognize that cancer impacts sexuality and may result in dysfunction as a result of the disease process, treatment, or because of psychological effects.
- Trainees should be familiar with the indication and uses of psychotropic drugs.
- Trainees should have knowledge of the bereavement process.
- The trainee should have an appreciation of the physicians' personal coping.
- Trainees also should know how to integrate family members, pastoral care, nursing support, hospice, and cancer support groups in the multidisciplinary treatment of patients.
- Trainees should be able to communicate with patients and their family. They should be able to break bad news and act adequately in difficult situations. Trainees should learn to communicate and work together with other professional health care takers in a team.

#### **Patient education**

#### **Genetic counseling**

The trainee should be capable of assessing the increased risk of cancer in the patient and the patient's family. They should be aware of the principles for genetic screening and counseling.

#### **Health maintenance**

The trainee should be capable of counseling the patients and their family about known risk factors for subsequent malignancy: diet, smoking, alcohol, and sun exposure.

#### **Long-term complications**

Trainees should recognize long-term complications of each treatment modality employed including the following.

Risk of treatment-induced cancers. Acute myeloid leukemia after chemotherapy, and radiation induced sarcomas

Endocrine dysfunctions Hypothyroidism after neck radiation, sterility with chemotherapy

#### **Chemoprevention measures/clinical trials**

Testing and intervals for follow-up

Bioethics, legal, and economic issues

#### **Informed consent**

The trainee should know the requirements for obtaining informed consent.

### **Ethics**

The trainee should understand the ethics involved in the conduct of medical research.

### **Legal issues**

They should know the legal issues related to anticancer treatment, institution of life support, and withdrawal of life support systems.

### **Cost efficiency**

Trainees should appreciate the cost effectiveness of medical intervention in the management of cancer.

### **Conflict of interest**

The trainee should be aware of guidelines to define conflict of interest within professional activities.

### **Professional attitude**

Trainees must demonstrate professionalism and humanism in their care of patients and their families.

### **Skills**

#### **Anticancer agent administration**

The trainees should have knowledge of how to prescribe and safely administer anticancer agents. They should be able to care and access indwelling venous catheters. They should have knowledge about the handling and disposal of chemotherapeutic and biologic agents.

#### **Bone marrow aspiration, biopsy, and interpretation**

Trainees should be able to perform a marrow aspiration and biopsy. They should have an experience in the interpretation of marrow aspirations and biopsies. Trainees should have a fundamental knowledge about marrow interpretation.

#### **Ommaya reservoir and lumbar puncture**

Training must demonstrate an ability to perform a lumbar puncture and to administer chemotherapy by that route. The trainee should be able to use a subcutaneous device to administer medication. He should be able to

recognize and solve complications of such device. Trainees must be capable of administering chemotherapy through an Ommaya reservoir.

## **CANCER BIOLOGY and RADIOBIOLOGY CURRICULUM**

**(15 Hrs.)**

### **Summary**

An understanding of carcinogenesis, cellular and molecular features of malignancy, including biochemical control, signaling and cell death. Tumor development, growth kinetics, micro-environmental changes, metastasis and immune response. Common laboratory techniques to demonstrate these features. A knowledge of the cellular and molecular basis for the response of cells, tissues and tumors to ionizing radiation and chemotherapy. A knowledge of current models of radiation response and the biological principles underlying the application of radiotherapy to the treatment of disease, including normal tissue responses.

### **General principles of tumor biology**

- Definitions of and distinctions between different types of growth disorder, dysplasia and carcinoma in situ
- The cell cycle, basic cell kinetics, including parameters associated with cell cycle times
- Mechanisms of spread, local invasion/migration, metastasis
- Effects of tumors: local (e.g. pressure), distant (metastatic and non-metastatic)
- Tumor vasculature and angiogenesis

### **Techniques in molecular biology**

- Principles and use of technique only, not details of execution
- Nucleic acid analyses including electrophoresis, hybridization, blotting, PCR, sequencing, transfection
- Micro array techniques
- Transgenic models

### **The genetics of normal and malignant cells**

- Normal chromosomal structure and function, normal gene transcription and its control
- Normal DNA repair mechanisms
- Polymorphisms, mini and microsatellites
- Chromatin structure and function
- Methylation, hypomethylation and methylation reversal
- Chromosomal and genetic changes in malignancy, point mutations, translocations, deletions, gene amplification and over-expression
- Oncogenes, proto-oncogenes, tumor suppressor genes (a knowledge of well established examples in each class is expected)
- Protein-protein interactions

### **Normal and aberrant mechanisms of cell growth control**

- Control of normal cell growth and behavior
- Autocrine, paracrine and endocrine growth factors
- Altered expression, function and control of these mechanisms in malignancy
- Signal transduction (MAP kinases)
- The role of cyclin kinases
- Gene promoters and their activity in normal and malignant cells

### **Cancer genetics**

- Inherited syndromes associated with cancer: ataxia telangiectasia, xeroderma pigmentosum, Nijmegen break syndrome, Li-Fraumeni, Lynch, MEN, Cockayne's, familial polyposis coli, inherited breast cancer syndromes
- Genes conferring susceptibility to cancer
- Mechanisms whereby such genes can be associated with neoplasia
- Linkage analysis
- Principles of genetic counseling

### **The physiology of haemopoiesis**

- Marrow structure and organization
- The haemopoietic microenvironment
- Cell lineages and hierarchies
- Control mechanisms in normal haemopoiesis

### **The immune system**

- Cellular involvement in the immune system
- Antigen recognition and processing
- Dendritic cells
- Clonal expansion of lymphoid cells in response to stimulation
- Immunological surveillance
- Tumor immunology

### **Causation of human cancers**

- Environmental factors and influences
- Carcinogenesis in vitro and in vivo
- Viral carcinogenesis
- Viruses firmly associated with cancer (HPV, EBV etc)
- Radiation carcinogenesis
  - ionizing and non-ionizing radiation associated with carcinogenesis
  - DNA damage and repair (differing effects with various radiation types)

- Nucleotide excision repair
- Genes and products associated with repair
- Normal tissue damage (early and late)

### **Molecular and cell biology of radiation and drug damage and repair**

- Radiation damage at the cellular level (membrane, cytoplasmic, nuclear)
- LET and its relevance to cellular damage
- The basics of experimental molecular radiobiology
- Molecular processes involved in radiation damage and repair
- Time course of repair
- Molecular biology of chemotherapy drug resistance

### **Population radiobiology**

- Production of the cell survival curve
- Descriptive models, e.g. linear quadratic model
- The concept of damage (lethal, sub-lethal, potentially lethal)
- Concept of repair (early and late)
- Effect of cell cycle on radiation sensitivity
- Repopulation
- The cell survival curve as a basis for fractionation
- Terms describing cellular sensitivity (SF2,  $\alpha$ ,  $\beta$ , mean inactivation dose)
- $\alpha/\beta$  ratio and its relevance to acute and late responding tissues
- Isoeffect curves (various forms) and formulae, including BED
- Fractionation and its influence on outcome with varying  $\alpha/\beta$  ratio
- Hyperfractionation, accelerated fractionation and hypofractionation
- Influence of gaps in radiotherapy and their management
- Influence of time on radiation response, including dose rate effects
- Relative biological effect (RBE) and relation to LET
- Use of high LET radiation

### **Normal tissue radiobiology**

- Cellular systems (hierarchical, flexible) and their response to radiation
- Parallel and linear systems
- Normal tissue damage (early and late)
- The concept of normal tissue tolerance
- Factors influencing tolerance

- Effects of radiation on different tissues and organs
- Tolerance levels for different tissues and organs
- Organ tolerance to retreatment with radiation
- Schemes for reporting normal tissue damage

#### **Interaction between radiation and other agents**

- Influence of oxygen on radiosensitivity, including oxygen enhancement ratio (OER)
- Reoxygenation
- Relationship between OER and LET
- Methods of identifying hypoxia experimentally
- Hypoxic cell sensitisers and cytotoxins
- Radiation protectors
- Chemotherapy (before, during or following radiation)
- Basic principles of hyperthermia

### **CLINICAL PHARMACOLOGY CURRICULUM**

**(20 Hrs.)**

#### **Summary**

The emphasis is on cytotoxic drugs, hormones and biological therapies used in clinical practice, their mode of action and side-effects. The syllabus also includes the basic principles of pharmacokinetics and pharmacodynamics, clinical trials and the basic pharmacology of drugs used in the supportive care of patients with cancer.

#### **Mode of action of cytotoxic drugs**

- Mechanisms of action
- Phase specific and cycle specific drugs
- Mechanisms of cell death
- Mechanisms of drug resistance
- Drug resistance modifiers

#### **Drug design and development**

- Novel therapeutic targets
- New drug discovery and development
- Preclinical assessment of candidate compounds
- Clinical studies (Phase I, II, III, IV)

#### **Pharmacokinetics and pharmacodynamics**

- General principles of pharmacokinetics



- Route and timing of administration
- Plasma concentration and its relationship to drug actions
- AUC
- Drug activation, metabolism and clearance
- Protein and tissue binding
- Drug concentration at target site

#### **Principles of clinical use**

- Dose response curves
- Dose intensity
- Single agent and combination therapy
- Adjuvant and neo-adjuvant therapy
- High-dose chemotherapy
- Regional therapy
- Targeting of drugs
- Modification of drug resistance
- The clinical pharmacology and technology of continuous infusion
- The clinical pharmacology of intrathecal treatment

#### **Toxicity of chemotherapy**

- Dose limiting and common toxicities
- Common toxicities
- Dose-related and idiosyncratic toxicity
- Early, intermediate and late toxicity
- Mechanisms of toxicity
- Chemical and other factors modifying drug toxicity
- Safe handling of cytotoxic drugs

#### **The clinical pharmacology of analgesics**

- Morphine and derivatives
- Drug combinations
- Different formulations, e.g. slow release and patch formulations

#### **The clinical pharmacology of steroids and anti-emetics**

#### **Drug interactions in cancer treatment**

- Common or important interactions between drugs used in cancer therapy and other commonly used agents, e.g. increased toxicity in patients receiving methotrexate who are taking NSAIDs

#### **Endocrine therapy**

- Mechanisms of action

- Mechanism of resistance
- Common side-effects
- Combination with other therapies

#### **Biological and novel therapies**

- Biological therapies, their mechanism of action, their combination with standard therapy
- The mode of action of Interferons, interleukins, growth factors, antibody therapy, gene therapy and immunotherapy
- Novel targets for anti-cancer drugs, including vasculature, cell signal control and oncogene products
- Bioreductive drugs
- Cancer vaccines

#### **The basic principles of high-dose therapy**

- The clinical pharmacology and rationale of high-dose therapy
- Methods for protection/rescue of stem cells
- Unusual toxicities, e.g. veno-occlusive disease etc

### **MEDICAL STATISTICS CURRICULUM**

**(15 Hrs.)**

#### **Summary**

Candidates will be required to have sufficient knowledge of the principles of the subject to enable them to study critically the statistical validity of published investigations. Particular emphasis is placed on candidates acquiring sufficient knowledge of the subject to enable them to appreciate the requirements needed to design, monitor and assess clinical trials and epidemiological studies.

#### **Types of data**

- Presenting and summarising individual variables
- Categorical data (nominal, ordinal)
- Numerical data (discrete and continuous, the Normal distribution, transformation to Normality)
- Bar charts and histograms
- Measures of central tendency and spread

#### **Sampling**

- Concept of a source population
- Random sampling
- Estimation of population statistics
- Standard error of a sample mean and of a proportion, and their differences
- Confidence intervals
- Reference ranges

#### **Principles of statistical inference**

- Hypothesis testing and estimation
- Type I and II errors,

- Interpretation of p-values and confidence intervals
- Statistical and clinical significance
- 

### Comparing two or more groups

- Tests for comparing means (t-test, paired t, Mann-Whitney, Wilcoxon's signed ranks, ANOVA, Kruskal-Wallis)
- Tests for comparing percentages (chi-squared, Fisher's exact, McNemar's)

### Measures and tests of association between variables

- Correlation and regression
- Scatter plots
- Screening tests
- sensitivity and specificity
- positive and negative predictive value

### Survival analysis

- Types of time-to-event data (survival data, recurrence data)
- Presentation of survival data
- Kaplan-Meier and actuarial survival curves
- Summarising survival data
  - Comparing groups
  - logrank test for two or more groups, including ordered groups
  - use of Cox's proportional hazards regression model
  - hazard ratios and their interpretation

### Clinical trials

- Phases I-IV of clinical trials
- Randomisation
  - need for randomisation
  - problems with non-randomised studies and historical controls
  - methods of randomisation (simple, block, stratified minimisation)
  - blinding/masking
- Designs: parallel group, cross-over, factorial
- Contents of a trial protocol
- Ethics and informed consent
- Measures of outcome
  - tumor regression
  - quality of life
  - morbidity
  - local and regional recurrence
  - distant metastases
  - death
- Principles of sample size calculation
- Interim analyses
- Intention-to-treat analysis

- Role and basic principles of meta-analysis

### **Epidemiology**

- Design and interpretation of retrospective (case control) and prospective (cohort) studies
- Odds ratios and relative risks
- Mortality rates and standardised mortality rates
- Cancer registration and follow-up
- Trends in cancer incidence and mortality for major cancers

### **Physics Curriculum (54 Hrs.)**

The following Physics Curriculum has been adopted from the recommendations by American Society of therapeutic Radiology and Oncology (ASTRO), designed for Medical Residents. For each subject, there are learning objectives and for each hour there is a detailed outline of material to be covered.

<b>Subject Matter</b>	<b>Teaching Hours</b>
Atomic and nuclear structure (including decay and	3
Production of X-rays, Photons, and	2
Radiation	3
Treatment machines and generators; simulators computed	3
Radiation beam quality and	2
Radiation measurement and	4*
Photons and X-rays (including concepts, Isodoses, monitor heterogeneities, field shaping, Compensation, field matching,	7*
Electrons (including concepts, Isodoses, monitor heterogeneities, Field shaping, field matching,	3*
External beam quality	2*
Radiation protection and	2
Imaging for radiation	4
3D-CRT including ICRU concepts and beam-related	3*
Assessment of patient setup and treatment (Including portal imaging device, immobilization,	2*
IMRT	2*
Special procedures (including radiosurgery, TBI,	3*
Brachytherapy (including intracavitary, interstitial, HDR,	7*
Hyperthermi	1
Particle	1
<b>Total</b>	<b>54</b>

Abbreviations: 3D-CRT = three-dimensional conformal radiation therapy; ICRU = International Commission on Radiation Units;

IMRT = intensity-modulated radiation therapy; TBI = total body irradiation; HDR = high dose rate.

\* Indicates subject matter that should be complemented during a physics rotation.

## **Details of the Subjects**

### **1. Atomic and Nuclear Structure (3 lectures)**

#### **Learning objectives**

#### **The candidate should:**

1. Learn the structure of the atom, including types of nucleons, relation between atomic number and atomic mass, and electron orbits and binding energy.
2. Be able to relate energy to wavelength and rest mass, and understand and describe an energy spectrum.
3. Learn about radioactivity, including decay processes, probability, half life, parent-daughter relationships, equilibrium, and nuclear activation.
  - A. The atom ; Protons, neutrons, electrons (charge, rest mass) Atomic number and atomic mass  
Orbital electron shells (binding energy, transitions)
  - B. Wave and quantum models of radiation Energy and wavelength, energy spectrum.
  - C. Radioactivity and decay, Decay processes, Probability and decay constant Activity, half life, mean life Radioactive series, Parent-daughter relationships and equilibrium Nuclear reactions, bombardment, and reactors.

### **2. Production of Photons and Electrons (2 lectures)**

#### **Learning objectives**

#### **The candidate should learn:**

1. The concepts of beam production, including acceleration of electrons in diagnostic X-ray tubes, Bremsstrahlung, X-ray tube design, and characteristic radiation.
2. About the general design of a linear accelerator, including major components and their functions, steering, flattening filtration, and beam hardening.
  - A. Physics concepts of beam production Concept of Bremsstrahlung X-ray tube design, Energy spectrum, Characteristic radiation
  - B. Generation of beams Filters, Gamma-radiation teletherapy sources (Co-60, Cs-137), Linear accelerator production.

### **3. Radiation Interactions (3 lectures)**

#### **Learning objectives**

**The candidate should learn:**

The physical description, random nature, and energy dependence of the five scatter and absorption interactions that X-ray photons undergo with individual atoms (coherent scatter, photoelectric effect, Compton Effect, pair production, and photonuclear disintegration).

definitions of the key terms such as attenuation, scatter, beam geometry, linear and mass attenuation coefficients, energy transfer, energy absorption, half-value layer, and how these terms relate to radiation scatter and absorption through the exponential attenuation equation.

The physical description and energy dependence of the elastic and inelastic collision processes in matter for directly and indirectly ionizing particulate radiation.

definitions of key terms such as linear energy transfer, specific ionization, mass stopping power, range, and how these terms relate to energy deposition by particulate radiation.

A. Interactions of X-rays and  $\gamma$ -rays with matter Scatter vs. absorption, Coherent scatter Photoelectric effect Compton effect Pair production Photonuclear disintegration

B. Attenuation of photon beams Attenuation, energy transfer, and energy absorption, Exponential attenuation equation, Attenuation coefficients, Half-value layer, Beam geometry.

C. Interactions of particulate radiation Directly and indirectly ionizing particles, Elastic and inelastic collisions with orbital electrons and the nucleus, Linear energy transfer, specific ionization, mass stopping power, range, Interactions of electrons, Interactions of heavy charged particles, Interactions of neutrons.

**4. Treatment Machines and Generators; Simulators (3 lectures)**

**Learning objectives**

**The candidate should learn about:**

1. The mechanics and delivery of radiation with respect to wave guides, magnetron vs. klystron for production.
2. The production and delivery of electrons by the electron gun, buncher, and scattering foil vs. scanning.
3. The production and delivery of photons including the target and flattening filter.
4. Benefits and limitations of Multileaf collimator (MLC) collimators and cerrobend and hand-block.
5. The production and collimation of superficial photons.
6. The production of low-energy X-rays for imaging.
7. The differences in film and other imaging modalities for simulation.
8. Digitally reconstructed radiograph (DRR) production and use.

**A. Linear accelerators**

Operational theory of wave guides, Bending magnet systems, Photon beam delivery, Electron beam delivery, Beam energy, Monitor chamber.



B. Linac collimation systems and other teletherapy, Primary and secondary collimators Multileaf collimators, Other collimation systems, Radiation and light fields (including field size definition), Cobalt units, Therapeutic X-ray (<300 kVp)

C. Simulators Mechanical and radiographic operation, Fluoroscopy and intensifiers, Computed tomography (CT) simulation machinery, CT simulation operation.

D.

**5. Radiation Beam Quality and Dose (2 lectures)**

**Learning objectives**

**The candidate should learn:**

1. The physical characteristics of monoenergetic and heteroenergetic photon and particle beams, the terms such as energy spectrum, effective energy filtration, geometry, and homogeneity that are used to describe such beams.
2. Definitions and units for kerma, exposure, absorbed dose, dose equivalent, and RBE dose, the conditions under which each quantity applies, and the physical basis for measuring or computing each quantity.
- A. Monoenergetic and heteroenergetic Bremsstrahlung beams, Energy spectra for Bremsstrahlung beams, Effects of electron energy, filtration, beam geometry, Homogeneity coefficient, Effective energy, Clinical indices for megavoltage beams (e.g., percent depth dose (PDD) at reference depth).
- B. Dose quantities and units Kerma, Exposure, Absorbed dose, Dose equivalent RBE dose, Calculation of absorbed dose from exposure, Bragg-Gray cavity theory.

**1. Radiation Measurement and Calibration (4 lectures)**

**Learning objectives**

**The candidate should learn:**

1. The units and definitions associated with radiation absorbed dose.
2. The relationship between kerma, exposure, and absorbed dose.
3. How absorbed dose can be determined from exposure, and the historical development of this approach.

4. Bragg-Gray cavity theory and its importance in radiation dosimetry.
5. Stopping power ratios, and the effective point of measurement for radiation dosimetry.
6. How photon and electron beams are calibrated, the dose calibration parameters, and the calibration protocols for performing Linac calibrations.
7. How to determine exposure and dose from radioactive sources.
8. The various methods by which to measure absorbed dose; these should include calorimetry, chemical dosimetry, solid-state detectors, and film dosimetry.

**A. Dose and relationships**

Radiation absorbed dose-definition and units Relationship between kerma, exposure, and absorbed dose, Bragg-Gray cavity theory-stopping powers

**B. Ionization chambers, Cylindrical, Parallel-plate, Effective points of measurement.**

**C. Calibration of megavoltage beams, Photon beams, Electron beams, Dose calibration parameters, Task Group-21 and Task Group-51**

**D. Other methods of measuring absorbed dose**

1. Calorimetry
2. Chemical dosimetry
3. Solid state detectors Thermoluminescent Dosimeter (TLD), Diode detectors
4. Scintillation detectors, Diamond detectors
5. Film dosimetry
6. Xonat Verification (XV)-2 film, Extended Dose Range (EDR-2 film Radiochromic film.

**2. Photons and X-rays (7 lecture)**

**Learning objectives**

The candidate should learn:

1. Basic dosimetric concepts of photon beams.
2. How these concepts relate to calculation concepts.
3. Basic calculation parameters.
  - i. How these parameters relate to one another and how to cross convert.

- ii. Parameters used for calculations and their dependencies for source-to skin distance (SSD) and source-to-axis distance [SAD] setup.
  - iii. How beam modifiers affect beams and calculation.
  - iv. Basic treatment planning arrangements and strategies.
  - v. How beam shaping affects isodose maps.
  - vi. Surface and exit dose characteristics (the effect and use of beam modifiers including bolus).
  - vii. Heterogeneity corrections (air effects on isodoses).
  - viii. Beam matching technique and Understanding of peripheral dose.
  - ix. Special Considerations for pacemaker, pregnant patients.
- A. External beam dosimetry concepts (part I)**  
 Dosimetric variables, Inverse square law, Backscatter factor, Electron buildup percent depth dose, Mayneord F-factor, Tissue Air Ratio correction to F-factor, Equivalent squares.
- B. External beam dosimetry concepts (part II)**  
 Tissue-air ratio, Scatter-air ratio, Tissue-phantom ratio, Tissue-maximum ratio.
- C. System of dose calculations**
1. Monitor unit calculations
    - (a) Output factor
    - (b) Field size correction factors
    - (c) Collimator scatter factor and phantom scatter factor
    - (d) Beam modifier factors
    - (e) Patient attenuation factors
  2. Calculations in practice
    - (a) SSD technique
      1. SSD treatment same as SSD of calibration
      2. SSD treatment different from SSD of calibration
      3. SSD treatment and SAD calibration
    - (b) SAD technique
      1. SAD treatment and SAD calibration
      2. SAD treatment and SSD calibration
      3. SAD rotational treatment

**D. Translation of planning to calculations**

1. Beam parameters
2. Beam weighting
3. Arc rotation therapy
4. Irregular fields

**E. Computerized treatment planning**

1. Isodose curves (beam characteristics)
2. Surface dose
3. Parallel opposed beam combination
4. Wedge isodose curves
  - (a) Wedge angle and hinge angle, (b) Wedge factor
5. Wedge techniques
  - (a) Wedge pair, (b) Open and wedged field combination, (c) Skin compensation.
6. Beam combination (3-, 4-, and 6- field techniques)

**F. Surface corrections and heterogeneities.**

1. Corrections for surface obliquities.
2. Corrections for inhomogeneities

**G. Adjoining fields and special dosimetry problems**

1. Two-field problem
  2. three-field problem
  3. Craniospinal gapping
  4. Pacemaker
  5. Gonadal dose
  6. Pregnant patient
3. Electron Beam (3 lectures)

**Learning objectives**

**The candidate should learn:**

1. The basic characteristics of electron beams for therapy, including components of a depth-dose curve as a function of energy, electron interactions, isodoses, oblique incidence, and electron dose measurement techniques.
2. The nature of treatment planning with electrons, including simple rules for selecting energy based on treatment depth and range, effect of field size, dose to skin and bolus, and effects of field shaping, especially for small fields.
3. about field matching with photons and other electron fields, internal shielding, backscatter, and
4. The effects of inhomogeneities on electron isodoses.

**A. Basic characteristics**

Depth-dose/isodose characteristics, Electron interactions, Coulomb scattering and range Dose vs. depth, Isodoses, Oblique incidence AAPM TG-25.

**B. Treatment planning with electrons**

1. Rules of thumb
2. Selection of energy, field size
3. Electron skin dose
4. Electron bolus
5. Electron field shaping

**C. Field matching and other considerations**

1. Electron-electron gapping
3. Electron-photon gapping.
4. Electron backscatter
5. Inhomogeneities
6. Internal shielding

**4. External Beam Quality Assurance (2 lectures)**

**Learning objectives**

The candidate should learn.

1. The goals of a departmental quality assurance (QA) program, the staffing required to perform these QA activities, and the duties and responsibilities of the individuals associated with the QA program.
2. What is entailed in making equipment selections in radiation therapy and the content of equipment specification.
3. What is involved in acceptance testing of a linear accelerator and in commissioning both a linear accelerator and a treatment planning system.
4. What linear accelerator quality assurance is required on a daily, monthly and yearly basis and the acceptance tolerances associated with these tests.

**1. Overview of quality assurance in radiation therapy**

- a) Goals, JCMIO, ACR, AAPM, TG-40.
- b) Staffing
- c) Roles, training, duties and responsibilities of individuals Equipment selection and specifications

**2. Linac quality assurance**

- a) Acceptance testing-Linac
- b) Commissioning-Linac Data required Computer commissioning

c) Routine QA and tolerances Daily QA, Monthly QA, Yearly QA

## 5. Radiation Protection and Shielding (2 lectures)

### Learning objectives

The candidate should learn:

1. The general concept of shielding, including "As Low As Reasonably Achievable" (ALARA) and Federal regulations.
2. The units of personnel exposure, sources of radiation (manmade and natural), and means of calculating and measuring exposure for compliance with regulations.
3. Components of a safety program, including Nuclear Regulatory Commission (NRC) definitions and the role of a radiation safety committee.

### I. Radiation safety

#### 1. Concepts and units

Radiation protection standards, Quality factors, Definitions for radiation protection, Dose equivalent, Effective dose equivalent

#### 2. Types of radiation exposure Natural background radiation, Manmade radiation, National Council on Radiation Protection (NCRP) #91 recommendations on exposure limits.

#### 3. Protection regulations

##### a) NRC definitions

- i. Medical event
- ii. Authorized user

##### b) NRC administrative requirements

- i. Radiation safety program
- ii. Radiation safety officer
- iii. Radiation safety committee

##### c) NRC regulatory requirements

##### d) Personnel monitoring

## **2. Radiation shielding**

1. Treatment room design
  - a) Controlled/uncontrolled areas
  - b) Types of barriers
  - c) Factors in shielding calculations
    - i. Workload (W).
    - ii. Use factor (U).
    - iii. Occupancy factor (T).
    - iv. Distance
2. Shielding calculations
  - a. Primary radiation barrier
  - b. Scatter radiation barrier
  - c. Leakage radiation barrier
  - d. Neutron shielding for high-energy photon and electron beams
3. Sealed source storage
  - a) Protection equipment and surveys
  - b) Operating principles of gas-filled detectors
  - c) Operating characteristics
  - d) Radiation monitoring equipment
    - i. Ionization chamber (Cutie Pie).
    - ii. Geiger-Mueller counters.
    - iii. Neutron detectors

### **Imaging for Radiation Oncology (4 lectures)**

#### **Learning objectives**

#### **The candidate should learn:**

1. The physical principles associated with good diagnostic imaging techniques.
2. The rationale behind taking port films, how port films are used in the clinic, and the response characteristics of common films used in the radiation therapy department.
3. The types of portal imaging devices that are available in radiation therapy, the operating

characteristics of these various devices, and the clinical application of this technology in daily practice.

4. The physical principles of ultrasound, its utility and limitations as an imaging device, and its application to diagnosis and patient positioning.
5. The physical principles behind CT, magnetic resonance imaging (MRI, and positron emission tomography (PET) scanning, how these modalities are applied to treatment planning, and their limitation.
6. The advantages of one image modality over another for various disease and body sites.
7. Image fusion, its advantage in treatment planning, the difficulties and limitations associated with image fusion and how image fusion can be accomplished.

### 1. Routine imaging

- i. Diagnostic imaging physical principles.
- ii. Port films.
- iii. XV-2 film.
- iv. EDR-2 film characteristics Processors.

### 2. Other imaging

- i. Electronic portal imaging
  - a) Overview of electronic portal imaging devices (EPID)
  - b) Types of portal imaging devices
  - c) Clinical applications of EPID technology in daily practice
- ii. Ultrasonography  
Physical principles. Utility in diagnosis and patient positioning

### 3. Image-based treatment planning

- i. CT scans

Physical principles. Hounsfield units. CT numbers. inhomogeneity corrections based on CT scan images

- ii. MRI scanning

Physical principles. T1, T2, TE, TR imaging characteristics Advantages and limitations of MRI images for diagnosis and computerized treatment planning

- iii. PET imaging

- a) Physical principles
- b) Utility for radiation therapy
- c) Image fusion



- Advantages
- Challenges
- Techniques
- Limitations

#### 4. Three-dimensional Conformal Radiation Therapy (3DCRT) Including International Commission on Radiation Units (ICRU) Concepts and Beam-

##### Related Biology (3 lectures)

##### Learning objectives

##### The candidate should learn:

1. The concepts, goals, and technologies needed for planning and delivering 3D-CRT compared with conventional RT.
  2. Concepts and definitions associated with 3D-CRT planning including optimization strategies.
  3. uniform vs. non-uniform tumor dose distributions, non-biologic and biologic models for computing dose-volume metrics, beam shaping techniques, and magnitudes, sources, and implications of day-to-day treatment variabilities.
  4. ICRU definitions and reporting recommendations for tumor-related volumes such as gross tumor volume (GTV), clinical target volume (CTV), planning target volume (PTV).
- A. 3D-CRT concepts and goals vs. traditional RT, comparison with protons Technology and methods for planning multiple volume images (CT, MR, PET, MRSI, etc.)  
Image processing (registration, segmentation) Virtual simulation. DRRs, Multiple beams (>4), Non-coplanar beams.
- B. Optimization methods Biologic implications of uniform vs. non-uniform dose delivery Non-biologic and biologic dose-volume metrics (Dose Volume histograms [DVHs], tumor control probability [TCPs], Normal Tissue Complication Probability [NTCP])  
Margins
- C. Implications of treatment variabilities (systematic and random setup variabilities, patient breathing)  
ICRU 50 prescribing, recording, and reporting ICRU report 62 (supplement to ICRU report 50)

##### Assessment of Patient Setup and Verification (2 lectures)

##### Learning objectives

##### The candidate should learn the principles of and devices for:

1. Patient immobilization and positioning.
2. Imaging methods for monitoring patient geometry in the treatment position and how such images can be used, for correcting patient alignment and modifying the initial treatment plan via an adaptive planning strategy.
  - A. Immobilization devices and methods  
Table positions, lasers, distance indicators Immobilization methods. Positioning methods (calibrated frames, optical and video guidance, etc.)
  - B. In-the-room intra-treatment imaging (cont'd), Cone-beam, Ultrasound Internal markers (e.g., implanted seeds), On-line correction of setup errors, Adaptive planning concepts.

**9. Intensity-Modulated Radiation Therapy (2 lectures)**

**Learning objectives**

**The candidate should learn:**

1. Details on the different delivery system including advantages, Differences, and limitations.
2. The differences for simulation and positioning compared with conventional therapy.
3. Principles of inverse planning and optimization algorithms.
4. Systematic and patient specific quality assurance.
  - A. IMRT delivery systems
    - i. Segmental MLC (SMLC) and dynamic MLC (DMLC)
    - ii. Serial tomotherapy (MIMiC)
    - iii. Helical tomotherapy
    - iv. Robotic Linac
    - v. Simulation and immobilization/repositioning
  - B. Dose prescription and inverse planning
    - i. Treatment calculations
    - ii. IMRT quality assurance

**10. Special Procedures (3 lectures)**

**Learning objectives**

**The candidate should learn:**

1. The basis of stereotaxic frame systems.
2. The frame placement, imaging, and treatment logistics.

3. Differences in the stereotactic radiosurgery (SRS) systems and accuracy requirements.
  4. Dosimetry of small-field irradiation.
  5. Total Body Irradiation (TBI) techniques and large field dosimetry.
  6. Logistics and dosimetric considerations, for Total Skin Electron Radiotherapy (TSET) and e-arc
- A. Stereotactic radiosurgery
    - i. SRS delivery systems
    - ii. Linac based
    - iii. Gamma knife
    - iv. Robotic Linac
    - v. Simulation and immobilization repositioning
  - B. SRS Dose prescription and treatment planning
    - i. Treatment calculations
    - ii. SRS quality assurance
  - C. Other special procedures
    - i. Photon total body irradiation, Patient setup, Dosimetry, Selection of energy, field size, distance Monitor unit calculations.
    - ii. TSET
    - iii. Electron arc

## 11. Brachytherapy (7 lectures)

### Learning objectives

#### The candidate should learn about:

1. Characteristics of the individual sources: Half-life, photon energy, half-value layer shielding, exposure rate constant, and typical clinical use.
2. Source strength units: Activity, apparent activity, air kerma strength, exposure rate, equivalent of mgh of radium, and National Institute of Science and Technology (NIST) standards for calibration.
3. High-dose rate vs. low-dose rate in terms of alpha beta ratios, fractionation, dose equivalence.
4. Specification of linear and point sources.
5. Implant dosimetry for planar implants vs. volume implant including Patterson-Parker, Quimby, Memorial, Paris, and computational optimizations and calculations.
6. Implantation techniques for surface and interstitial implants, the sources used, and how they are optimized.
7. Uterine cervix applicators: Fletcher-Suit applicators (tandem and ovoids), high-dose rate applicators (tandem and ovoids ring), and vaginal cylinders, and the treatment planning systems, for each applicator.

8. Cervix dosimetry conventions: Milligram-h, Manchester system, bladder and rectum dose, and the ICRU system (point A and point B).
  9. Radiation detector's used for calibration and patient safety.
  10. Remote after-loading units, including dose rates and devices for delivery, safety concerns and emergency procedures, and shielding for patient and personnel.
  11. Discuss NRC and state regulations regarding use, storage, and shipping of sources.
    - A. Radioactive sources (general information)  
Radium, Cesium-137, Cobalt-60, Iridium-192, Gold-198, Iodine-125, Palladium-103.
    - B. Calibration of Brachytherapy sources Specification of source strength  
Radium substitutes and radioactive isotopes currently used in Brachytherapy, Linear sources Seeds, Exposure rate calibration.
    - C. Calculations of dose distributions  
Biologic considerations of dose, dose rate, and fractionation, Calculation of dose from a point source, Calculation of dose from a line source
    - D. Systems of implant dosimetry Paterson-Parker  
Quimby, Memorial, Paris, Computer.
    - E. Implantation techniques  
Surface molds/plaques, Interstitial therapy, Intra-cavitary therapy, Uterine cervix, Milligram-h, Manchester system, Bladder and rectum dose, ICRU system, Absorbed dose at reference points.
    - F. Gynecological implants  
General information (Advantages/disadvantages)  
Remote after-loading units, High-dose rate (HDR)
    - G. Radiation protection for Brachytherapy  
Detector, Regulatory requirements, Surveys, Inventory and wipe tests, Shipping and receiving
- 12. Hyperthermia**
- Learning objectives**
- The candidate should learn:**
1. Basic physics of hyperthermia and how this applies clinically.
  2. Hyperthermia system
  3. Thermometry.

**A. Physics aspects of hyperthermia**

The bio-heat equation and simplified solutions. Specific absorption rate (SAR), Thermal aspects of blood flow perfusion, Basic physics of ultrasound, important technical considerations with microwaves and ultrasound devices.

**B. Elements of clinical hyperthermia physics External superficial**

- i. Electromagnetic hyperthermia applicators.
- ii. Interstitial electromagnetic hyperthermia applicators.
- iii. Electromagnetic applicators for regional hyperthermia.
- iv. Thermometry performance criteria, tests, and artifacts.

**C. Ultrasound hyperthermia systems**

**13. Particle Therapy**

**Learning objectives**

**The resident should learn:**

1. Basic physics of neutron and proton beams.
2. Configurations of proton and neutron delivery systems.
3. Treatment planning consideration for particle therapy.

**A. Protons**

Proton beam energy deposition, Equipment for proton beam therapy, Clinical beam dosimetry, Clinical proton beam therapy, Treatment planning, Treatment delivery, Clinical applications.

**B. Neutrons**

Fast neutron production, Basic interactions, Accelerator requirements, Clinical beam dosimetry, Treatment planning, Treatment delivery, Clinical applications, Boron neutron capture.

**ONCOLOGICAL SCIENCE CURRICULUM**

[120 Hrs.]

**INTRODUCTION**

The Final MD Examination expects candidates to have a wide knowledge of malignant disease and the management of patients with cancer. The main emphasis is on radiotherapy and drug therapy, but a good knowledge of general medicine, surgery and gynaecology is expected.

**KNOWLEDGE**

Candidates for the Final MD Examination need to have a broad knowledge relating to all aspects of the investigation and management of patients with cancer.

**A. Prevention**

A broad knowledge of the environmental causes of cancer and possible strategies for prevention

**B. Screening**

Details of screening programmes for cervical, breast and colorectal cancers

**C. Genetics**

The familial aspect of some cancers is required (colorectal, breast, ovary, retinoblastoma, multiple cancer syndromes) and the management of high risk families and genetic counseling.

**D. Anatomical Sites and Types of Tumors**

**Head and Neck**

1. Lip
2. Oral cavity
3. Oropharynx
4. Hypopharynx
5. Nasopharynx
6. Supraglottis
7. Vocal cord
8. Sub-glottis
9. Middle ear
10. Nose and nasal sinuses
11. Orbit and optic nerve
12. Lachrymal gland
13. Salivary gland
14. Glomus jugulare tumours
15. Carotid body tumours

**Gastro-Intestinal Tract**

16. Oesophagus
17. Stomach
18. Liver
19. Pancreas and biliary tract
20. Small bowel
21. Colon and rectum
22. Anal canal and peri-anal region

**Chest**

23. Pleura

- 24. Trachea
- 25. Lung
- 26. Mediastinum and thymus

**Genito-Urinary Tract**

- 27. Kidney
- 28. Ureter
- 29. Bladder
- 30. Urethra
- 31. Prostate
- 32. Penis
- 33. Testis

**Female Genital Tract**

- 34. Uterine cervix
- 35. Uterine body
- 36. Vagina
- 37. Vulva
- 38. Ovary
- 39. Fallopian tube

**Central Nervous System**

- 40. Brain
- 41. Spinal cord
- 42. Craniopharyngioma
- 43. Chordoma
- 44. Acoustic neuroma
- 45. Meninges

**Soft Tissue Sarcomata and Bone Tumours**

- 46. Adult soft tissue sarcoma
- 47. Childhood adolescent sarcoma
- 48. Chondrosarcoma
- 49. Osteosarcoma
- 50. Ewing's tumour

**Paediatric Tumours**

- 51. Medulloblastoma
- 52. Neuroblastoma

53. Nephroblastoma

54. Retinoblastoma

**Lymphoproliferative and Myeloproliferative Disorders**

55. Hodgkin's lymphoma

56. Non-Hodgkin's lymphomas

57. Plasma cell malignancies

58. Acute and chronic leukaemias

**Skin**

59. Basal cell carcinoma

60. Squamous cell carcinoma

61. Malignant melanoma

62. Cutaneous lymphoma

63. Kaposi's sarcoma

**Endocrine**

64. Breast

65. Thyroid

66. Parathyroid

67. Pituitary

68. Adrenal

**E. Management**

- Initial staging investigations including imaging and tumour markers
- Relevant prognostic factors
- Assessment for treatment
- Role of surgery
- A management plan, or, where applicable, a range of such plans
- Ionising Radiation Regulations
- Roles of surgery, radiotherapy and cytotoxic chemotherapy in multimodality approaches to cancer treatment

**F. Pathology**

- The range of tumours that can occur
- Their aetiology, incidence and epidemiology
- A brief morphology of the common tumours



- The natural history of the disease including likely presentation, characteristic growth and metastatic pattern
- Staging classifications, eg TNM, FIGO
- Use of tumour markers in diagnosis and treatment of tumours
- Use of specialised pathology techniques, eg immunocytochemistry Interpretation of clinicopathological data in the tumour site specialised multidisciplinary approach to patient management

### G. Radiotherapy

- The role of irradiation in radical and palliative management:
- Where radical radiotherapy is a treatment option:
  - : Staging investigations
  - : A definition of tumor volume and target volume boundaries
  - : ICRU reports 50 and 62
  - : An acceptable radiotherapeutic technique, or, where applicable, a range of such techniques
  - : The correct treatment position
  - : Details of the target volume localisation process
  - : Use of CT axial images, 3D planning
  - : Verification techniques such as laser alignment, skin tattoos, orthogonal and portal films
  - : The approximate dose distributions for the chosen technique
  - : An appropriate dose/fractionation regime
  - : Relevant dose modifying factors (changes in fractionation, age, target volume, intercurrent infections, previous therapies)
  - : Details of the set-up instructions for radiographers
  - : Appropriate responses to changes of patient parameters or interruptions during treatment
  - : The possible acute and late side effects of the irradiation
  - : Radiation dose modifying factors, chemotherapy timing in all forms of chemoradiation schedules

### H. Drug Therapy

- The role of cytotoxic, hormonal and biological drugs therapies in radical and palliative management
- Radical and palliative regimen in common use including dosage, scheduling, toxicities and outcome
- The techniques of stem cell mobilisation and the procedures for stem cell and bone marrow harvesting
- The timing of total body irradiation, the re infusion of bone marrow or stem cells and patient support during the engraftment

## **I. Outcomes**

The expected outcomes of treatment

### **Drug Therapy**

- **Cytotoxic Chemotherapy**

A basic knowledge of the pharmacokinetics, therapeutic uses, dose ranges and toxicities of the currently used cytotoxic agents

Where applicable, a range of multi agent chemotherapy regimens and details of their administration

- **Hormone Therapy**

A basic knowledge of the therapeutic use and toxicities of currently used hormone therapy

- **Biological Therapies**

A basic knowledge of the clinical uses of currently used biological therapies including interferons, colony stimulating factors, other growth factors and preparations such as Hereceptin

### **Oncological Emergencies**

The management of the following complications when they are related to cancer:

- Ureteric obstruction
- Spinal cord compression
- Haemorrhage
- Mediastinal obstruction

### **Radiotherapy for Benign Disease**

The indications for radiotherapy in the treatment of benign conditions, including suitable techniques and dosage schedules, and likely benefits and risks

### **Complications of Treatment**

The acute and late complications of oncological treatment and their management including:

- Skin reactions
- Nausea and vomiting
- Diarrhoea
- Oedema
- Bone marrow toxicity

- Neutropenic sepsis
- Drug reactions
- Cytotoxic extravasation
- Alopecia
- Cataract
- Skin atrophy and ulceration
- Colitis, proctitis, gut strictures and perforation
- Renal effects
- Cardiac effects
- Pulmonary effects
- Fibrosis and lymphoedema
- Endocrine effects (thyroid, pituitary and salivary gland)
- Effects on fertility
- Incidence of second and radiation induced cancers

#### **Symptom Control and Continuing Care**

- The available medical and surgical techniques for the control of pain, nausea, vomiting and malignant effusions
- Treatment of various cancer related conditions and paraneoplastic syndromes including
  - Hypercalcaemia
  - Ectopic hormone production
  - Raised intra cranial pressure
  - Anaemia

#### **Current Research and Literature**

- Current major research in progress in the form of multicentre trials
- Recent major publications in oncology journals

#### **SKILLS AND CLINICAL EXPERIENCE**

Candidates need to have gained a wide range of experience in the areas of patient investigation, diagnosis, treatment with radiation, chemotherapy, hormonal therapy, biological therapy and in palliative and supportive care and to have gained the practical experience detailed below.

- Radiotherapy – Basic Techniques

### 1. *Positioning the Patient*

- ◆ Setting up of a patient in each of the three basic treatment positions (supine, prone and lateral) to allow the patient to be planned and treated effectively and without discomfort
- ◆ Setting up the source skin distance for fixed FSD, and extended FSD treatment
- ◆ Setting up patients using laser beam alignment
- ◆ Making temporary and permanent marks on the patient for field positions (Gentian violet, tattoo)

### 2. *Immobilisation Techniques*

- ◆ Application of some of the following immobilisation techniques: head clamp, Velcro strap, polystyrene beads, vacuum bag, breast armrest
- ◆ The construction of thermoplastic beam direction shell

### 3. *Methods of Target Volume Determination*

- ◆ Performance of planning
  - : using direct vision of the tumour (eg skin tumours)
  - : from surface landmarks (eg the parotid bed, breast tumours)
  - : with direct screening using simulator (eg lung tumours, bone metastases), including opacification techniques (eg barium swallow, cystogram)
  - : by volume transfer to orthogonal radiographs (eg head and neck tumours, brain tumours)
- ◆ Volume determination from planning CT scans for creating a central axis plan and for 3-dimensional CT planning

### 4. *Outline Techniques*

Use of manual techniques (flexi-curves, plaster of Paris bandage) and CT derived outlines

### 5. *Basic Field Arrangements*

- ◆ Planning of treatments (under supervision where necessary) using the following field arrangements:
  - : Single direct field
  - : Opposed pair of fields using equal and unequal weightings
  - : Opposed pair using wedges
  - : Wedged right-angled pair
  - : Wedged oblique pair
  - : Plans using 3 and 4 fields
  - : Total body irradiation

### 6. *Tissue Compensation*

Planning of patients requiring tissue compensation using bolus, wedges and remote tissue compensators

#### *Shielding*

- ◆ Planning of patients using lead cut outs and lead masks for simple superficial tumours

- ◆ Knowledge of the thickness of lead required for superficial, orthovoltage and electron treatments at various energies
- ◆ Prescription and insertion of eye shields

#### *8. Megavoltage Techniques*

Planning of patients incorporating simple lead blocking techniques using standard blocks and cast blocks from templates

#### *9. Electrons*

- ◆ The indications for, and planning of, electron treatments, including the selection of electron energy
- ◆ A technique for total skin electron therapy and experience of its use

#### *10. Dose Calculation*

- ◆ Proficiency in the use of equivalent square tables
- ◆ Performance of depth dose calculations for single fields and opposed fields using various energies
- ◆ The principles applied to convert dose to machine units for a range of machines
- ◆ The principles of computer based treatment planning

#### *11. Radiotherapy Prescriptions*

- ◆ Writing radiotherapy prescriptions (countersigned where necessary) for all the field arrangements mentioned above
- ◆ Understanding of dose specification as in ICRU50 and 62

#### *12. Radiotherapy Machines*

Planning of patients for treatment on a full spectrum of equipment, including superficial x ray therapy, megavoltage x ray therapy and megavoltage electron therapy (also orthovoltage x ray therapy and cobalt 60 therapy, if available)

#### *13. Quality Assurance in External Beam Therapy*

- ◆ Requesting portal imaging and interpreted their appearance satisfactorily in all sites
- ◆ Principles of in vivo dosimetry and interpretation of results

#### *14. Brachytherapy*

- ◆ The insertion and removal of radioactive sources manually or using an appropriate after loading device
- ◆ Interpretation of subsequent check films
- ◆ Interpretation of the corresponding dose calculation and writing of an appropriate prescription
- ◆ Removal of live sources and the after loading device
- ◆ The placement of implants
- ◆ Principles of oral and intravenous radionuclide therapy

#### *15. Radiation Safety*

- ◆ The role of the radiation safety and radiation protection supervisor
- ◆ The meaning of and requirements for controlled and supervised areas and their location

- ◆ The procedure to be adopted in the case of a spill of radioactive material
- ◆ Quality assurance practices in radiotherapy and the procedures for dealing with errors in treatment delivery

- **Radiotherapy Assessment and the Care of Patients on Treatment**

- 1. *Treatment Review Clinics*

Regular weekly treatment review clinics

- 2. *Treatment Checks*

- ◆ Assessment of patient position and treatment field placement(s) in relation to the target volume at the start of treatment
- ◆ Performance of checks during the course of treatment on the implementation of the treatment plan, position of shielding for critical normal structures and the use of portal imaging
- ◆ Assessment of changes occurring in patient parameters during treatment and resultant modification of treatment when appropriate
- ◆ Assessment of normal tissue reactions to radiotherapy
- ◆ Use of dose volume histograms and in vivo radiation dosimetry techniques

- 3. *Symptom Control*

- ◆ Giving advice on skin care during radiation treatment and on the management of skin reactions, including desquamation
- ◆ Managing mucosal reactions in oral cavity, oropharynx, nasopharynx, trachea, oesophagus, anus and vagina
- ◆ Giving dietary advice during abdominal radiotherapy
- ◆ Managing radiation induced nausea and vomiting, diarrhoea, dysphagia, xerostomia and cystitis
- ◆ Giving prophylaxis for radiation induced cerebral oedema
- ◆ Giving advice on timing and extent of hair loss with respect to radiation dose

- 4. *Follow-up*

Managing acute and chronic radiation sequelae, such as pneumonitis, cystitis, chronic bowel complications, gynaecological sequelae (vaginal stenosis, vaginal dryness, infertility and dyspareunia)

- **Drug Therapy**

### ***1. Access Technique for Sampling and Delivery***

- ◆ Insertion and maintenance of intravenous lines for both sampling of blood and delivery of chemotherapy, including temporary sharp cannulation (butterfly type) and intermediate term flexible cannulation (venflon type)
- ◆ Arranging the insertion of Hickman or temporary long lines and subcutaneous implanted lines (portacath type), their use for sampling (where possible) and the delivery of chemotherapy and maintenance for protracted use
- ◆ Principles, regulations and guidelines for the delivery of intrathecal chemotherapy

### ***2. Drug Delivery***

- ◆ The indications and eligibility of a wide variety of cytotoxic agents, and their side-effect profiles as single agents and in combinations
- ◆ Prescription and delivery of drugs in current usage

### ***3. Support Techniques***

- ◆ Pre hydration and maintenance of urine flow and modification of urine pH during chemotherapy delivery
- ◆ Prescription of protective agents, eg folinic acid (oral and iv) with MTX level monitoring or Mesna with appropriate chemotherapy regimens
- ◆ The use of anti-emetics
- ◆ The appropriate use of colony stimulating factors
- ◆ The appropriate use of bone marrow reconstitution techniques after high dose chemotherapy TBI

### ***4. Management of Acute Complications***

- ◆ Managing extravasation reactions caused by vesicant drugs
- ◆ Managing patients with chemotherapy induced neutropenia, with and without pyrexia
- ◆ Managing chemotherapy induced thrombocytopenia, including the use of platelet transfusions

### ***5. Treatment with Hormonal Therapy***

Implementation of hormone treatment for breast and prostate cancer

### ***6. Treatment with Biological Therapies***

## **• Supportive and Palliative Care**

### ***1. Pain Relief***

- ◆ Drug treatment
  - A wide range analgesic techniques, including simple analgesics, mild and strong opioids, given by a variety of routes

- Management of the complications of analgesics, including constipation, nausea, gastro intestinal discomfort and analgesic intolerance
- ◆ Mechanical methods
  - Prescription, siting and evaluation of TENS analgesia
  - Referral of patients with refractory pain for procedures such as a nerve block, intrathecal analgesia, rhizotomy or orthopaedic stabilisation
- ◆ Radiotherapy
  - Use of radiation to treat painful metastatic disease with single fractions, multiple fractions and hemi body radiotherapy
- 2. *Nausea and Vomiting*
  - ◆ Treatment of nausea and vomiting arising in advanced illness using anti emetics
  - ◆ Palliative management of sub-acute intestinal obstruction
- 3. *Anorexia and Dysphagia*
  - ◆ Management, where appropriate, with corticosteroids, progestogens and nasal gastric feeding
- 4. *Pleural Effusions and Ascites*
  - ◆ Drainage of pleural effusions and ascites
  - ◆ Other treatments, such as talc pleurodesis
- 5. *Depression and Anxiety*
  - ◆ Treatment of depression at all stages of cancer management, using counselling and drug techniques with anti depressants
  - ◆ Treatment of anxiety with counselling, anxiolytics and major tranquillisers
- 6. *Hospice Care*
  - ◆ Awareness of local hospice facilities
  - ◆ A one week (at least) attachment to a hospice or palliative care team
- 7. *Counselling*
  - ◆ Counselling of patients and relatives at all stages of the disease
- **Investigational Techniques**
- 1. *Laboratory Investigations*
  - ◆ Interpretation of the results of haematological, biochemical and radio immune assay investigations
- 2. *Radiology*
  - ◆ Attendance at regular radiological review sessions involving a consultant clinical radiologist for the examination of plain x rays, CT scans, magnetic resonance imaging and ultrasound covering the whole spectrum of cancer radiology



- ◆ Current indications and techniques in interventional procedures

### 3. *Pathology*

- ◆ Attendance at regular pathological review sessions involving a consultant pathologist

### 4. *Other Procedures*

- ◆ Indirect laryngoscopy
- ◆ Lumbar puncture
- ◆ Skin biopsy
- ◆ Fibre optic naso-endoscopy
- ◆ Pelvic EUA and cystoscopy

### 5. *Site or Disease Specific Procedures*

- ◆ Assessment, treatment and follow-up, in detail, for each of the anatomical sites and types of tumour listed at paragraph 4 of the "Knowledge" section above
- ◆ Presentation and assessment of patients discussed at multidisciplinary team meeting
- ◆ Staging
- ◆ Radiotherapy – adjuvant, radical and palliative
- ◆ Chemotherapy – adjuvant, radical and palliative
- ◆ Hormone and biological therapy
- ◆ Palliative care
- ◆ Appropriate follow up
- ◆ Acute and late side effects of treatment

### **Clinical Trials, Literature and Research**

- The aims and format of Phase I to IV clinical trials
- Obtaining informed consent, following study protocols and using data forms
- Research programmes (although research experience is not a prerequisite)
- Major areas of current research and of recent important publications
- Submission of a research project to an ethics committee
- Structure and functioning of local and national clinical and research cancer networks

### **Communication and Publication**

- Effective communication with colleagues, patients and their carers
- Giving clear and comprehensive descriptions of disease processes, investigations and treatment

- Clear expression in English and production of legible script
- Preparing work for publication
- Outpatient and Joint Clinics
- Participation in joint consultative clinics and regular general oncology outpatient sessions
- Seeing review and new patients and planning their overall management
- Resource Management and Quality Assurance
- Introduction to the resource management and quality assurance of an oncology service, so as to be able to develop these skills at a later stage

## **SPECIALIST TRAINING**

The framework for specialist training will consist of rotations, which should give appropriate experience in the areas identified below.

Generic modules:

- Prescription and administration of cytotoxic chemotherapy
- Professional attitudes
- Communication skills

- **System-based site specialties:**

- Breast
- Thoracic malignancy
- Upper and lower gastrointestinal (GI)
- Head and neck
- Sarcomas
- Gynecological oncology
- Urological malignancy and germ cell tumors
- Neuro-oncology
- Skin
- Lymphomas
- Paediatric oncology

- **Technique-based specialties:**

- **Brachytherapy**

In many training schemes trainees will receive specialist training in more than one site specialty at the same time. The order of rotations and their duration will be decided on case to case basis.

Training schemes must ensure that their trainees are able to achieve all or almost all of the specialist training objectives for each site specialty.

On-call. When competence for such work has been established, each trainee will participate in an appropriate on-call rota, or other schemes of exposure to acute and emergency oncology, in which he/she will be responsible to a named consultant(s).

- **Clinical skills**

The Clinical Skills Section of the curriculum delineates the training objectives (knowledge and skills) that will be acquired at expert and advanced levels.

Each component of the training programme will have a clearly defined structure for the supervision of the trainee by senior colleagues (trainers). There will be a named consultant(s) who will assume overall responsibility for the training given during that period.

The trainer will also be responsible for undertaking appraisal of the trainee at the beginning, during and at the end of the rotation and may be involved in the end of rotation assessment.

## FACULTY

### **Clinical Oncology & Radiobiology**

Dr. Jawaid A Mallick - Associate Professor & Head Cancer Hospital  
Dr. Abn-e-Hasan - Consultant Radiation Oncologist  
Dr. S. Asif Ali - Clinical Research Physician

### **Medical Physics**

Mr. Aziz Ahmad Siddiqui - Chief Medical Physicist  
Mr. Arshad Mahmood - Medical Physicist

### **Pathology**

Dr. Saba Jamal - Assistant Professor & Consultant Hematologist & Pathologist  
Dr. Fauzia – Consultant Histopathologist  
Dr. Aziza – Consultant Histopathologist  
Dr. Fatima – Consultant Hematologist  
Dr. Adnan Zuberi – Consultant Clinical Pathologist

### **Medicine**

Professor Dr. Ejaz A. Vohra - Chairman Department of medicine & Dean Postgraduate Education (Clinical)  
Dr. Irfan Ahmed Khan - Assistant Professor, Department of Medicine.  
Dr. Imtiaz Khalid - Assistant Professor

### **Radiology**

Dr. Tamim Ahmed - Professor  
Dr. Anwar Ahmad - Associate Professor  
Dr. Misbah – Asst. Professor

### **Surgery**

Dr. Abbas Zafar – Professor (ENT)  
Dr. Haris Rashid – General Surgeon

### **GI Medicine**

Dr. Nasir Laeeq – GI Consultant  
Dr. Laiq Ahmed – GI Consultant  
Dr. Saad Niaz – Visiting Faculty

### **Paediatrics**

Dr. Shamvil Ashraf – Visiting Faculty (Cons. Paed. Oncologist)

**Biostatistics - (To be nominated by the university)**

## Site specialised curriculum modules

**Descriptors:** These define the levels of competence expected by the end of specialist training (I) or advanced specialist training (A).

**I:** corresponds to competence achieved during specialist training, usually associated with supervision level 1 (moderate supervision) noted in the log book.

**A:** corresponds to competence achieved during advanced specialist training, usually associated with supervision level 2 (minimal supervision) noted in the log book.

### Prescribing and administering cytotoxic chemotherapy and biological agents

It is assumed that this module is to be studied at the same time as the syllabus in Clinical Pharmacology for the First MD examination.

#### 1. Protocols and Prescriptions

Objective	Knowledge	Skills	Assessment
Be able to use local protocols for prescribing and administering chemotherapy (I)	Is familiar with commonly used drug protocols and their side effects. Knows which regimes are appropriate for use in the clinical situation. Understands the action of chemotherapeutic agents, their limitations and interactions	Able to prescribe common therapeutic regimes	1,2,3,4,5
Be familiar with electronic prescribing where appropriate (I)			1,2
Be able to calculate doses of drugs for individual patients(I)	Understands the use of Surface Area calculations, maximum doses, Calvert's ( or other equivalent formula) for estimating renal function, patient parameters affecting dose	Calculates doses of drugs for patients	1,2
Understands assessment of patient's fitness the receive the chemotherapy prescribed (I)	Knows the biological activity of commonly used drugs and their effect on the patient	Takes part in chemotherapy review clinics	1,2
Be able to modify chemotherapy prescription in the light of major organ dysfunction (I)	Understands pharmacology of commonly used drugs.	Able to prescribe growth factors and other support drugs	1,2,3,5
Be able to advise on less common therapeutic regimes in particular palliative treatment for recurrent disease (A)	Understands the principles of palliative chemotherapy and the use of cytotoxic agents in heavily pre-treated patients and patients with significant co-morbidities	Able to prescribe less common cytotoxic regimes	1,2,3,5
Able to participate in Phase 2 and Phase 3 clinical trials and maintain appropriate research records (A)	Understands the principles of clinical research. Undertakes GCP training	Consents for Phase 2 and 3 trials and randomises patients	1
Able to care for patients having routine curative and palliative chemotherapy (I)	Understands the acute side effects of chemotherapy and their biological basis.	Able to prescribe chemotherapy according to protocol and modify schedules for patients based on individual needs and judge when to continue or stop treatment	1,2,3,5

## 2. Adverse Reactions

Objective	Knowledge	Skills	Assessment
Able to recognise and manage extravasation (1)	Knows the chemical properties of commonly used drugs. Knows how to recognise and treat extravasation.	Treats extravasation according to local guidelines.	1,3,4,5
Able to recognise and manage hypersensitivity reactions (1)	Knows which drugs commonly cause hypersensitivity reactions, and can recognise them. Knows the local guidelines for managing hypersensitivity.	Treats hypersensitivity reactions.	1,3,4,5
Able to modify future chemotherapy treatment in the light of hypersensitivity reaction (1).	Knows which drugs show cross-reactivity and which drugs can be substituted in the case of hypersensitivity. Understands implications for future treatment.		1,3,5

## 3. Handling and Administration of drugs

Objective	Knowledge	Skills	Assessment
Able to handle cytotoxic drugs safely (1)	Knows local guidelines for storage and handling of cytotoxic drugs. Knows how to deal with contamination of skin or eyes.	Explains to patient about appropriate precautions to be taken at home where indicated including treatment with oral, intra-vesical and transcutaneous drugs.	1,3,4
Able to administer cytotoxic drugs safely via oral and intravenous routes including permanent and semi-permanent venous access (1)		Can administer drugs intravenously and orally.	2,3,4
Understands how to administer drugs via intra-thecal, intra-vesical, intra-peritoneal and intra-vesical routes (A)	Knows local guidelines for administering drugs via intra-thecal, intra-vesical and intra-peritoneal routes. Attended local Intra-Thecal awareness course.	Can administer drugs intra-vesically, intrathecally, intra-peritoneally.	3,4
Able to assess patient and blood results and know when to administer or withhold chemotherapy (1)	Knows local guidelines and protocols for proceeding with chemotherapy or withholding it.	Takes part in treatment review clinics.	2,3,4,5

## 4. Information and Consent

Objective	Knowledge	Skills	Assessment
Understands professional responsibilities and competence in prescribing cytotoxic drugs and is able to recognise limits of personal competence(1)	Knows local guidelines regarding prescription of cytotoxic drugs.		1,2
Able to understand information needs of patients and discuss treatment using cytotoxic drugs including activity and side effects (1)	Knows how to explain activity and side effects to patients and relatives. Knows local guidelines for obtaining informed consent. Knows how to advise on acute complications of treatment including neutropenic sepsis.	Takes informed consent for routine treatment using chemotherapy.	1,2,4
Understands the role of clinical trials in the management of cancer patients (1)	Knows the guidelines for decentral randomisation and obtaining consent for current trials used in the department.	Takes informed consent for clinical trials.	2,5,6

## Communication Skills

All trainees will have completed CMT or ACCS and will have demonstrated their knowledge and skills in PACES examinations. They will already be competent in important generic communication skills and will be able to demonstrate that they are able to:

- Take an accurate and reliable history
- Listen carefully and check understanding
- Establish rapport with patients and obtain mutual understanding
- Explain disease processes and treatment details honestly in language appropriate to patients and carers
- Break bad news showing sensitivity and consideration of the patient and carers
- Undertake patient education as part of a consultation
- Communicate clearly and efficiently both orally and in writing with medical colleagues and colleagues in other disciplines
- Maintain accurate records of consultations and other interactions with patients and their carers

The discipline of Radiotherapy (Clinical Oncology) requires additional specialist communication skills which the trainee will acquire incrementally during the indicative five years of training and the trainee will be expected to demonstrate increasing capability as he/she gains experience and skills. It is anticipated that the trainee will undertake very few of these skills unsupervised during the first phases of training but by the time that he/she is ready to take the Final MD examination, will have gained some experience in all domains listed and will have successfully negotiated the majority of situations at least once with minimal supervision.

Objective	Knowledge	Skills	Assessment
Be able to communicate the change from curative to palliative treatment (I)	Knows the risks and benefits of treatment and the effects of treatment on prognosis	Communicates risk in a clear and comprehensible manner	1,2,3,5
Be able to communicate confidently and appropriately with the 'expert patient' (I)	Is familiar with resources available to patients	Listens carefully, actively and appropriately. Shows respect and consideration. Enhances and encourages mutual understanding	1,2,3,5
Be able to deal sympathetically and appropriately with angry patients and carers (I)	Understand patient's perspective. Knows how to impart knowledge sensitively and effectively.	Able to select the correct environment and setting. Listens carefully, actively and appropriately. Explains clearly, honestly and using language effectively and appropriately.	1,2,3,5
Be able to explain highly technical and complex treatments in such a way that the patient is able to become involved in treatment decisions (I)	Knows details of treatment alternatives including the option of best supportive care where appropriate	Able to accurately assess the needs of patients and provide appropriate information.	1,2,3,5
Be able to explain prognosis accurately and honestly (B II)	Knows prognosis of different stages of disease and the effects of treatment	Able to accurately assess the needs of patients and provide appropriate information.	1,2,3,5
Be able to handle complaints about treatment (A)	Understands how the hospital's complaints system works	Able to mediate, negotiate and deal appropriately with complaints	1,2,3,5
Is able obtain informed consent for randomised trials (A)	Knows the ethical and statistical issues associated with clinical trials and how they are performed. Has excellent knowledge of the Data Protection Act and codes of conduct governing clinical research	Explains clearly, honestly and using language effectively and appropriately	1,2,3,5

Is able to obtain consent for novel drugs and treatments in a Phase 1 and Phase 2 setting (A)	Understands the ethics and statistics involved in Phase 1 and Phase 2 studies	Explains clearly, honestly and using language effectively and appropriately	1.2.4.5
Is able to participate effectively in a multidisciplinary team (A)	Understands the role of other members of the team. Has an understanding of group dynamics	Listens carefully, actively and appropriately. Considerate, polite and thoughtful of patients and colleagues. Explains clearly, honestly and effectively	



## Breast Cancer

### I. Selection and assessment of patients with male and female breast cancer.

Objective	Knowledge	Skills	Assessment
Be able to diagnose and stage invasive adenocarcinoma of the breast (I)	<p>Understands epidemiology and aetiology of breast cancer.</p> <p>Understands the importance of screening and its limitations</p> <p>Knows the TNM staging for breast cancer and Nottingham Prognostic Index</p> <p>Understands common benign breast diseases and their importance in patients with breast cancer or suspected breast cancer</p> <p>Can recommend appropriate diagnostic and staging investigations for women presenting with suspected breast cancer</p>	Examination of the female breast and axilla	1,2,3,5
Be familiar with the main histological types of breast cancer and their management (I) Is familiar with less common malignancies affecting the breast eg sarcomas and lymphomas (A)	<p>Understands the management of all stages of breast cancer and how its management differs according to the main histological types and grades of malignancy.</p> <p>Understands the importance of immunohistochemical testing.</p>	Able to recognise the main histological types of cancer presenting in the breast	1,5
Is familiar with male breast cancer and its management (I)	Understands the ways in which male breast cancer behaves and how it differs from female breast cancer		1,2,5
Able to assess prognosis for patients with breast cancer(I)	Knows the effect of stage, age, co-morbidity and histological type on prognosis		1,2,3,5
Able to discuss treatment options in the light of understanding of prognosis (I)	Understands the effects of treatment on prognosis	Advises patients on treatment options	1,2,3,4,5
Take part in discussions in multi-disciplinary meetings (A)	<p>Understands the indications and limitations of different treatment modalities in both curative and palliative treatment of breast cancer in patients presenting in all stages of disease.</p> <p>Understands the importance of ensuring seamless transition of care between colleagues.</p>		1,4

## 2. Radiotherapy treatment (external beam radiotherapy)

Objective	Knowledge	Skills	Assessment
<p>Be able to explain clearly the benefits, side effects and risks of a course of radiotherapy.(1)</p> <p>Be able to seek informed consent for a course of treatment.(1)</p> <p>Be able to seek informed consent for clinical trials (A)</p>	<p>Understands the acute and long term complications of external beam radiotherapy and their relation to dose and volume in both the intact breast, and the chest wall after surgery, and draining lymphatic regions.</p> <p>Understands the legal aspects and ethics of informed consent for treatment and for clinical trials.</p>	<p>Able to take informed consent for radical and palliative treatment</p>	1,3,4,5
<p>Be able to determine the target volume for planning for radiotherapy to the breast or chest wall and regional lymphatics.(1)</p>	<p>Understands the clinical and radiological parameters associated with planning radiotherapy to the breast and lymphatics including CT planning</p> <p>Is competent in the interpretation of diagnostic imaging (including CT and MRI) for determination of target volume for treatment of the whole breast, partial breast and boost to tumour bed.</p> <p>Aware of normal tissue morbidity and its impact on target volume definition</p> <p>Is able to judge how to modify treatment plans based on morbidity.</p>	<p>Able to define a planning target volume for different stages of breast cancer</p>	1,3,5
<p>Be able to modify treatment plans according to patient's individual needs, pre-morbid conditions etc(1)</p>	<p>Knows how to judge the relative risks and benefits of dose gradients in the breast, chest wall and regional lymphatic areas</p>		1,3,5
<p>Be able to use special planning modalities including CT planning (and BEV planning) (A)</p>	<p>Understands the use of cross-sectional imaging in planning breast radiotherapy</p>	<p>Able to use CT planning (and IMRT) in the treatment of breast cancer</p>	1,2,3,4,5
<p>Be able to care for patients undergoing radiotherapy for breast cancer (1)</p>	<p>Understands early reactions to breast radiotherapy and their management</p>	<p>Able to conduct radiotherapy review and manage early reactions</p>	1,2,3,4,5
<p>Be able to modify course of treatment for individual patients according to severity of reactions including adjustments for gaps in treatment (1)</p>	<p>Understands the radiobiology associated with radical radiotherapy for breast cancer</p>		
<p>Be able to participate in protocol development in radiotherapy for breast cancer (A)</p>	<p>Understands developments in radiotherapy research and their application to local protocols</p>		1,4

### 3. Systemic therapy (chemotherapy, hormone therapy, biological agents)

Objective	Knowledge	Skills	Assessment
Be able to assess patients for appropriate systemic therapy used as neoadjuvant, concomitant or adjuvant treatment (I)	Is familiar with commonly used drug protocols and their side effects. Knows which regimes are appropriate for use in the clinical situation.	Able to prescribe common therapeutic regimes	1,2,3,4,5
Be familiar with research developments in drug therapy for breast cancer (A)	Understands the action of chemotherapeutic agents, hormones and biological agents, their limitations and interactions with radiotherapy		1,2
Be able to modify systemic therapy prescription in the light of major organ dysfunction (I)	Understands pharmacology of drugs used in treatment of breast cancer	Able to prescribe growth factors and other support drugs	1,2,3,5
Be able to advise on less common therapeutic regimes in particular palliative treatment for recurrent disease (A)	Understands the principles of palliative chemotherapy and the use of cytotoxic agents in heavily pre-treated patients	Able to prescribe less common cytotoxic regimes	1,2,3
Be able to participate in Phase 2 and Phase 3 clinical trials and maintain appropriate research records (A)	Understands the principles of clinical research		1,6
Be able to care for patients having routine neo-adjuvant, concomitant, adjuvant and palliative systemic therapy (I)	Understands the acute and long term side effects of systemic therapies and their interaction with radiotherapy and other drugs.	Able to prescribe chemotherapy and biological agents according to protocol and modify schedules for patients based on individual needs and judge when to continue or stop treatment	1,2,3,5

### 4. Brachytherapy

Objective	Knowledge	Skills	Assessment
Understand the indications for brachytherapy in the management of breast cancer (I)	Radiobiological and physical aspects of interstitial brachytherapy in breast cancer.		1,2,5
Be familiar with the planning and modification of brachytherapy treatment and prescriptions in the light of normal tissue tolerance (A)	Quality assurance of brachytherapy for breast cancer	Perform straightforward single plane brachytherapy insertions.	1,2,3

Be able to participate in planning departmental brachytherapy workload and use of LDR, MDR and HDR afterloading equipment (A)	Understanding of the organisation of a brachytherapy service		1,2,3
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#### 5. Assessment of response and follow-up

Objective	Knowledge	Skills	Assessment
Be able to assess and advise patients attending for follow-up after completion of treatment. Be able to advise on appropriate investigations during follow-up.(1)	Understands the natural history of the illness. Knows the common complications of treatment and how to manage them appropriately	Able to perform clinical examination in patients who have been previously treated for breast cancer	1,2,3,4,5
Be able to recognise less common complications of treatment and how to manage them (A)	Understand the variety of rarer complications of radical treatment and how to differentiate them from recurrence.		1,2,3,4
Be able to diagnose and investigate recurrent disease (1)	Knowledge of natural history of treated breast cancer	Perform full physical examination	1,2,5
Understand how to manage recurrent disease and its symptoms including palliative treatment and symptom control where indicated.(1)	Understands the roles of radiotherapy, chemotherapy and surgery in the management of recurrence. Understands the importance of involving palliative care team in management.	Able to break news of recurrence to patients and discuss appropriate management options	1,2,4,5
Understand common breast cancer genetics, how to assess risk and give advice on risk (1)	Knows how to advise on family risk. Knows the indications for referral for specialist genetic advice.		1,2,4,5

#### Breast Cancer: Pre-invasive disease

##### 1. Selection and assessment of patients with carcinoma in situ for radiotherapy.

Objective	Knowledge	Skills	Assessment
Understand how to diagnose ductal and lobular carcinoma in situ(1)	Understands epidemiology and aetiology of DCIS and LCIS. Can recommend appropriate diagnostic investigations for women presenting with suspected DCIS and LCIS	Examination of the breast  Interprets simple imaging	1,2,3,5
Be familiar with DCIS LCIS and its management (1)	Understands the management of DCIS LCIS	Able to recognise the main histological types of CIS	1,5
Be able to assess patients for adjuvant postoperative radiotherapy (1)			

Be able to discuss treatment options in the light of understanding of prognosis for patients with DCIS and LCIS (A)	Understands the effects of treatment on prognosis	Advises patients on treatment options	1.2.3.4
Be able to take part in discussions in multi-disciplinary meetings (A)	Understands the indications and limitations of radiotherapy, surgery and systemic therapy in patients presenting with DCIS LCIS.		1.2

## 2. Radiotherapy treatment (external beam radiotherapy)

Objective	Knowledge	Skills	Assessment
Be able to explain clearly the benefits, side effects and risks of a course of radiotherapy.(I)  Be able to seek informed consent for a course of treatment.(I) Be able to seek informed consent for clinical trials (A)	Understands the acute and long term complications of breast radiotherapy and their relation to dose and volume. Understands the legal aspects and ethics of informed consent for treatment and for clinical trials.	Able to take informed consent for radical and palliative treatment	1.2.4.2
Be able to determine the target volume for planning field for radiotherapy to the breast for pre-invasive disease (I)	Understands the clinical and radiological parameters associated with planning radiotherapy including CT planning. Is competent in the interpretation of diagnostic imaging (including CT and MR) for determination of target volume. Aware of normal tissue morbidity and its impact on target volume definition. Is able to judge how to modify treatment plans based on morbidity.	Able to define a planning target volume for radiotherapy for pre-invasive carcinoma of the breast	1.2.5
Be able to modify treatment plans according to patient's individual needs, pre-morbid conditions etc(I)	Knows how to judge the relative risks and benefits of dose gradients in the pelvis		1.2.5
Be able to use special planning modalities including CT planning and BEV planning(A)	Understands the use of cross-sectional imaging in planning radiotherapy to the breast	Able to use CT planning and IMRT in the treatment of pre-invasive breast cancer	1.2.3.4.5
Be able to care for patients undergoing radiotherapy for pre-invasive breast cancer (I)	Understands early reactions to radiotherapy and their management	Able to conduct radiotherapy review and manage early reactions	1.2.3.4
Be able to modify course of treatment for individual patients according to severity of reactions (I)	Understands the radiobiological basis of radical radiotherapy for pre-invasive breast cancer		

Be able to participate in protocol development in radiotherapy for pre-invasive breast cancer (A)	Understands developments in radiotherapy research and their application to local protocols		1,4
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### 3. Assessment of response and follow-up

Objective	Knowledge	Skills	Assessment
Be able to assess and advise patients attending for follow-up after completion of treatment. Be able to advise on appropriate investigations during follow-up.(I)	Understands the natural history of the illness. Knows the common complications of treatment and how to manage them appropriately	Able to perform examination of the breast and regional lymphatics in patients who have been previously treated for pre-invasive breast cancer	1,2,3,4,5
Recognise less common complications of treatment and how to manage them (A)	Understand the variety of rarer complications of radical treatment and how to differentiate them from recurrence		1,2,3,4
Able to diagnose and investigate recurrent disease (I)	Knowledge of natural history of treated pre-invasive breast cancer	Perform full physical examination including breast examination	1,2,5
Know how to manage recurrent disease and its symptoms.(A)	Understand the roles of radiotherapy, and surgery in the management of recurrence	Able to break news of recurrence to patients and discuss appropriate management options	1,2,4

## Breast Cancer : advanced and metastatic disease

### 1. Selection and assessment of patients with advanced and metastatic breast cancer for treatment.

Objective	Knowledge	Skills	Assessment
Be able to diagnose common presentations of metastatic breast cancer (I)	Understands epidemiology and aetiology of breast cancer.  Can recommend appropriate diagnostic and staging investigations for women presenting with suspected advanced or metastatic breast cancer	Physical examination in out-patients clinic.	1,2,3,5
Able to assess prognosis for patients with advanced and metastatic disease (I)	Knows the effect of stage, age, co-morbidity and histological type on prognosis		1,2,3,5
Able to discuss treatment options in the light of understanding of prognosis (I)	Understands the effects of treatment on prognosis	Advises patients on treatment options	1,2,3,4,5
Take part in discussions in multi-disciplinary meetings (A)	Understands the indications and limitations of chemotherapy, radiotherapy and surgery in palliative treatment of advanced or metastatic breast cancer. Understands the importance of involving palliative care team in management		1,4

## 2. Systemic therapy

Objective	Knowledge	Skills	Assessment
Be able to assess patients for appropriate systemic therapy for advanced and metastatic disease (I)	Is familiar with commonly used drug protocols and their side effects. Knows which regimes are appropriate for use in the clinical situation.	Able to prescribe common therapeutic regimes	1,2,3,4,5
Be familiar with research developments in drug therapy for advanced and metastatic disease (A)	Understands the action of chemotherapeutic, hormonal or biological agents, their limitations and interactions		1,2
Be able to modify chemotherapy prescription in the light of major organ dysfunction (I)	Understands pharmacology of drugs used in treatment of advanced and metastatic disease	Able to prescribe growth factors and other support drugs	1,2,3,5
Be able to advise on less common therapeutic regimes in palliative treatment for recurrent disease (A)	Understands the principles of palliative chemotherapy and the use of cytotoxic agents in heavily pre-treated patients and patients with significant co-morbidities	Able to prescribe less common cytotoxic regimes	1,2,3
Able to participate in Phase 2 and Phase 3 clinical trials and maintain appropriate research records (A)	Understands the principles of clinical research		1,6
Able to care for patients having routine palliative chemotherapy (I)	Understands the acute side effects of chemotherapy.	Able to prescribe chemotherapy according to protocol and modify schedules for patients based on individual needs and judge when to continue or stop treatment	1,2,3,5
Able to use supportive treatments eg bisphosphonates (I)	Understands the action of various supportive interventions and their indications		1,2,3,5

## 3. Radiotherapy treatment (external beam radiotherapy)

Objective	Knowledge	Skills	Assessment
Be able to explain clearly the benefits, side effects and risks of a course of radiotherapy.(I) Be able to seek informed consent for a course of treatment.(I) Be able to seek informed consent for clinical trials (A)	Understands the acute and long term complications of radiotherapy and their relation to dose and volume in the different organs. Understands the legal aspects and ethics of informed consent for treatment and for clinical trials.	Able to take informed consent for palliative treatment	1,3,4,5
Be able to determine the target volume for planning field for palliative radiotherapy (I)	Understands the clinical and radiological parameters associated with planning palliative radiotherapy including CT planning Is competent in the interpretation of diagnostic imaging (including CT and MR) for determination of target volume Aware of normal tissue morbidity and its impact on target volume definition.	Able to define a planning target volume for palliative radiotherapy in a patient with advanced breast cancer	1,3,5

Be able to modify treatment plans according to patient's individual needs, pre-morbid conditions etc(I)	Knows how to judge the relative risks and benefits of dose gradients in the radiation field Is able to judge how to modify treatment plans based on morbidity.		1,3,5
Be able to care for patients undergoing palliative radiotherapy for metastatic breast cancer (I)	Understands early reactions to radiotherapy and their management	Able to conduct radiotherapy review and manage early reactions	1,2,3,4,5
Be able to modify course of treatment for individual patients according to severity of reactions (I)	Understands the radiobiology associated with palliative radiotherapy for advanced breast cancer		
Be able to participate in protocol development in radiotherapy for advanced or metastatic breast cancer (A)	Understands developments in radiotherapy research and their application to local protocols		1,4

#### 4. Assessment of response and follow-up

Objective	Knowledge	Skills	Assessment
Be able to assess and advise patients attending for follow-up after completion of treatment. Be able to advise on appropriate investigations during follow-up.(I)	Understands the natural history of the illness. Knows the common complications of treatment and how to manage them appropriately	Able to perform physical examination in patients who have been previously treated for advanced breast cancer	1,2,3,4,5
Recognise less common complications of treatment and how to manage them (A)	Understand the variety of rarer complications of treatment and how to differentiate them from disease progression		1,2,3,4
Able to diagnose and investigate further disease progression (I)	Knowledge of natural history of treated advanced breast cancer	Perform full physical examination	1,2,5
Knows how to manage recurrent disease and its symptoms including palliative treatment and symptom control where indicated.(I)	Understand the roles of radiotherapy, chemotherapy and surgery in the management of recurrence	Able to break news of recurrence to patients and discuss appropriate management options	1,2,4,5



## Thoracic Oncology/Lung Cancer: NSCLC

### 1. NSCLC: Selection and assessment of patients for treatment.

Objective	Knowledge	Skills	Assessment
To relate clinical and radiological anatomy to diagnosis and therapy (I)	Understand clinical and radiological anatomy of thorax	Be able to identify thoracic anatomical landmarks, key structures including vessels, lymph nodes and airways on CT	1, 3, 5
Be able to diagnose and stage NSCLC (I)	Understands epidemiology and aetiology of NSCLC. Knows the indications for urgent referral for chest X-ray and respiratory opinion from primary or secondary care. Aware of the risks associated with CT guided biopsy. Knows the TNM staging for NSCLC. Understands technique and limitations of mediastinoscopy and node sampling Is able to recognise common paraneoplastic syndromes and recognise their importance	Respiratory and cardiovascular examination in out-patients clinic Able to interpret X-ray, CT, MRI and PET imaging Can recommend appropriate diagnostic and staging investigations for patients presenting with suspected NSCLC including indications for PET scanning and mediastinal lymph node sampling Attendance at bronchoscopy session	1,2,3,5
Be able to assess patients for radical radiotherapy (I)  Be able to assess patients for post-operative treatment (A)  Be able to assess patients for palliative treatment (I)	Understands the indications for radical radiotherapy in early NSCLC and its side effects  Understands indications for surgery, different types of operation: wedge resection, lobectomy, pneumonectomy and risks associated  Aware of the role of CHART (Continuous Hyperfractionated Accelerated Radiotherapy) in early NSCLC Understands literature on post operative radiotherapy and the circumstances in which this might be considered  Understands evidence for adjuvant chemotherapy following surgery  Understands benefits and toxicity of palliative treatment for both radiotherapy and chemotherapy  Knows the importance of smoking cessation  Understands the importance of involving palliative care team in management	Able to assess performance state (WHO or Karnofsky)  Able to interpret pulmonary function tests but also how they relate to the patient's functional status  Able to discuss post operative treatment options and risk benefit with individual patients  Able to discuss palliative treatment appropriate to stage and fitness of patient  Able to advise on appropriate agencies for helping smoking cessation	1,2,3,5
Able to assess prognosis for patients with NSCLC (I)	Knows the effect of performance state, stage, age, co-morbidity and histological type on prognosis		1,2,3,5

Able to discuss treatment options in the light of understanding of prognosis (I)	Understands the effects of treatment on prognosis	Able to inform patients on treatment options and discuss individual risk/benefit	1,2,3,4,5
Take part in discussions in multi-disciplinary meetings (A)	Understands the indications for treatment of NSCLC, and the risks and benefits of different treatment options	Can contribute to MDT discussions	1,3,4

## 2. NSCLC: Radiotherapy treatment

Objective	Knowledge	Skills	Assessment
Be able to explain clearly the benefits, side effects and risks of a course of radiotherapy.(I) Be able to seek informed consent for a course of treatment.(I) Be able to seek informed consent for clinical trials (A)	Understands the acute and long term complications of thoracic radiotherapy and their relation to dose and volume irradiated and to whether single or multifraction regimens used.  Understands the potential response rates with palliative therapy for symptom control such as cough, haemoptysis.  Understands the legal aspects and ethics of informed consent for treatment and for clinical trials.	Able to assess performance status of patient and elicit symptoms and their severity.  Able to take informed consent for radical and for palliative treatment	1,3,4,5
Be able to determine the target volume for planning palliative and radical radiotherapy (I)	Is competent in the interpretation of diagnostic imaging (including CT, PET and MR) for determination of target volume.  Understands the clinical and radiological parameters associated with planning 2D conventional and 3D conformal lung radiotherapy.  Is competent in assessing tumour motion using X-ray fluoroscopy.  Understands current literature relating DVH values to tolerance of normal tissue  Understands the issues in defining target volume for those patients who have received neo-adjuvant chemotherapy which has debulked tumour	Able to define a planning target volume for NSCLC.  Can define DVH (dose volume histogram) based 3D conformal planning constraints.	1,2,3,5
Be able to prescribe appropriate dose and fractionation schedule for palliative and radical radiotherapy (I)	Understands evidence base for dose fractionation schedules commonly used in lung cancer	Is able to define appropriate treatment schedule according to stage of disease, performance status of patients and concomitant systemic therapy.	1,2,5
Be able to modify treatment plans according to patient's individual needs, pre-morbid conditions etc(I)	Aware of normal tissue morbidity and its impact on target volume definition.  Understands risks of retreatment with radiation based on normal tissue tolerance limits	Is able to judge how to modify treatment plans based on patient co-morbidity.  Able to assess when retreatment is acceptable and prescribe appropriate dose and fractionation	1,3,5

Be able to use special planning modalities including CT planning and BEV planning (A)	Understands the use of cross-sectional imaging in planning lung radiotherapy (I)  Aware of the evolving role of stereotactic radiotherapy, 4D CT planning and respiratory gating in radical lung radiotherapy (A)	Able to use CT planning in the treatment of NSCLC	1,2,3,5
Be able to verify treatment plan (A)	Understands use of digitally reconstructed radiographs and beam's eye views  Understands use of portal imaging	Able to assess accuracy of patient set-up and recommend adjustments	
Be able to care for patients undergoing radiotherapy for NSCLC (I)	Understands early reactions to thoracic radiotherapy and their management  Understands increased risks of toxicity associated with combination chemoradiotherapy	Able to conduct radiotherapy review and manage early reactions	1,2,3,5
Be able to modify course of treatment for individual patients according to severity of reactions including adjustments for gaps in treatment (I)	Understands the radiobiology associated with radical radiotherapy NSCLC		
Be able to participate in protocol development in radiotherapy for NSCLC (A)	Understands developments in radiotherapy research and their application to local protocols		1,4,6
Be able to use external beam radiotherapy as a palliative modality for pain relief from bony metastases (I)  Able to assess the underlying mechanism for pain and refer suitable patients for surgical approach (A)	Understand the mechanism of radiation induced pain relief  Have knowledge of bone metastases palliative radiotherapy trials with emphasis on symptom control and quality of life  Be aware of potential for acute pain flare  Able to pre-empt radiation induced nausea diarrhoeas if field is relevant to these symptoms  Knowledge of role of surgical fixation for lytic metastases in long bones and unstable vertebral column	Able to take informed consent for palliative RT to a bony metastasis and advise patient on side effects  Able to assess underlying mechanism for pain and refer appropriate patients for surgical intervention	1,3,4,5
Be able to assess patients for endobronchial therapy (A)	Understands potential role of endobronchial brachytherapy relative to laser treatment and photodynamic therapy	Able to identify suitable patients who may benefit from these treatments for referral to appropriate centre	

### 3. NSCLC: Systemic Therapy

Objective	Knowledge	Skills	Assessment
Be able to assess patients for appropriate chemotherapy (I) Able to adjust choice of chemotherapy regimen according to patient fitness (A)	Is familiar with commonly used drug protocols and their side effects. Understands principles of palliative chemotherapy and potential benefit to patient (BMJ meta-analysis). Understand different patient motives (coping, survival, enhancement, quality of life improvement) for receiving chemotherapy (A)	Able to prescribe common therapeutic regimens Able to assess patient's fitness eg by ECOG performance status  Able to assess and discuss whether	1,2,4,5

	Knows which regimes are appropriate for use in the clinical situation. This should include knowledge of appropriate regimes in the elderly, those with comorbidity and the PS2 patient	outcomes of therapy are meeting patients' needs (A)	
Be familiar with research developments in drug therapy for non-small cell lung cancer (A)	Is aware of recent literature and licensing status of new agents to allow a full discussion of options  Knowledge of reliable sources of information for patients to access eg BACUP, NCI website	Able to discuss developments in treatment knowledgeably, or know where to direct patients to find information	1,2
Be able to modify chemotherapy prescription in the light of major organ dysfunction (I)	Understands pharmacology of drugs used in treatment of non-small cell lung cancer  Understands when it is inappropriate to prescribe chemotherapy due to risk of toxicity.	Able to prescribe growth factors and other support drugs and able to dose reduce if appropriate. Able to organise and interpret investigations such as EDTA	1,2,3,5
Be able to advise on 2 <sup>nd</sup> line chemotherapy (I)	Understands the use of cytotoxic agents in pre-treated patients. Familiar with second line treatment options	Able to prescribe second line treatment appropriate to patient	1,2,3,5
Be able to participate in Phase 1, Phase 2 and Phase 3 clinical trials (A)	Understands the principles of clinical research Understands the risk benefit ratio to individual patient.	Able to obtain informed consent for a clinical trial. Able to record toxicity and response accurately.	1,6
Be able to assess response to chemotherapy (I).	Understands the aim of treatment and is able to assess response according to recognised criteria  Understands the palliative care options available to a patient who is not responding to tolerating chemotherapy	Able to prescribe chemotherapy according to protocol and modify schedules for patients based on individual needs and judge when to continue or stop treatment	1,2,3,5

#### 4. NSCLC: Assessment of response and follow up

Objective	Knowledge	Skills	Assessment
Be able to assess response to chemo and radiotherapy (I)	Imaging interpretation using RECIST criteria	Discuss response and current disease status with patients in clinic	1,2,5
Be able to advise on follow-up schedule and appropriate investigations (I)	Knowledge of patterns of relapse		1,2,5
Be able to diagnose recurrent disease (I)	Knowledge of natural history of lung cancer and ability to differentiate late effects of treatment from recurrence	Clinical assessment and selecting appropriate investigations, eg imaging or bronchoscopy	1,2,5
Be able to recognise and manage acute and long-term toxicity (A)	Knowledge of acute and late effects of treatment	Able to detect and treat acute pneumonitis and oesophagitis  Able to detect late effects at follow-up	1,2
Be able to manage recurrent disease (A)	Understanding the roles of chemotherapy, radiotherapy and supportive measures in the management of recurrence. Understands the importance of involving palliative care team in management.	Breaking bad news. Integration of palliative, supportive care. Ability to discuss roles of alternative therapies	1,2,4

## Lung Cancer: Small Cell Lung Cancer (SCLC)

### 1. Assessment of patients with SCLC for treatment

Objective	Knowledge	Skills	Assessment
Be able to diagnose and Stage SCLC (I)	Understands epidemiology and aetiology of SCLC  Knows staging system  Understands prognostic factors       Knows the importance of smoking cessation	Interpretation of x-rays and CT scan images  Can recommend appropriate diagnostic and staging investigations  Attendance at bronchoscopy session  Able to advise on appropriate agencies for helping smoking cessation.  Able to advise on appropriate agencies for helping smoking cessation	1,2,5
Be able to assess patients for appropriate therapy (I)	Understands the management of the condition (systemic and radiotherapy) Understands the role of early chemo-radiotherapy against sequential chemotherapy with consolidation radiotherapy	Clinical assessment, including assessing co-morbidity and its affect on outcome	1,2,5
Be able to discuss treatment options (I)	Understands prognosis and how treatment affects this	Advise patient on appropriate management	1,2,3,4,5
Take part in MDM discussions(A)	Understands indications for and limitations of treatment for SCLC	MDM interaction	1,2,3,4

### 2. Systemic Therapy

Objective	Knowledge	Skills	Assessment
Be able to assess patients for chemotherapy (I)	Knowledge of common drug protocols for SCLC and their toxicity Understand which regimes are appropriate in the clinical situation	Clinical Examination and Assessment	1,2,5
Look after patients undergoing radical and palliative treatment regimes (I)	Understands the acute side-effects of chemotherapy	Able to prescribe common chemo protocols, modify prescriptions, judge when to stop or continue treatment, and prescribe supportive treatment	1,2,3,5
Be able to modify prescription in the light of major organ dysfunction (I)	Understands the pharmacology of drugs used in the treatment of SCLC	Able to prescribe growth factors, supportive agents and dose reduce as appropriate	1,2,4,5
Be able to advise on second line therapeutic regimes (A)	Understands the use of cytotoxics in pre-treated patients	Able to prescribe and manage second line cytotoxic regimes	2,3
Be familiar with research developments in SCLC (A)	Knows details of recently published and ongoing trials	Able to discuss involvement in clinical trials	2,4,5
Be able to participate in ph I, II and III trials and maintain appropriate research records (A)	Understands the principles of clinical research		2,3,6

### 3. Radiotherapy Treatment

Objective	Knowledge	Skills	Assessment
Be able to assess patients suitability for consolidation or palliative RT (I)	Understand benefits side effects and risks of radiotherapy including PCI	Obtain informed consent	1,2,3,5
Be able to determine planning target volume for thoracic RT or palliative treatment (I)	Aware of normal tissue toxicity and its impact on target volume definition. Understand how respiratory movement affects PTV	Plan thoracic radiotherapy, including CT planning Plan PCI including blocks Plan palliative radiotherapy	1,2,3,5
Be able to manage and care for patients undergoing thoracic RT and PCI (I)	Understands radiobiology of thoracic RT and PCI Understands early reactions to thoracic RT and PCI and their management	Clinic review of on-treatment patients and management of early reactions	1,2,5
Be able to enter patients into clinical trials of RT in limited stage SCLC (A)	Good knowledge of rationale for on-going clinical trials	Obtain consent for entry into clinical trials	1,2,3
Be able to modify treatment plans according to patients individual needs pre-morbid conditions etc (I)	Judge relative risks and benefits	Prescribe and review radical treatment	1,2,3,5

### 4. Assessment of response and follow up

Objective	Knowledge	Skills	Assessment
Be able to assess response to chemo and radiotherapy (I)	Imaging interpretation using RECIST criteria	Discuss response and current disease status with patients in clinic	1,2,5
Be able to advise on follow-up schedule and appropriate investigations (I)	Knowledge of patterns of relapse of SCLC		1,2,5
Be able to diagnose recurrent disease (I)	Knowledge of likely symptoms and signs of recurrent metastatic disease	Clinical assessment and selecting appropriate investigations, eg imaging bronchoscopy	1,2,5
Be able to recognise and manage long-term toxicity (A)	Knowledge of late effects of treatment	Detect at follow-up	1,2
Be able to manage recurrent disease (A)	Understanding the roles of chemotherapy, radiotherapy and supportive measures in the management of recurrence	Breaking bad news. Integration of palliative, supportive care Ability to discuss roles of alternative therapies	1,2,4

## Thoracic Oncology: Mesothelioma

### 1. Selection and assessment of patients with mesothelioma for treatment.

Objective	Knowledge	Skills	Assessment
Be able to diagnose and stage mesothelioma (I)	Understands the epidemiology and aetiology of mesothelioma.  Knows the IMIG staging for mesothelioma and is aware of its limitations.  Can recommend appropriate diagnostic and staging investigations for patients presenting with suspected mesothelioma.  Is aware of the legal implications and support issues of a diagnosis of mesothelioma.	Respiratory examination in the out patient clinic. Interpretation of CT scanning, understanding of the limits of plain chest radiology, ability to suggest appropriate diagnostic methods eg pleural biopsy, VAT	1,2,3,5
Be familiar with the main histological types of mesothelioma (I)	Understands the difficulties of establishing a definite histological diagnosis in suspected mesothelioma.  Knows the main histological types of mesothelioma.  Understands the management of all stages of mesothelioma and how its management may differ according to the histological type.	Able to discuss relevant histological markers	1,5
Be able to assess patients for radiotherapy (I)	Understands the indications for radiotherapy and its side effects.		1,2,3
Able to assess prognosis for patients with mesothelioma (I)	Knows the effect of stage, age, co-morbidity and histological type on prognosis.		1,2,3,5
Able to discuss treatment options in the light of understanding of prognosis (A)	Understands potential roles of radiotherapy and surgery and the limitations of evidence base on both.  Understands the indications for chemotherapy, the evidence base, contentious issues and side effects.	Can inform patient of treatment options and discuss as required.	1,2,3,4
Take part in discussions in multi-disciplinary meetings (A)	Understands the indications and limitations of treatment in both curative and palliative setting of mesothelioma in patients presenting in all stages. Understands the importance of involving palliative care team in management.		1,4

### 2. Radiotherapy treatment (external beam radiotherapy)

Objective	Knowledge	Skills	Assessment
Be able to explain clearly the benefits, side effects and risks of a course of radiotherapy.(B II) Be able to seek informed consent for a course of treatment.(I) Be able to seek informed consent for clinical trials (A)	Understands the acute and long term complications of prophylactic (I) palliative (I) post operative (A) radiotherapy and their relation to dose and volume in the different organs in the chest and abdomen. Understands the legal aspects and ethics of informed consent for treatment and for clinical trials.	Able to take informed consent for radical (A) and palliative (I) treatment.	1,3,4,5



Be able to determine the target volume for planning field for post operative radiotherapy (A)	Understands the clinical and radiological parameters associated with planning radiotherapy including CT planning. Is competent in the interpretation of diagnostic imaging for determination of target volume. Aware of normal tissue morbidity and its impact on target volume definition. Is able to judge how to modify treatment plans based on morbidity.	Able to define a planning target volume in palliative setting, but have an understanding of the issues in planning post-OPP.	1.3
Be able to use special planning modalities including CT planning (A)	Understands the use of cross-sectional imaging (CT and MRI) in planning thoracic radiotherapy.	Able to use CT planning in the treatment of mesothelioma.	1.2,3,4
Be able to care for patients undergoing thoracic radiotherapy for mesothelioma (I)	Understands early reactions thoracic radiotherapy and their management.	Able to conduct radiotherapy review and manage early reactions.	1.2,3,4
Be able to participate in protocol development in thoracic radiotherapy for mesothelioma (A)	Understands developments in radiotherapy research and their application to local protocols.		1.4

### 3. Systemic therapy

Objective	Knowledge	Skills	Assessment
Be able to assess patients for appropriate chemotherapy (I)	Is familiar with commonly used drug protocols and their side effects and potential interactions. Knows which regimes are appropriate for use in the clinical situation.	Able to prescribe common therapeutic regimes with vitamin supplements as required.	1.2,3,4,5
Be familiar with research developments in drug therapy for mesothelioma (A)	Understands the action of chemotherapeutic agents, their limitations and interactions.		1.2
Be able to modify chemotherapy prescription in the light of major organ dysfunction (I)	Understands pharmacology of drugs used in treatment of mesothelioma.	Able to prescribe growth factors and other support drugs.	1.2,3,5
Be able to advise on less common therapeutic regimes in particular palliative treatment for recurrent disease (A)	Understands the principles of palliative chemotherapy and the use of cytotoxic agents in heavily pre-treated patients.	Able to prescribe less common cytotoxic regimes.	1.2,3
Be able to participate in Phase 2 and Phase 3 clinical trials and maintain appropriate research records (A)	Understands the principles of clinical research.		1
Be able to care for patients having routine neo-adjuvant and palliative chemotherapy (I)	Understands the acute side effects of chemotherapy.	Able to prescribe chemotherapy according to protocol and modify schedules for patients based on individual needs and judge when to continue or stop treatment.	1.2,3,5



#### 4. Assessment of response and follow-up

Objective	Knowledge	Skills	Assessment
Be able to assess and advise patients attending for follow-up after completion of treatment. Be able to advise on appropriate investigations during follow-up.(I)	Understands the natural history of the illness. Knows the common complications of treatment and how to manage them appropriately.	Able to interpret CT scans and Chest x rays in patients who have been previously treated for mesothelioma	1,2,3,4,5
Be able to recognise less common complications of treatment and how to manage them (A)	Understand the variety of rarer complications of radical treatment and how to differentiate them from recurrence		1,2,3,4
Be able to diagnose and investigate recurrent disease (I)	Knowledge of natural history of treated mesothelioma	Perform full physical examination.	1,2,5
Understand how to manage recurrent disease and its symptoms including palliative treatment and symptom control where indicated.(A)	Understand the roles of radiotherapy, chemotherapy and surgery in the management of recurrence. Understands the importance of involving palliative care team in management.	Able to break news of recurrence to patients and discuss appropriate management options.	1,2,4

#### Thoracic Oncology: Thymic Tumours

##### 1. Selection and assessment of patients with thymic tumours for radiotherapy.

Objective	Knowledge	Skills	Assessment
To relate clinical and radiological anatomy to diagnosis and therapy (I)	Understand clinical and radiological anatomy of thorax	Be able to identify thoracic anatomical landmarks, key structures including vessels, lymph nodes, thymic remnant and airways on CT	1, 3, 5
Be able to diagnose and stage thymic tumours (A)	Understands presentations of thymic tumours including neurological, haematological and immunological manifestations.  Knows the staging/classifications for thymic tumours.	History and examination in outpatients clinic  Able to interpret X-ray, CT, MRI and PET imaging of thymic tumours  Can recommend appropriate diagnostic and staging investigations for patients presenting with suspected thymic tumours	1,2,3
Be able to assess patients for radiotherapy (A)	Understands the indications for adjuvant radiotherapy in thymic tumours  Understands the role of palliative radiotherapy in thymic tumours	Able to assess performance state (WHO or Karnofsky)  Able to discuss surgical findings with surgery and pathology colleagues	1,2,3
Able to assess prognosis for patients with thymic tumours (A)	Knows the effect of performance state, stage, age, co-morbidity and histological type on prognosis		1,2,3

Able to discuss treatment options in the light of understanding of prognosis (A)	Understands the effects of treatment on prognosis	Informs patient and discusses treatment options	1,2,3,4
Take part in discussions in multi-disciplinary meetings (A)	Understands the indications and limitations of radiotherapy and chemotherapy in the management of thymic tumours	Can contribute to MDT discussions (A)	1,3,4

## 2. Radiotherapy treatment (external beam radiotherapy)

Objective	Knowledge	Skills	Assessment
Be able to explain clearly the benefits, side effects and risks of a course of radiotherapy.(A) Be able to seek informed consent for a course of treatment.(A) Be able to seek informed consent for clinical trials (A)	Understands the acute and long term complications of lung radiotherapy and their relation to dose and volume irradiated.  Understands the legal aspects and ethics of informed consent for treatment and for clinical trials.	Able to take informed consent for radical treatment	1,3,4
Be able to determine the target volume for planning radical radiotherapy (A)	Is competent in the interpretation of diagnostic imaging (including CT, PET and MR) for determination of target volume.  Understands the clinical and radiological parameters associated with planning 3D conformal thoracic radiotherapy.	Able to define a planning target volume for thymic tumours.  Can define DVH (dose volume histogram) based 3D conformal planning constraints.	1,2,3,5
Be able to modify treatment plans according to patient's individual needs, pre-morbid conditions etc.(A)	Aware of normal tissue morbidity and its impact on target volume definition.	Is able to judge how to modify treatment plans based on morbidity.	1,3
Be able to care for patients undergoing radical radiotherapy for thymic tumours(I)	Understands early reactions to thoracic radiotherapy and their management  Understands verification and correction procedures for radical radiotherapy	Able to conduct radiotherapy review and manage early reactions  Able to supervise correction protocols for set-up errors	1,2,3,4,5
Be able to modify course of treatment for individual patients according to severity of reactions including adjustments for gaps in treatment (A)	Understands the radiobiology associated with radical radiotherapy		
Be able to participate in protocol development in radiotherapy for thymic tumours (A)	Understands developments in radiotherapy and chemotherapy research and their application to local protocols		1,4
Be able to participate in follow-up for patients with thymic tumours (I)	Understand presentation of relapse of thymic tumours and of late complications of therapy		1,3,4,5

## Upper Gastro-intestinal Cancer: Cancer of the Oesophagus

### 1. Selection and assessment of patients with all stages of oesophageal cancer for treatment.

Objective	Knowledge	Skills	Assessment
Be able to diagnose and stage oesophageal cancer (I)	Understands epidemiology and aetiology of oesophageal cancer.  Understands the importance of screening and its limitations  Knows the TNM staging for oesophageal cancer  Can recommend appropriate diagnostic and staging investigations for patients presenting with suspected oesophageal cancer	Perform full examination including chest and abdomen and interpret diagnostic information including CT imaging including CT imaging, ultrasound scanning and PET	1,2,5
Be familiar with the main histological types of oesophageal cancer and their management (I)	Understands the management of all stages of oesophageal cancer and how its management differs according to the main histological types which present in this country	Able to recognise the main histological types of cancer presenting in the oesophagus	1,5
Be able to assess patients for radical therapy (I)	Understands the indications for treatment (surgery, radiotherapy and or chemotherapy), including combined modality therapy, and its side effects. Understand the main surgical procedures undertaken and associated morbidities		1,2,5
Able to assess prognosis for patients with oesophageal cancer (I)	Knows the effect of stage, age, co-morbidity and histological type on prognosis Understand investigations employed to assess for response to therapy and their limitations		1,2,5
Able to discuss treatment options in the light of understanding of prognosis (I)	Understands the effects of treatment on prognosis	Advises patients on treatment options	1,2,4,5
Take part in discussions in multi-disciplinary meetings (A)	Understands the indications and limitations of chemotherapy, radiotherapy, surgery and endoscopic therapy in both curative and palliative treatment of oesophageal cancer in patients presenting in all stages. Understands specialist contribution from SALT and nutritional therapists, clinical nurse specialists and palliative care team.		1,4,5

### 2. Radiotherapy treatment (external beam radiotherapy)

Objective	Knowledge	Skills	Assessment
Be able to explain clearly the benefits, side effects and risks of a course of radiotherapy.(I) Be able to seek informed consent for a course of treatment.(I) Be able to seek informed consent for clinical trials (A)	Understands the acute and long term complications of mediastinal radiotherapy and their relation to dose and volume in the different organs in the chest and upper abdomen. Understands the legal aspects and ethics of informed consent for treatment and for clinical trials.	Able to take informed consent for radical and palliative treatment	1,3,4,5
Be able to determine the target volume for planning field for mediastinal radiotherapy (I)	Understands the clinical and radiological parameters associated with planning mediastinal radiotherapy including CT planning	Able to define a planning target volume for different stages of oesophageal cancer	1,3,5

	Is competent in the interpretation of diagnostic imaging (including CT) for determination of target volume. Aware of normal tissue morbidity and its impact on target volume definition. Is able to judge how to modify treatment plans based on morbidity.		
Be able to modify treatment plans according to patient's individual needs, pre-morbid conditions etc(I)	Knows how to judge the relative risks and benefits of dose gradients in the chest and upper abdomen	Able to review treatment plans including DVH data	1,3,5
Be able to use special planning modalities including CT planning (A)	Understands the use of cross-sectional imaging in planning mediastinal radiotherapy	Able to use conventional and CT planning in the treatment of oesophageal cancer	1,2,3,4,5
Be able to care for patients undergoing mediastinal radiotherapy for oesophageal cancer (I)	Understands early reactions to mediastinal radiotherapy and their management	Able to conduct radiotherapy review and manage early reactions	1,2,3,4,5
Be able to modify course of treatment for individual patients according to severity of reactions including adjustments for gaps in treatment (I)	Understands the radiobiology associated with radical mediastinal radiotherapy for oesophageal cancer	Able to modify radiotherapy and chemo-radiation prescriptions including dose-fractionation schedules to compensate for treatment delays/gaps	
Be able to participate in protocol development in mediastinal radiotherapy for oesophageal cancer (A)	Understands developments in radiotherapy research and their application to local protocols		1,4

### 3. Systemic therapy

Objective	Knowledge	Skills	Assessment
Be able to assess patients for appropriate chemotherapy (I)	Is familiar with commonly used drug protocols and their side effects. Knows which regimes are appropriate for use in the clinical situation.	Able to prescribe common therapeutic regimes	1,2,3,4,5
Be familiar with research developments in drug therapy for oesophageal cancer (A)	Understands the action of chemotherapeutic agents, their limitations and interactions with radiotherapy		1,2,5
Be able to modify chemotherapy prescription in the light of major organ dysfunction (I)	Understands pharmacology of drugs used in treatment of oesophageal cancer	Able to prescribe growth factors and other support drugs	1,2,3,5
Be able to advise on less common therapeutic regimes in particular palliative treatment for recurrent disease (A)	Understands the principles of palliative chemotherapy and the use of cytotoxic agents in heavily pre-treated patients	Able to prescribe less common cytotoxic regimes	1,2,3
Be able to care for patients having routine neo-adjuvant, con-comitant, adjuvant and palliative chemotherapy (I)	Understands the acute side effects of chemotherapy and its interaction with radiotherapy	Able to prescribe chemotherapy according to protocol and modify schedules for patients based on individual needs and judge when to continue or stop treatment	1,2,5

#### 4. Brachytherapy

Objective	Knowledge	Skills	Assessment
Understand the indications for brachytherapy in the management of oesophageal cancer (I)	Radiobiological and physical aspects of intraluminal brachytherapy in oesophageal cancer.		1,2,5
Be able to administer, plan and modify brachytherapy treatment and prescriptions in the light of normal tissue tolerance (A)	Quality assurance of intraluminal brachytherapy	Perform straightforward brachytherapy insertions	1,2,3
Be able to participate in planning departmental brachytherapy workload and use of HDR afterloading equipment (A)	Understanding of the organisation of a brachytherapy service		1,2,3

#### 5. Assessment of response and follow-up

Objective	Knowledge	Skills	Assessment
Be able to assess and advise patients attending for follow-up after completion of treatment. Be able to advise on appropriate investigations during follow-up.(I)	Understands the natural history of the illness. Knows the common complications of treatment and how to manage them appropriately		1,2,4,5
Be able to recognise less common complications of treatment and how to manage them (A)	Understand the variety of rarer complications of radical treatment, how to differentiate them from recurrence and how to manage them		1,2,4
Be able to diagnose and investigate recurrent disease (I)	Knowledge of natural history of treated oesophageal cancer	Perform full physical examination including chest and abdominal examination	1,2,5
Understand how to manage recurrent disease and its symptoms including palliative treatment and symptom control where indicated (I)	Understand the roles of radiotherapy, chemotherapy, surgery and endoscopic therapy in the management of recurrence	Able to break news of recurrence to patients and discuss appropriate management options	1,2,4,5

### Upper GI Cancer: Cancer of the Stomach

#### 1. Selection and assessment of patients with all stages of gastric cancer for treatment

Objective	Knowledge	Skills	Assessment
Be able to diagnose and stage gastric cancer (I)	Understands epidemiology and aetiology of gastric cancer.  Knows the TNM staging for gastric cancer  Can recommend appropriate diagnostic and staging investigations for patients presenting with suspected gastric cancer	Perform full examination including chest and abdomen and interpret diagnostic information including CT imaging, ultrasound scanning and PET	1,2,3,5
Be familiar with the main histological types of gastric cancer and their management (I)	Understands the management of all stages of gastric cancer and how its management differs according to the main histological types which present in this country.	Able to recognise the main histological types of cancer presenting in the stomach	1,5

Be able to assess prognosis for patients with gastric cancer(I)	Knows the effect of stage, age, co-morbidity and histological type on prognosis		1,2,3,5
Be able to discuss treatment options in the light of understanding of prognosis for patients with common (I) and uncommon (A) types of gastric cancer	Understands the effects of radiotherapy, chemotherapy, surgery and endoscopic therapy on prognosis Understand the main surgical procedures undertaken and associated morbidities	Advises patients on treatment options	1,2,3,4,5
Be able to participate in Phase 2 and Phase 3 clinical trials and maintain appropriate research records (A)	Understands the principles of clinical research	Able to discuss, enter and review patients in appropriate clinical trials	1,5,6
Be able to take part in discussions in multi-disciplinary meetings (A)	Understands the indications and limitations of radiotherapy, chemotherapy, surgery and endoscopic therapy in both curative and palliative treatment of gastric cancer in patients presenting in all stages. Understands specialist contribution from SALT and nutritional therapists and the importance of nutritional support. Understands the importance of involving palliative care team in management		1,4

## 2. Radiotherapy treatment (external beam radiotherapy)

Objective	Knowledge	Skills	Assessment
Be able to explain clearly the benefits, side effects and risks of a course of radiotherapy.(I) Be able to seek informed consent for a course of treatment.(I) Be able to seek informed consent for clinical trials (A)	Understands the acute and long term complications of abdominal radiotherapy and their relation to dose and volume in the different organs in the abdomen. Understands the legal aspects and ethics of informed consent for treatment and for clinical trials.	Able to take informed consent for radical and palliative treatment	1,3,4,5
Be able to determine the target volume for planning field for radical and palliative radiotherapy (I)	Understands the clinical, anatomical and radiological parameters associated with planning abdominal radiotherapy including CT planning. Is competent in the interpretation of diagnostic imaging (including CT) and surgical findings for determination of target volume. Aware of normal tissue morbidity and its impact on target volume definition. Is able to judge how to modify treatment plans based on morbidity.	Able to define a planning target volume for palliative primary and radical postoperative radiotherapy for gastric cancer	1,3,5
Be able to modify treatment plans according to patient's individual needs, pre-morbid conditions etc(I)	Knows how to judge the relative risks and benefits of dose gradients in the abdomen	Able to review treatment plans including DVH data	1,3,5
Be able to use special planning modalities including CT planning (A)	Understands the use of cross-sectional imaging in planning abdominal radiotherapy	Able to use conventional and CT planning in the treatment of gastric cancer	1,2,3,4,5
Be able to care for patients undergoing abdominal radiotherapy for gastric cancer (I)	Understand early reactions to abdominal radiotherapy and their management	Able to conduct radiotherapy review and manage early reactions Able to modify	1,2,3,4,5

Be able to modify course of treatment for individual patients according to severity of reactions (I)	Understands the radiobiological basis of abdominal radiotherapy for gastric cancer	radiotherapy and chemo-radiation prescriptions including dose-fractionation schedules to compensate for treatment delays gaps	
Be able to participate in protocol development in abdominal radiotherapy for gastric cancer (A)	Understands developments in radiotherapy research and their application to local protocols		1,4

### 3. Systemic therapy

Objective	Knowledge	Skills	Assessment
Be able to assess patients for appropriate chemotherapy (I)	Is familiar with commonly used drug protocols and their side effects. Knows which regimes are appropriate for use in the clinical situation.	Able to prescribe common therapeutic regimes	1,2,3,4,5
Be familiar with research developments in drug therapy for gastric cancer (A)	Understands the action of chemotherapeutic agents, their limitations and interactions with radiotherapy		1,2
Be able to modify chemotherapy prescription in the light of major organ dysfunction (I)	Understands pharmacology of drugs used in treatment of gastric cancer	Able to prescribe growth factors and other support drugs	1,2,3,5
Be able to advise on less common therapeutic regimes in particular palliative treatment for recurrent disease (A)	Understands the principles of palliative chemotherapy and the use of cytotoxic agents in heavily pre-treated patients and patients with significant co-morbidities	Able to prescribe less common cytotoxic regimes	1,2,3
Able to participate in Phase 2 and Phase 3 clinical trials and maintain appropriate research records (A)	Understands the principles of clinical research	Able to discuss, enter and review patients in appropriate clinical trials	1,6
Able to care for patients having routine neo-adjuvant, con-comitant, adjuvant and palliative chemotherapy (I)	Understands the acute side effects of chemotherapy and its interaction with radiotherapy.	Able to prescribe chemotherapy according to protocol and modify schedules for patients based on individual needs and judge when to continue or stop treatment	1,2,3,5

### 4. Assessment of response and follow-up

Objective	Knowledge	Skills	Assessment
Be able to assess and advise patients attending for follow-up after completion of treatment. Be able to advise on appropriate investigations during follow-up.(I)	Understands the natural history of the illness. Knows the common complications of treatment and how to manage them appropriately	Able to perform abdominal examination in patients who have been previously treated for gastric cancer	1,2,3,4,5
Recognise less common complications of treatment and how to manage them (A)	Understand the variety of rarer complications of radical treatment and how to differentiate them from recurrence		1,2,3,4
Able to diagnose and investigate recurrent disease (I)	Knowledge of natural history of treated gastric cancer	Perform full physical examination including abdominal examination	1,2,5



Know how to manage recurrent disease and its symptoms including palliative treatment and symptom control where indicated.(A)	Understands the roles of radiotherapy, chemotherapy and surgery in the management of recurrence. Understands the importance of involving palliative care team in management.	Able to break news of recurrence to patients and discuss appropriate management options	1,2,4
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## Upper Gastro-Intestinal Cancer : Hepato-biliary and Pancreatic Cancer

### 1. Selection and assessment of patients with all stages of hepato-biliary and pancreatic cancer for treatment.

Objective	Knowledge	Skills	Assessment
Be able to diagnose and stage hepato-biliary and pancreatic cancer (I)	Understands epidemiology and aetiology of hepato-biliary and pancreatic cancer.  Knows the TNM staging for hepato-biliary and pancreatic cancer  Can recommend appropriate diagnostic and staging investigations for patients presenting with suspected hepato-biliary and pancreatic cancer	Perform full examination including chest and abdomen and interpret diagnostic information including CT imaging, ultrasound scanning and PET	1,2,3,5
Be familiar with the main histological types of hepato-biliary and pancreatic cancer and their management (I)	Understands the management of all stages of hepato-biliary and pancreatic cancer and how its management differs according to the main histological types which present in this country	Able to recognise the main histological types of hepato-biliary and pancreatic cancer	1,5
Able to assess prognosis for patients with hepato-biliary and pancreatic cancer(I)	Knows the effect of stage, age, co-morbidity and histological type on prognosis		1,2,3,5
Able to discuss treatment options in the light of understanding of prognosis (A)	Understands the effects of treatment on prognosis Understand the principal surgical, endoscopic and ablative procedures used and the associated morbidities	Advise patients on treatment options	1,2,3,4
Be able to participate in Phase 2 and Phase 3 clinical trials and maintain appropriate research records (A)	Understands the principles of clinical research	Able to discuss, enter and review patients in appropriate clinical trials	1,5
Take part in discussions in multi-disciplinary meetings (A)	Understands the indications and limitations of chemotherapy, radiotherapy, surgery and endoscopic therapy in both curative and palliative treatment of hepato-biliary and pancreatic in patients presenting in all stages of disease		1,4,5

### 2. Systemic therapy

Objective	Knowledge	Skills	Assessment
Be able to assess patients for appropriate chemotherapy for hepato-biliary and pancreatic cancer (I)	Is familiar with commonly used drug protocols and their side effects Knows which regimes are appropriate for use in the clinical situation.	Able to prescribe common therapeutic regimes	1,2,3,4,5



Be familiar with research developments in drug therapy for hepato-biliary and pancreatic cancer (A)	Understands the action of chemotherapeutic agents, their limitations and interactions		1,2,5
Be able to modify chemotherapy prescription in the light of major organ dysfunction (A)	Understands pharmacology of drugs used in treatment of hepato-biliary and pancreatic cancer	Able to prescribe growth factors and other support drugs	1,2,3
Be able to advise on less common therapeutic regimes in particular palliative treatment for recurrent disease (A)	Understands the principles of palliative chemotherapy and the use of cytotoxic agents in heavily pre-treated patients and patients with significant co-morbidities	Able to prescribe less common cytotoxic regimes	1,2,3
Able to participate in Phase 2 and Phase 3 clinical trials and maintain appropriate research records (A)	Understands the principles of clinical research	Able to discuss, enter and review patients in appropriate clinical trials	1,5,6
Able to care for patients having routine curative and palliative chemotherapy (I)	Understands the acute side effects of chemotherapy.	Able to prescribe chemotherapy according to protocol and modify schedules for patients based on individual needs and judge when to continue or stop treatment	1,2,3,5

### 3. Radiotherapy treatment (external beam radiotherapy)

Objective	Knowledge	Skills	Assessment
Be able to explain clearly the benefits, side effects and risks of a course of radiotherapy.(A) Be able to seek informed consent for a course of treatment.(A) Be able to seek informed consent for clinical trials (A)	Understands the acute and long term complications of abdominal radiotherapy and their relation to dose and volume in the different organs in the abdomen. Understands the legal aspects and ethics of informed consent for treatment and for clinical trials.	Able to take informed consent for radical and palliative treatment	1,5,4
Be able to determine the target volume for planning field for pancreatic radiotherapy (A)	Understands the clinical and radiological parameters associated with planning pancreatic radiotherapy including CT planning. Is competent in the interpretation of diagnostic imaging (including CT) for determination of target volume. Aware of normal tissue morbidity and its impact on target volume definition. Is able to judge how to modify treatment plans based on morbidity.	Able to define a planning target volume for radiotherapy for pancreatic cancer	1,3
Be able to modify treatment plans according to patient's individual needs, pre-morbid conditions etc.(A)	Knows how to judge the relative risks and benefits of dose gradients in the abdomen	Able to review treatment plans including DVH data	1,3
Be able to use special planning modalities including CT planning and BEV planning(A)	Understands the use of cross-sectional imaging in planning pancreatic radiotherapy	Able to use CT planning in the treatment of cancer of the pancreas	1,2,3,4
Be able to care for patients undergoing abdominal radiotherapy for pancreatic cancer (A)	Understands early reactions to abdominal radiotherapy and their management	Able to conduct radiotherapy review and manage early reactions	1,2,3,4

<b>Be able to modify course of treatment for individual patients according to severity of reactions (A)</b>	Understands the radiobiology associated with palliative and radical abdominal radiotherapy for pancreatic cancer		
<b>Be able to participate in protocol development in abdominal radiotherapy for pancreatic cancer (A)</b>	Understands developments in radiotherapy research and their application to local protocols		1,4

#### 4. Assessment of response and follow-up

Objective	Knowledge	Skills	Assessment
<b>Be able to assess and advise patients attending for follow-up after completion of treatment. Be able to advise on appropriate investigations during follow-up.(1)</b>	Understands the natural history of the illness. Knows the common complications of treatment and how to manage them appropriately	Able to perform physical examination in patients who have been previously treated for hepato-biliary and pancreatic cancer	1,2,3,4,5
<b>Recognise less common complications of treatment and how to manage them (A)</b>	Understand the variety of rarer complications of radical treatment and how to differentiate them from recurrence		1,2,3,4,5
<b>Able to diagnose and investigate recurrent disease (1)</b>	Knowledge of natural history of treated hepato-biliary and pancreatic cancer	Perform full physical examination including chest and abdominal examination	1,2,5
<b>Knows how to manage recurrent disease and its symptoms including palliative treatment and symptom control where indicated.(1)</b>	Understand the roles of radiotherapy, chemotherapy and endoscopic therapy in the management of recurrence. Understands the importance of involving palliative care team in management.	Able to break news of recurrence to patients and discuss appropriate management options	1,2,4,5

## Lower gastro-intestinal cancer: Cancer of the caecum and colon

### I. Selection and assessment of patients with all stages of colon cancer for radiotherapy.

Objective	Knowledge	Skills	Assessment
Know how to diagnose and stage cancer of the caecum and colon (I)	<p>Understands epidemiology and aetiology of cancer of the caecum and colon.</p> <p>Understands the value of population screening programmes and how they are applied.</p> <p>Understands appropriate endoscopic procedures and can explain them to patients.</p> <p>Knows TNM and Dukes' staging for caecal and colonic cancer</p> <p>Can recommend appropriate diagnostic and staging investigations for patients presenting with suspected cancer of the caecum and colon</p>	Physical examination in out-patients clinic	1,2,3,5
Be familiar with the main histological types of cancer of the caecum and colon and their management (I)	Understands the management of all stages of cancer of the caecum and colon and how its management differs according to stage and histology.	Able to recognise the main histological types of cancer presenting in the caecum and colon	1,5
Be able to assess and advise patients of the relative merits of and indications for surgery and adjuvant therapy. (A)	<p>Understands the indications for surgery, radiotherapy and systemic therapy and their side effects</p> <p>Understands the main surgical procedures for colonic cancer and their indications</p>		1,2,3
Be able to assess patients for postoperative radiotherapy (I)	Understands the indications for radiotherapy and its side effects		1,2,3
Able to assess prognosis for patients with cancer of the caecum and colon (I)	Knows the effect of stage, age, co-morbidity and histological type on prognosis		1,2,3,5
Able to discuss treatment options in the light of understanding of prognosis (I)	Understands the effects of treatment on prognosis.	Advising patients on treatment options	1,2,3,4,5
Take part in discussions in multi-disciplinary meetings (A)	Understands the indications and limitations of radiotherapy and surgery in both curative and palliative treatment of cancer of the caecum and colon in patients presenting in all stages. Understands the importance of involving palliative care team in management.		1,4

## 2. Radiotherapy treatment (external beam radiotherapy)

Objective	Knowledge	Skills	Assessment
<p>Be able to explain clearly the benefits, side effects and risks of a course of radiotherapy.(I)</p> <p>Be able to seek informed consent for a course of treatment.(I)</p> <p>Be able to seek informed consent for clinical trials (A)</p>	<p>Understands the acute and long term complications of pelvic and abdominal radiotherapy and their relation to dose and volume in the different organs in the abdomen and pelvis.</p> <p>Understands the legal aspects and ethics of informed consent for treatment and for clinical trials.</p>	<p>Able to take informed consent for radical postoperative and palliative treatment</p>	1,3,4,5
<p>Be able to determine the target volume for planning field for postoperative or palliative radiotherapy to the caecum and colon (A)</p>	<p>Understands the clinical and radiological parameters associated with planning abdominal and pelvic radiotherapy including CT planning.</p> <p>Is competent in the interpretation of diagnostic imaging (including CT and MR) for determination of target volume.</p> <p>Aware of normal tissue morbidity and its impact on target volume definition.</p> <p>Is able to judge how to modify treatment plans based on morbidity.</p>	<p>Able to define a planning target volume for different stages of cancer of the caecum and colon</p> <p>Able to interpret dose volume histograms.</p>	1,3
<p>Be able to modify treatment plans according to patient's individual needs, pre-morbid conditions etc(I)</p>	<p>Knows how to judge the relative risks and benefits of dose gradients in the abdomen and pelvis.</p>		1,3,5
<p>Be able to use special planning modalities including CT planning and BEV planning (A)</p>	<p>Understands the use of cross-sectional imaging in planning radiotherapy to the caecum and colon</p>	<p>Able to use CT planning and be aware of the role of IMRT in the treatment of cancer of the caecum and colon</p>	1,2,3,4
<p>Be able to care for patients undergoing radiotherapy for cancer of the caecum and colon (I)</p>	<p>Understands early reactions to abdominal and pelvic radiotherapy and their management</p>	<p>Able to conduct radiotherapy review and manage early reactions</p>	1,2,3,4,5
<p>Be able to modify course of treatment for individual patients according to severity of reactions (I)</p>	<p>Understands the radiobiology associated with radical radiotherapy for cancer of the caecum and colon</p>		
<p>Be able to participate in protocol development in radiotherapy for cancer of the caecum and colon (A)</p>	<p>Understands developments in radiotherapy research and their application to local protocols</p>		1,4

## 3. Systemic therapy

Objective	Knowledge	Skills	Assessment
<p>Be able to assess patients for appropriate neo-adjuvant, concomitant and adjuvant chemotherapy and biological therapy (I)</p>	<p>Is familiar with commonly used systemic therapy and its side effects.</p> <p>Knows which regimes are appropriate for use in the clinical situation.</p> <p>Understands the acute side effects of chemotherapy and its interaction with radiotherapy.</p>	<p>Able to prescribe common therapeutic regimes</p>	1,2,3,4,5
<p>Be familiar with research developments in drug therapy for cancer of the caecum and colon (A)</p>	<p>Understands the action of chemotherapeutic agents and potential side effects.</p>		1,2
<p>Be able to modify chemotherapy prescription in the light of major organ dysfunction (I)</p>	<p>Understands pharmacology of drugs used in treatment of cancer of the caecum and colon</p>	<p>Able to prescribe growth factors and other support drugs</p>	1,2,3,5

Be able to advise on less common therapeutic regimes in particular palliative treatment for recurrent disease (A)	Understands the principles of palliative chemotherapy and biological therapy and the use of cytotoxic agents in heavily pre-treated patients	Able to prescribe common cytotoxic regimes and biological agents	1,2,3
Be able to participate in Phase 2 and Phase 3 clinical trials and maintain appropriate research records (A)	Understands the principles of clinical research		1
Be able to care for patients having routine neo-adjuvant, adjuvant and palliative chemotherapy. (I)	Understands the acute side effects of chemotherapy and its interaction with radiotherapy.	Able to prescribe chemotherapy according to protocol and modify schedules for patients based on individual needs and judge when to continue or stop treatment	1,2,3,5

#### 4. Assessment of response and follow-up

Objective	Knowledge	Skills	Assessment
Be able to assess and advise patients attending for follow-up after completion of treatment. Be able to advise on appropriate investigations during follow-up.(I)	Understands the natural history of the illness. Knows the common complications of treatment and how to manage them appropriately	Able to perform appropriate clinical examination in patients who have been previously treated for cancer of the caecum and colon	1,2,3,4,5
Be able to recognise less common complications of treatment and how to manage them (A)	Understand the variety of rarer complications of radical treatment and how to differentiate them from recurrence.		1,2,3,4
Be able to diagnose and investigate recurrent disease (I)	Knowledge of natural history of treated cancer of the caecum and colon		1,2,5
Understand how to manage recurrent disease and its symptoms including palliative treatment and symptom control where indicated.(I)	Understand the roles of radiotherapy chemotherapy and surgery in the management of recurrence. Understands the importance of involving palliative care team in management.	Able to break news of recurrence to patients and discuss appropriate management options	1,2,4,5

### Lower gastro-intestinal cancer: Cancer of the rectum

#### 1. Selection and assessment of patients with all stages of rectal cancer for treatment.

Objective	Knowledge	Skills	Assessment
Be able to diagnose and stage rectal cancer (I)	Understands epidemiology and aetiology of rectal cancer.  Knows the TNM and Dukes' staging for rectal cancer  Can recommend appropriate diagnostic and staging investigations for patients presenting with suspected rectal cancer	Attendance at an endoscopy session	1,2,3,5
Be familiar with the main histological types of rectal cancer and their management (I)	Understands the management of all stages of rectal cancer and how its management differs according to the main histological types which present in this country	Able to recognise the main histological types of cancer presenting in the rectum.	1,5

Be able to assess and advise patients of the relative merits of and indications for radical radiotherapy and surgery. (A)	Understands the indications for radiotherapy and surgery and their side effects		1,2,3
Be able to assess prognosis for patients with rectal cancer(I)	Knows the effect of stage, age, co-morbidity and histological type on prognosis		1,2,3,5
Be able to discuss treatment options in the light of understanding of prognosis for patients with common types of rectal cancer (I)	Understands the effects of treatment on prognosis.	Advises patients on treatment options	1,2,3,4,5
Be able to take part in discussions in multi-disciplinary meetings (A)	Understands the indications and limitations of radiotherapy and surgery in both curative and palliative treatment of rectal cancer in patients presenting in all stages. Understands the importance of involving palliative care team in management.		1,4

## 2. Radiotherapy treatment (external beam radiotherapy)

Objective	Knowledge	Skills	Assessment
Be able to explain clearly the benefits, side effects and risks of a course of radiotherapy.(I) Be able to seek informed consent for a course of treatment.(I) Be able to seek informed consent for clinical trials (A)	Understands the acute and long term complications of pelvic radiotherapy and their relation to dose and volume in the different organs in the abdomen. Understands the legal aspects and ethics of informed consent for treatment and for clinical trials.	Able to take informed consent for radical and palliative treatment	1,3,4,5
Be able to determine the target volume for planning field for radiotherapy for rectal cancer(I) Be aware of the treatment options for cancer of the rectum (I)	Understands the clinical and radiological parameters associated with planning pelvic radiotherapy including CT planning. Is competent in the interpretation of diagnostic imaging (including CT and MR) for determination of target volume. Aware of normal tissue morbidity and its impact on target volume definition. Is able to judge how to modify treatment plans based on morbidity.	Able to define a planning target volume for radiotherapy for rectal cancer.	1,3,5
Be able to modify treatment plans according to patient's individual needs, pre-morbid conditions etc(I)	Knows how to judge the relative risks and benefits of dose gradients in the pelvis		1,3,5
Be able to use planning modalities including CT planning and conformal techniques(I)	Understands the use of cross-sectional imaging in planning pelvic radiotherapy	Able to use CT planning and have knowledge of IMRT in the treatment of rectal cancer.	1,2,3,4,5
Be able to care for patients undergoing pelvic radiotherapy for rectal cancer (I)	Understands early reactions to pelvic radiotherapy and their management	Able to conduct radiotherapy review and manage early reactions	1,2,3,4

Be able to modify course of treatment for individual patients according to severity of reactions (I)	Understands the radiobiological basis of radical pelvic radiotherapy for rectal cancer		
Be able to participate in protocol development in radiotherapy for rectal cancer (A)	Understands developments in radiotherapy research and their application to local protocols		1,4

### 3. Systemic therapy

Objective	Knowledge	Skills	Assessment
Be able to assess patients for appropriate adjuvant, neo-adjuvant and palliative systemic therapy (I)	Is familiar with commonly used drug protocols and their side effects. Knows which regimes are appropriate for use in the clinical situation.	Able to prescribe common therapeutic regimes	1,2,3,4,5
Be familiar with research developments in drug therapy for rectal cancer (A)	Understands the action of chemotherapeutic agents, their limitations and interactions with radiotherapy		1,2
Be able to modify chemotherapy prescription in the light of major organ dysfunction (I)	Understands pharmacology of drugs used in treatment of stomach cancer	Able to prescribe growth factors and other support drugs	1,2,3,5
Be able to advise on less common therapeutic regimes in particular palliative treatment for recurrent disease (A)	Understands the principles of palliative chemotherapy and the use of cytotoxic agents in heavily pre-treated patients and patients with significant co-morbidities	Able to prescribe less common cytotoxic regimes	1,2,3
Able to participate in Phase 2 and Phase 3 clinical trials and maintain appropriate research records (A)	Understands the principles of clinical research		1

### 4. Assessment of response and follow-up

Objective	Knowledge	Skills	Assessment
Be able to assess and advise patients attending for follow-up after completion of treatment. Be able to advise on appropriate investigations during follow-up.(I)	Understands the natural history of the illness. Knows the common complications of treatment and how to manage them appropriately	Able to perform clinical examination in patients who have been previously treated for stomach cancer	1,2,3,4,5
Recognise less common complications of treatment and how to manage them (A)	Understand the variety of rarer complications of radical treatment and how to differentiate them from recurrence		1,2,3,4
Able to diagnose and investigate recurrent disease (I)	Knowledge of natural history of treated stomach cancer	Perform full physical examination	1,2,5
Know how to manage recurrent disease and its symptoms including palliative treatment and symptom control where indicated.(A)	Understand the roles of radiotherapy, chemotherapy and surgery in the management of recurrence. Understands the importance of involving palliative care team in management.	Able to break news of recurrence to patients and discuss appropriate management options	1,2,4



## Lower gastro-intestinal cancer: Cancer of the anal canal and anal margin

### 1. Selection and assessment of patients with all stages of anal cancer for treatment.

Objective	Knowledge	Skills	Assessment
Be able to diagnose anal cancer (I)	Understands epidemiology and aetiology of anal cancer  Knows the TNM staging for anal cancer  Can recommend appropriate diagnostic and staging investigations for patients presenting with suspected anal cancer	Examination of the abdomen, pelvis and regional lymphatic areas in out-patients clinic.	1,2,3,5
Be familiar with the main histological types of anal tumours and their management (I)	Understands the management of all stages of anal cancer and how its management differs according to the main histological types which present in this country	Able to recognise the main histological types of cancer presenting in the anus	1,5
Able to assess prognosis for patients with anal cancer (I)	Knows the effect of stage, age, co-morbidity and histological type on prognosis		1,2,3,5
Able to discuss treatment options in the light of understanding of prognosis (I)	Understands the effects of treatment on prognosis	Advises patients on treatment options	1,2,3,4
Take part in discussions in multi-disciplinary meetings (A)	Understands the indications and limitations of chemotherapy, radiotherapy, biological therapy and surgery in both curative and palliative treatment of anal cancer in patients presenting in all stages of disease.		1,4

### 2. Systemic therapy

Objective	Knowledge	Skills	Assessment
Be able to assess patients for appropriate concomitant, neo-adjuvant, adjuvant and palliative chemotherapy for anal cancer (I)	Is familiar with commonly used drug protocols and their side effects. Knows which regimes are appropriate for use in the clinical situation.	Able to prescribe common therapeutic regimes	1,2,3,4,5
Be familiar with research developments in drug therapy for anal cancer (A)	Understands the action of systemic agents, their limitations and interactions		1,2
Be able to modify systemic therapy prescription in the light of major organ dysfunction (I)	Understands pharmacology of drugs used in treatment of anal cancer	Able to prescribe growth factors and other support drugs	1,2,3,5
Be able to advise on less common therapeutic regimes in particular palliative treatment for recurrent disease (A)	Understands the principles of systemic treatments used in the palliation of symptoms from anal cancer.	Able to prescribe systemic therapies.	1,2,3
Able to participate in Phase 2 and Phase 3 clinical trials and maintain appropriate research records (A)	Understands the principles of clinical research and the currently extant studies available for patients with anal cancer.		1



Able to care for patients having routine curative and palliative chemotherapy (I)	Understands the acute side effects of commonly used chemotherapy agents.	Able to prescribe chemotherapy according to protocol and modify schedules for patients based on individual needs and judge when to continue or stop treatment	1,2,3,5
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### 3. Radiotherapy treatment (external beam radiotherapy)

Objective	Knowledge	Skills	Assessment
Be able to explain clearly the benefits, side effects and risks of a course of radiotherapy.(I) Be able to seek informed consent for a course of treatment.(I) Be able to seek informed consent for clinical trials (A)	Understands the acute and long term complications of radiotherapy to the perineum and pelvis and their relation to dose and volume in the different organs in the pelvis Understands the legal aspects and ethics of informed consent for treatment and for clinical trials.	Able to take informed consent for radical and palliative treatment	1,3,4,5
Be able to determine the target volume for planning field for radiotherapy for anal cancer (A) Be aware of the treatment options for cancer of the anus (I)	Understands the clinical and radiological parameters associated with planning pelvic radiotherapy including CT planning. Is competent in the interpretation of diagnostic imaging (including CT and MR) for determination of target volume. Aware of normal tissue morbidity and its impact on target volume definition. Is able to judge how to modify treatment plans based on morbidity.	Able to define a planning target volume for radiotherapy for anal cancer.	1,3,5
Be able to modify treatment plans according to patient's individual needs, pre-morbid conditions etc (A)	Knows how to judge the relative risks and benefits of dose gradients in the pelvis		1,3
Be able to use planning modalities including CT planning and conformal techniques(A)	Understands the use of cross-sectional imaging in planning pelvic radiotherapy	Able to use CT planning and have knowledge of IMRT in the treatment of anal cancer.	1,2,3,4
Be able to care for patients undergoing pelvic and perineal radiotherapy for anal cancer (I)	Understands early reactions to pelvic radiotherapy and their management	Able to conduct radiotherapy review and manage early reactions	1,2,3,4,5
Be able to modify course of treatment for individual patients according to severity of reactions (A)	Understands the radiobiological basis of radical upper abdominal radiotherapy for anal cancer		1,2,3,4
Be able to seek informed consent for clinical trials (A)	Understands the legal aspects and ethics of informed consent for treatment and for clinical trials.	Able to take informed consent for radical and palliative treatment and clinical trials	1,3,4,5

### 4. Brachytherapy

Objective	Knowledge	Skills	Assessment
Understand the indications for and principles of brachytherapy in the management of anal cancer (A)	Radiobiological and physical aspects of brachytherapy in anal cancer.		1,2,5

### 5. Assessment of response and follow-up

Objective	Knowledge	Skills	Assessment
Be able to assess and advise patients attending for follow-up after completion of treatment. Be able to advise on appropriate investigations during follow-up.(1)	Understands the natural history of the illness. Knows the common complications of treatment and how to manage them appropriately	Able to perform clinical examinations in patients who have been previously treated for anal cancer	1,2,3,4,5
Recognise less common complications of treatment and how to manage them (A)	Understand the variety of rarer complications of radical treatment and how to differentiate them from recurrence.		1,2,3,4
Able to diagnose and investigate recurrent disease (1)	Knowledge of natural history of treated anal cancer	Perform full physical examination	1,2,5
Knows how to manage recurrent disease and its symptoms including palliative treatment and symptom control where indicated.(A)	Understand the roles of radiotherapy, chemotherapy and surgery in the management of recurrence. Understands the importance of involving palliative care team in management.	Able to break news of recurrence to patients and discuss appropriate management options	1,2,4

**Upper and Lower Gastro-intestinal cancer: Management of primary and secondary liver cancer (limited numbers of metastases)**

Objective	Knowledge	Skills	Assessment
Be able to diagnose secondary liver cancer (I) and to diagnose and stage primary liver cancer (A)	Can recommend appropriate diagnostic and staging investigations for patients presenting with suspected hepatic cancer including appropriate imaging techniques	Examination in out-patients clinic	1,2,3,5
Be familiar with the main histological types and grading of liver cancer and their management. (I)	Knows the common histological types of hepatic cancer	Able to recognise the main histological types of cancer presenting in the liver.	1,5
Be able to take part in discussions in multi-disciplinary meetings (A)	Understands the indications and limitations of radiotherapy and surgery and systemic therapy in both curative and palliative treatment of hepatic cancer		1,3
Be able to explain clearly the benefits, side effects and risks of a course of radiotherapy.(A) Be able to seek informed consent for a course of treatment.(A) Be able to seek informed consent for clinical trials (A)	Understands the acute and long term complications of radiotherapy to the liver and their relation to dose and volume in the different organs in the upper abdomen Understands the legal aspects and ethics of informed consent for treatment and for clinical trials.	Able to take informed consent for radical and palliative treatment	1,3,4
Be able to assess patients for appropriate chemotherapy for secondary cancer (I) and primary liver cancer (A)	Is familiar with commonly used drug protocols and their side effects. Knows which regimes are appropriate for use in the clinical situation.	Able to prescribe common therapeutic regimes	1,2,3,4,5
Able to assess prognosis for patients with primary and secondary liver cancer. (A)	Knows the effect of stage, smoking and co-morbidity on prognosis.		1,2,3
Knows how to manage recurrent disease and its symptoms including palliative treatment and symptom control where indicated.(A)	Understand the roles of radiotherapy, chemotherapy and surgery in the management of recurrence. Understands the importance of involving palliative care team in management.	Able to break news of recurrence to patients and discuss appropriate management options	1,2,4

## Head & Neck Cancer.

### 1. Generic skills and knowledge in Head and Neck Cancer

Objective	Knowledge	Skills	Assessment
Can assess patients with head and neck tumours (1)	Understands the anatomy of Head and Neck cancers and their aetiology and epidemiology Knows the TNM staging for Head and Neck cancers	Is able to perform clinical examination of patients with H&N cancer, including use of head mirror and fibroptic nasendoscope	1,2,3,5
Understands the anatomical distribution of lymph nodes in the Head and Neck (1)	Understands the distribution of lymph nodes in the H&N and recognises the tumours which drain to them Knows the anatomical groupings of lymph nodes according to the international consensus	Is able to examine lymph nodes in the neck and knows their anatomical distribution on CT imaging and MRI	2,3,5
Understands the different types of immobilisation shells in use (1)	Knows the different head immobilisation positions and different types of immobilisation device. Understands the use of tongue depressors and mouth bites		1,2,4,5
Understands the importance of dental health and oral hygiene in patients with H&N cancer (1)	Knows how to advise appropriate dental care before and after radiotherapy		1,2,4,5
Understands the importance of maintaining nutrition throughout treatment and afterwards (1)	Knows different methods of maintaining nutrition including naso-gastric tube and gastrostomy.	Is able to insert and care for naso-gastric tubes. Is able to care for gastrostomy sites	1,2,4,5
Understands the importance of smoking cessation in all patients (1)	Can advise on different techniques available to aid smoking cessation.		1,2,5
Understands the importance of second (synchronous and metachronous) malignancies in H&N cancer (1)	Knows the epidemiology of second malignancies and possible prevention measures.	Is able to diagnose second malignancies in previously treated patients	1,2,5
Be able to explain clearly the benefits, side effects and risks of a course of radiotherapy. Be able to seek informed consent for a course of treatment. (1) Be able to seek informed consent for clinical trials. (A)	Understands the acute and long term complications of head and neck radiotherapy and their relation to dose and volume in the different organs in the head and neck. Understands the legal aspects and ethics of informed consent for treatment and for clinical trials.	Able to take informed consent for radical and palliative treatment	1,3,4,5
Be able to care for patients undergoing Head and Neck radiotherapy (1)	Understands early reactions to head and neck radiotherapy and their management	Able to conduct radiotherapy review and manage early reactions.	1,2,3,4
Be able to modify course of treatment for individual patients according to severity of reactions including adjustments for gaps in treatment (1).	Understands the radiobiology associated with radical head and neck radiotherapy for H&N cancer.		1,2,4,5

Be able to modify treatment plans according to patient's individual needs, pre-morbid conditions etc (A).	Knows how to judge the relative risks and benefits of dose gradients in the head and neck.		1,2,4
Be able to care for patients having routine concomitant, adjuvant and palliative chemotherapy for Head and Neck tumours (I)	Understands the acute side effects of chemotherapy and its interaction with radiotherapy. Knows the importance of contributions from SALT, nutritionists, clinical nurse specialists and the palliative care team.	Able to prescribe chemotherapy according to protocol and modify schedules for patients based on individual needs and judge when to continue or stop treatment.	1,2,3,5

## Head & Neck Cancer : Cancer of the larynx/pharynx

### 1 Selection and assessment of patients with all stages of laryngeal pharyngeal cancer for radiotherapy.

Objective	Knowledge	Skills	Assessment
Be able to diagnose and stage laryngeal pharyngeal cancer (I)	Can recommend appropriate diagnostic and staging investigations for patients presenting with suspected laryngeal pharyngeal cancer	Examination in out-patients clinic using indirect mirror and fiberoptic techniques.	1,2,3,5
Be familiar with the main histological types and grading of laryngeal pharyngeal cancer and their management. (I)	Knows the common histological types of H&N cancer	Able to recognise the main histological types of cancer presenting in the larynx pharynx.	1,5
Be able to assess patients for radical radiotherapy. (I)	Understands the indications for definitive and post op radiotherapy and its side effects		1,2,3,5
Able to assess prognosis for patients with laryngeal pharyngeal cancer. (I)	Knows the effect of stage, smoking and co-morbidity on prognosis.		1,2,3,5
Able to discuss treatment options in the light of understanding of prognosis. (I)	Understands the effects of treatment on prognosis. Understands the main surgical alternative treatments for primary tumours and neck nodes and their acute and long term morbidity.	Advises patients on treatment options	1,2,3,4,5
Understands the indications for surgery in the management of larynx pharynx cancer. (I)	Understanding of general principles of laser surgery, open partial and total laryngectomy, open partial and total pharyngectomy as well as rehabilitative and reconstructive principles and tracheostomy care		1,2,3,5
Understands the indications for neck dissection in the management of larynx pharynx cancer. (I)	Familiarity with modifications of neck dissection with regards to nodal groups excised and sparing of non lymphatic structures.		1,2,3,5
Take part in discussions in multi-disciplinary meetings. (A)	Understands the indications, functional impact and limitations of radiotherapy and surgery in both curative and palliative treatment of larynx pharynx cancer in patients presenting in all stages. Understands the contribution and role of specialised Speech and Language Therapists, Nutritional Advisors, clinical nurse specialists and palliative care team.		1,2,3

## 2. Radiotherapy treatment (external beam radiotherapy).

Objective	Knowledge	Skills	Assessment
Be able to determine the target volumes for planning laryngeal/pharyngeal/neck radiotherapy (I).	Understands the clinical and radiological parameters associated with planning head and neck radiotherapy including CT planning. Is competent in the interpretation of diagnostic imaging (including CT and MR) for determination of target volume.  Understands when and how to treat lymph node areas electively.  Aware of normal tissue morbidity and its impact on target volume definition.  Is able to judge how to modify treatment plans based on morbidity.	Able to define a planning target volume for different stages of larynx/pharynx cancer	1,3,5
Be able to use special planning modalities including CT planning and Beams Eye View planning (A).	Understands the use of cross-sectional imaging (CT, MRI, PET-CT) in planning head and neck radiotherapy.	Able to use CT 3-D conformal treatment planning in Head and Neck cancer.	1,2,3,4,5
Understands the use of IMRT in laryngeal/pharyngeal cancer (A)	Understands the principles of IMRT treatment planning	Able to plan IMRT treatment of larynx/pharynx cancer.	1,2

## 3 Systemic Therapy

Objective	Knowledge	Skills	Assessment
Be able to assess patients for appropriate concomitant, neo-adjuvant and palliative chemotherapy (I)	Is familiar with commonly used drug protocols and their side effects.  Knows which regimes are appropriate for use in the clinical situation.	Able to prescribe common therapeutic regimes.	1,2,3,4,5
Be familiar with research developments in drug therapy for laryngeal/pharyngeal cancer (A).	Understands the action of chemotherapeutic agents, their limitations and interactions with radiotherapy.  Understands developments in molecular targeting agents and their interaction with radiotherapy and commonly used cytotoxics.		1,2
Be able to modify chemotherapy prescription in the light of major organ dysfunction. (I)	Understands pharmacology of drugs used in treatment of laryngeal/pharyngeal cancer.	Able to prescribe growth factors and other support drugs.	1,2,3,5
Be able to advise on less common therapeutic regimes in particular palliative treatment for recurrent disease. (A)	Understands the principles of palliative chemotherapy and the use of cytotoxic agents in heavily pre-treated patients.	Able to prescribe less common cytotoxic regimes. Explains benefit and disadvantages of treatment clearly to patients	1,2
Be able to participate in Phase 2 and Phase 3 clinical trials and maintain appropriate research records. (A)	Understands the principles of clinical research.		1,2

#### 4. Assessment of response and follow-up

Objective	Knowledge	Skills	Assessment
Be able to assess and advise patients attending for follow-up after completion of treatment (I).  Be able to advise on appropriate investigations during follow-up.(I)	Understands the natural history of the illness. Knows the common complications of treatment and how to manage them appropriately.	Able to perform head and neck examination in patients who have been previously treated for larynx pharynx cancer.	1,2,3,4,5
Be able to recognise less common complications of treatment and how to manage them. (A)	Understand the variety of rarer complications of radical treatment and how to differentiate them from recurrence.		1,2,3,4
Be able to diagnose and investigate recurrent disease. (I)	Knowledge of natural history of treated laryngeal pharyngeal cancer.	Perform full physical examination including fiberoptic examination of the larynx and pharynx	1,2,5
Understand how to manage recurrent disease and its symptoms including palliative treatment and symptom control where indicated. (A)	Understand the roles of radiotherapy, chemotherapy and surgery in the management of recurrence. Knows the importance of contributions from SALT, nutritionists, clinical nurse specialists and palliative care team.	Able to break news of recurrence to patients and discuss appropriate management options.	1,2,4

### Head & Neck Cancer: Cancer of the Oropharynx and Oral Cavity

#### 1. Selection and assessment of patients with all stages of cancer of the oral cavity and oropharynx for radiotherapy.

Objective	Knowledge	Skills	Assessment
Be able to diagnose and stage cancer of the oral cavity and oropharynx. (I)	Can recommend appropriate diagnostic and staging investigations for patients presenting with suspected cancer of the oral cavity and oropharynx. .	Oral and neck examination in out-patients clinic including use of head mirror and fiberoptic equipment.	1,2,3,5
Be able to assess patients for radical radiotherapy (I)	Understands the indications for radiotherapy and its side effects.		1,2,3,5
Be able to assess patients for adjuvant postoperative radiotherapy. (I)	Understands the clinical and surgical histological parameters which determine level of risk of recurrence.		1,2,5
Be able to assess prognosis for patients with cancer of the oral cavity and oropharynx. (I)	Knows the effect of stage, age, co-morbidity and histological type on prognosis.		1,2,3,5
Understand the indications for surgery in the management of cancer of the oral cavity and oropharynx. . (I)	Principles of laser surgery, pedicled and free flaps as well as dental rehabilitation.		1,2,5
Understands the indications for neck dissection in the management of cancer of the oral cavity and oropharynx. (I)	Familiarity with modifications of neck dissection with regards to nodal groups excised and sparing of non lymphatic structures.		1,2,5

Be able to discuss treatment options in the light of understanding of prognosis for patients with common (I) and uncommon (A) types of cancer of the oral cavity and oropharynx.	Understands the effects of treatment on prognosis.	Advises patients on treatment options.	1,2,3,4,5
Be able to take part in discussions in multi-disciplinary meetings. (A)	Understands the indications, functional impact and limitations of radiotherapy and surgery in both curative and palliative treatment of cancer of the oral cavity and oropharynx in patients presenting in all stages. Understands the contribution and role of specialised Speech and Language Therapists, Nutritional Advisors, clinical nurse specialists and palliative care team.		1,4

## 2. Radiotherapy treatment (external beam radiotherapy)

Objective	Knowledge	Skills	Assessment
Be able to determine the target volumes for planning oral cavity radiotherapy (I).	Understands the clinical and radiological parameters associated with planning head and neck radiotherapy including CT planning.  Is competent in the interpretation of diagnostic imaging (including CT and MR) for determination of target volume.  Understands when and how to treat lymph node areas electively.  Aware of normal tissue morbidity and its impact on target volume definition..  Is able to judge how to modify treatment plans based on morbidity.	Able to define a planning target volume for different stages of oral cancer	1,3,5
Be able to use special planning modalities including CT planning and BEV planning. (A)	Understands the use of cross-sectional imaging in planning head and neck radiotherapy.	Able to use CT planning and IMRT in the treatment of oral cancer	1,2,3,4,5
Is familiar with the use of IMRT in cancer of the oral cavity (A)	Understands the principles of IMRT treatment planning	Able to plan IMRT treatment of oral cancer.	
Be able to participate in protocol development in head and neck radiotherapy for oral cancer. (A)	Understands developments in radiotherapy research and their application to local protocols.		1,4

## 3. Brachytherapy

Objective	Knowledge	Skills	Assessment
Understands the indications for brachytherapy in the management of oral cancer. (I)	Radiobiological and physical aspects of interstitial brachytherapy in oral cancer using Paris system.		1,2,5



#### 4. Systemic Therapy

Objective	Knowledge	Skills	Assessment
Be able to assess patients for appropriate neo-adjuvant, concomitant or palliative chemotherapy. (I)	Is familiar with commonly used drug protocols and their side effects. Knows which regimes are appropriate for use in the clinical situation.	Able to prescribe common therapeutic regimes.	1,2,3,4,5
Be familiar with research developments in drug therapy for oral cancer. (A)	Understands the action of chemotherapeutic agents, their limitations and interactions with radiotherapy. Understands developments in molecular targeted drugs and their interactions with radiotherapy and commonly used cytotoxics		1,2
Be able to modify chemotherapy prescription in the light of major organ dysfunction. (A)	Understands pharmacology of drugs used in treatment of oral cancer.	Able to prescribe growth factors and other support drugs.	1,2,3
Be able to advise on less common therapeutic regimes in particular palliative treatment for recurrent disease. (A)	Understands the principles of palliative chemotherapy and the use of cytotoxic agents in heavily pre-treated patients and patients with significant co-morbidities. Knows the importance of contributions from SALT, nutritionists, clinical nurse specialists and palliative care team.	Able to prescribe less common cytotoxic regimes.	1,2,3

#### 5. Assessment of response and follow-up

Objective	Knowledge	Skills	Assessment
Be able to assess and advise patients attending for follow-up after completion of treatment.  Be able to advise on appropriate investigations during follow-up. (I)	Understands the natural history of the illness.  Knows the common complications of treatment and how to manage them appropriately.	Able to perform head and neck examination in patients who have been previously treated for oral cancer	1,2,3,4,5
Recognise less common complications of treatment and how to manage them. (A)	Understand the variety of rarer complications of radical treatment and how to differentiate them from recurrence.		1,2,3,4
Able to diagnose and investigate recurrent disease. (I)	Knowledge of natural history of treated oral cancer.		1,2,5
Know how to manage recurrent disease and it's symptoms including palliative treatment and symptom control where indicated. (A)	Understand the roles of radiotherapy, chemotherapy and surgery in the management of recurrence. Knows the importance of contributions from SALT, nutritionists, clinical nurse specialists and palliative care team.	Able to break news of recurrence to patients and discuss appropriate management options.	1,2,4

## Head & Neck Cancer: Cancer of the nasal passages, paranasal sinuses, and nasopharynx

### 1. Selection and assessment of patients with all stages of cancer of the nasal passages, paranasal sinuses and nasopharynx

Objective	Knowledge	Skills	Assessment
Be able to diagnose and stage cancer of the nasal passages, paranasal sinuses and nasopharynx. (I)	Can recommend appropriate diagnostic and staging investigations for patients presenting with these cancers.	Auroscopy and fiberoptic techniques.	1,2,3,5
Be familiar with the main histological types of cancer of the nasal passages, paranasal sinuses and nasopharynx and their management. (I)	Understands the management of all stages of cancer of the nasal passages, paranasal sinuses and nasopharynx and how management differs according to the commonly occurring histological types.	Able to recognise the main histological types of cancer presenting in these cancer of the nasal passages, paranasal sinuses and nasopharynx.	1,5
Be able to assess patients for radical radiotherapy. (I)	Understands the indications for definitive and post op radiotherapy and side effects.		1,2,4,5
Able to assess prognosis for patients with cancer of the nasal passages, paranasal sinuses and nasopharynx. (I)	Knows the effect of stage, age, co-morbidity and histological type on prognosis		1,2,3,5
Understand the indications for surgery in the management of cancer of the nasal passages, paranasal sinuses and nasopharynx. (I)	Understanding of general principles of extracranial and craniofacial nasal sinus resections.	Understand the indications for surgery in the management of cancer of the nasal passages, paranasal sinuses and nasopharynx. (I)	1,2,4,5
Able to discuss treatment options in the light of understanding of prognosis. (I)	Understands the effects of treatment on prognosis.	Advises patients on treatment options.	1,2,3,4
Take part in discussions in multi-disciplinary meetings. (A)	Understands the indications, functional impact and limitations of chemotherapy, radiotherapy and surgery in both curative and palliative treatment of miscellaneous cancers. Understands the contribution and role of specialised Speech and Language Therapists, Nutritional Advisors, prosthetists, clinical nurse specialists and palliative care team		1,4

### 2. Radiotherapy treatment (external beam radiotherapy)

Objective	Knowledge	Skills	Assessment
Be able to determine the target volumes for planning radiotherapy for cancer of the nasal passages, paranasal sinuses and nasopharynx. (I)	Understands the clinical and radiological parameters associated with planning head and neck radiotherapy including CT planning.  Is competent in the interpretation of diagnostic imaging (including CT and MR) for determination of target volume.  Understands when and how to treat lymph node areas effectively.	Able to define a planning target volume for definitive and postoperative radiotherapy for cancer of the nasal passages, paranasal sinuses and nasopharynx.	1,3,5

	Aware of normal tissue morbidity and its impact on target volume definition.  Is able to judge how to modify treatment plans based on morbidity.		
Be able to use special planning modalities including CT planning and BEV planning. (A)	Understands the use of cross-sectional imaging in planning head and neck radiotherapy.	Able to use CT planning and IMRT in the treatment of cancer of the nasal passages, paranasal sinuses and nasopharynx.	1,2,3,4
Be able to use IMRT in planning radiotherapy to cancer of the nasal passages, paranasal sinuses and nasopharynx as appropriate (A)	Understands the principles of IMRT treatment planning	Able to plan IMRT treatment of different sites of H&N cancer.	1,2
Be able to participate in protocol development in head and neck radiotherapy for cancer of the nasal passages, paranasal sinuses and nasopharynx. (A)	Understands developments in radiotherapy research and their application to local protocols.		1,4

### 3. Systemic Therapy

Objective	Knowledge	Skills	Assessment
Be able to assess patients for appropriate chemotherapy for cancer of the nasal passages, paranasal sinuses and nasopharynx. (I)	Is familiar with commonly used drug protocols and their side effects.  Knows which regimes are appropriate for use in the clinical situation.	Able to prescribe common therapeutic regimes.	1,2,3,4,5
Be familiar with research developments in drug therapy for cancer of the nasal passages, paranasal sinuses and nasopharynx. (A)	Understands the action of chemotherapeutic agents, their limitations and interactions with radiotherapy. Understands developments in molecular targeted drugs and their interactions with radiotherapy and commonly used cytotoxics.		1,2
Be able to modify chemotherapy prescription in the light of major organ dysfunction. (I)	Understands pharmacology of drugs used in treatment of cancer of the nasal passages, paranasal sinuses and nasopharynx.	Able to prescribe growth factors and other support drugs.	1,2,3,5
Be able to advise on less common therapeutic regimes in particular palliative treatment for recurrent disease. (A)	Understands the principles of palliative chemotherapy and the use of cytotoxic agents in heavily pre-treated patients and patients with significant co-morbidities.	Able to prescribe less common cytotoxic regimes.	1,2,3
Able to participate in Phase 2 and Phase 3 clinical trials and maintain appropriate research records. (A)	Understands the principles of clinical research.		1,6

### 4. Assessment of response and follow-up

Objective	Knowledge	Skills	Assessment
Be able to assess and advise patients attending for follow-up after completion of treatment. (I)	Understands the natural history of the illness.  Knows the common complications of treatment and how to manage them appropriately.	Able to perform head and neck examination in patients who have been previously treated for cancer of cancer of the nasal passages.	1,2,3,4,5

Be able to advise on appropriate investigations during follow-up. (I)		paranasal sinuses and nasopharynx including fibroptic nasendoscopy and indirect examination with a mirror.	
Recognise less common complications of treatment and how to manage them. (A)	Understand the variety of rarer complications of radical treatment and how to differentiate them from recurrence		1,2,3,4
Able to diagnose and investigate recurrent disease. (I)	Knowledge of natural history of treated cancer of the nasal passages, paranasal sinuses and nasopharynx	Perform full physical examination including fibroptic examination	1,2,5
Knows how to manage recurrent disease and its symptoms including palliative treatment and symptom control where indicated. (A)	Understand the roles of radiotherapy, chemotherapy and surgery in the management of recurrence. Knows the importance of contributions from SALT, nutritionists, clinical nurse specialists and palliative care team	Able to break news of recurrence to patients and discuss appropriate management options.	1,2,4

### Head & Neck Cancer: Cancer of the temporal bone, salivary glands and unknown primary herein labelled as: miscellaneous sites of cancer.

#### 1. Selection and assessment of patients with all stages of cancer of "miscellaneous sites" in the head and neck.

Objective	Knowledge	Skills	Assessment
Be able to diagnose and stage "miscellaneous" head and neck cancer. (I)	Can recommend appropriate diagnostic and staging investigations for patients presenting with these cancers.	Auroscopy and fibroptic techniques.	1,2,3,5
Be familiar with the main histological types of these miscellaneous cancers and their management. (I)	Understands the management of all stages of "miscellaneous" cancer and how management differs according to the commonly occurring histological types.	Able to recognise the diversity and main histological types of cancer presenting in these miscellaneous sites.	1,5
Be able to assess patients for radical radiotherapy. (A)	Understands the indications for definitive and post op radiotherapy and side effects.		1,2
Able to assess prognosis for patients with these miscellaneous cancers. (A)	Knows the effect of stage, age, comorbidity and histological type on prognosis		1,2,3
Understand the indications for surgery in the management of miscellaneous cancer. (A)	Understanding of general principles of surgical resection, salivary and temporal bone resections and "blind biopsies".	Understand the indications for surgery in the management of miscellaneous cancer	1,2
Understands the indications for neck dissection in the management of miscellaneous cancer. (A)	Familiarity with modification of neck dissections with regards to nodal groups excised and sparing of non lymphatic structures.	Understands the indications for neck dissection in the management of miscellaneous cancer.	1,2,3.
Able to discuss treatment options in the light of understanding of prognosis. (A)	Understands the effects of treatment on prognosis.	Advises patients on treatment options.	1,2,3,4
Take part in discussions in multi-disciplinary meetings. (A)	Understands the indications, functional impact and limitations of chemotherapy, radiotherapy and surgery in both curative and palliative treatment of miscellaneous cancers. Understands the contribution and role of specialised Speech and Language Therapists, Nutritional Advisors, clinical nurse specialists and palliative care team.		1,4

## 2. Radiotherapy treatment (external beam radiotherapy)

Objective	Knowledge	Skills	Assessment
Be able to determine the target volumes for planning field for miscellaneous sites radiotherapy. (B/II)	<p>Understands the clinical and radiological parameters associated with planning head and neck radiotherapy including CT planning.</p> <p>Is competent in the interpretation of diagnostic imaging (including CT and MR) for determination of target volume</p> <p>Understands when and how to treat lymph node areas electively.</p> <p>Aware of normal tissue morbidity and its impact on target volume definition.</p> <p>Is able to judge how to modify treatment plans based on morbidity.</p>	Able to define a planning target volume for definitive and postoperative radiotherapy for miscellaneous cancer.	1.3.5
Be able to use special planning modalities including CT planning and BEV planning. (A)	Understands the use of cross-sectional imaging in planning head and neck radiotherapy.	Able to use CT planning and IMRT in the treatment of miscellaneous cancers	1.2.3
Understands the use of IMRT in planning radiotherapy to 'miscellaneous sites' as appropriate (A)	Understands the principles of IMRT treatment planning	Able to plan IMRT treatment of different sites of H&N cancer.	1.2

## 3. Systemic Therapy

Objective	Knowledge	Skills	Assessment
Be able to assess patients for appropriate chemotherapy for miscellaneous cancer. (A)	<p>Is familiar with commonly used drug protocols and their side effects.</p> <p>Knows which regimes are appropriate for use in the clinical situation.</p>	Able to prescribe common therapeutic regimes.	1.2.3.4
Be familiar with research developments in drug therapy for miscellaneous cancer. (A)	<p>Understands the action of chemotherapeutic agents, their limitations and interactions with radiotherapy.</p> <p>Understands developments in molecular targeted drugs and their interactions with radiotherapy and commonly used cytotoxices.</p>		1.2
Be able to modify chemotherapy prescription in the light of major organ dysfunction. (A)	Understands pharmacology of drugs used in treatment of miscellaneous cancer.	Able to prescribe growth factors and other support drugs	1.2.3
Be able to advise on less common therapeutic regimes in particular palliative treatment for recurrent disease. (A)	Understands the principles of palliative chemotherapy and the use of cytotoxic agents in heavily pre-treated patients and patients with significant co-morbidities.	Able to prescribe less common cytotoxic regimes.	1.2.3
Able to participate in Phase 2 and Phase 3 clinical trials and maintain appropriate research records. (A)	Understands the principles of clinical research. *		1.6

#### 4. Assessment of response and follow-up

Objective	Knowledge	Skills	Assessment
Be able to assess and advise patients attending for follow-up after completion of treatment. (I) Be able to advise on appropriate investigations during follow-up. (I)	Understands the natural history of the illness. Knows the common complications of treatment and how to manage them appropriately.	Able to perform head and neck examination in patients who have been previously treated for cancer of miscellaneous sites.	1,2,3,4,5
Recognise less common complications of treatment and how to manage them. (A)	Understand the variety of rarer complications of radical treatment and how to differentiate them from recurrence		1,2,3,4
Able to diagnose and investigate recurrent disease. (I)	Knowledge of natural history of treated miscellaneous cancer.	Perform full physical examination including fiberoptic examination	1,2,5
Knows how to manage recurrent disease and its symptoms including palliative treatment and symptom control where indicated. (A)	Understand the roles of radiotherapy, chemotherapy and surgery in the management of recurrence. Knows the importance of contributions from SALT, nutritionists, clinical nurse specialists and palliative care team.	Able to break news of recurrence to patients and discuss appropriate management options.	1,2,4

### Head and Neck Cancer – Thyroid cancer

#### 1. Selection and assessment of patients with thyroid cancer.

Objective	Knowledge	Skills	Assessment
Be able to diagnose and stage thyroid cancer (I)	Understands epidemiology and aetiology of thyroid cancer. Understands the importance of clinical and pathological assessment. Can recommend appropriate diagnostic and staging investigations for patients presenting with a possible thyroid cancer.	Appropriate clinical examination in out-patients clinic.	1,2,3,5
Be familiar with the main histological sub types of thyroid cancer and their management (I)	Understands the management of all stages of thyroid cancer and how its management differs according to the histological type and grade.	Able to recognise the main histological sub types of thyroid cancer.	1,5
Able to discuss treatment options in the light of understanding of prognosis (A)	Understands the effects of treatment on prognosis.	Advises patients on treatment options.	1,2,3,4
Able to assess prognosis for patients with thyroid cancer (I)	Knows the effect of stage, age, co-morbidity, previous treatment and histological type on prognosis.		1,2,3,5
Take part in discussions in multi-disciplinary meetings (A)	Understands the indications and limitations of external beam radiotherapy as primary and adjuvant postoperative treatment, radio-iodine therapy and surgery in both curative and palliative treatment of thyroid cancer in patients presenting in all stages. Understands the indications for lymph node dissection in thyroid cancer		1,4

## 2. Radiotherapy treatment (external beam radiotherapy)

Objective	Knowledge	Skills	Assessment
Be able to determine the target volume for planning thyroid radiotherapy (A)	Understands the clinical and radiological parameters associated with planning radiotherapy including CT planning. Is competent in the interpretation of diagnostic imaging (including CT and MR) for determination of target volume. Aware of normal tissue morbidity and its impact on target volume definition.	Able to define a planning target volume for different stages of thyroid cancer including the intact organ and post operative volumes.	1,3,5
Be able to modify treatment plans according to patient's individual needs, pre-morbid conditions etc(A)	Knows how to judge the relative risks and benefits of dose gradients in the appropriate soft tissue and organs at risk (OAR)  Is able to judge how to modify treatment plans based on morbidity..		1,3,5
Be able to use special planning modalities including CT planning (A)	Understands the use of cross-sectional imaging in appropriate planning.	Able to use CT planning in the treatment of thyroid cancer.	1,2,3,4,5
Be able to care for patients undergoing radiotherapy for thyroid cancer (I)	Understands early reactions and their management.	Able to conduct radiotherapy review and manage appropriate reactions.	1,2,3,4,5
Be able to modify course of treatment for individual patients according to severity of reactions including adjustments for gaps in treatment (A)	Understands the radiobiology associated with radical radiotherapy for thyroid cancer		1,4
Be able to participate in protocol development in radiotherapy for thyroid cancer (A)	Understands developments in radiotherapy research and their application to local protocols		1,4

## 3. Systemic therapy (Radio-active iodine)

Objective	Knowledge	Skills	Assessment
Be able to assess patients for radio-iodine therapy (A)	Is familiar with radio-iodine treatment and its side effects.		1,2
Understand the indications for radio-iodine in the management of thyroid cancer (I)	Radiobiological and physical aspects of radio-iodine therapy in thyroid cancer, both for thyroid ablation and therapy for thyroid cancer.		1,2,5
Have a working knowledge of planning departmental radio-iodine workload and the legal requirements of treatment – IRMER regulations and radiation protection (I)	Understanding of the organisation of a radio-iodine service		1,2,3,5
Be able to prepare a patients for radio-iodine therapy for thyroid cancer (I)	Knows about cessation of thyroid replacement and use of thyroid stimulation		1,2,3,5



Be able to care for patients having radio-iodine therapy (A)	Understands the acute side effects of radio-iodine including effects on fertility. Can advise on thyroid replacement therapy Knows how to manage acute complications of treatment		1,2,3
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#### 4. Assessment of response and follow-up

Objective	Knowledge	Skills	Assessment
Be able to assess and advise patients attending for follow-up after completion of treatment. Be able to advise on appropriate investigations during follow-up.(1)	Understands the natural history of the illness. Knows the common complications of treatment and how to manage them appropriately	Able to perform appropriate clinical examination in patients who have been previously treated for thyroid cancer.	1,2,3,4,5
Be able to recognise less common complications of treatment and how to manage them (A)	Understand the variety of rarer complications of radical treatment and how to differentiate them from recurrence		1,2,3,4
Be able to diagnose and investigate recurrent disease (1)	Knowledge of natural history of treated thyroid cancer	Perform full physical examination and appropriate site examination	1,2,5
Understand how to manage recurrent disease and its symptoms including palliative treatment and symptom control where indicated.(A)	Understand the roles of radiotherapy, chemotherapy and surgery in the management of recurrence. Knows the importance of contributions from SALT, nutritionists, clinical nurse specialists and palliative care team	Able to break news of recurrence to patients and discuss appropriate management options	1,2,4



## Soft tissue and bone sarcoma - Soft tissue sarcoma.

### 1. Selection and assessment of patients with soft tissue sarcoma for radiotherapy.

Objective	Knowledge	Skills	Assessment
Be able to diagnose and stage malignant soft tissue sarcoma (I)	Understands epidemiology and aetiology of soft tissue sarcoma.  Understands the importance of clinical and pathological assessment.  Can recommend appropriate diagnostic and staging investigations for patients presenting with a possible soft tissue sarcoma.	Appropriate clinical examination in out-patients clinic. Soft tissue sarcoma may occur at any site in the body, usually head and neck, thorax, abdomen, pelvis and therefore clinical skills are required at assessing tumours at these sites as well as the commonest site, i.e. limb	1,2,3,5
Be familiar with the main histological sub types of soft tissue sarcoma and their management (I)	Understands the management of all stages of soft tissue sarcoma and how its management differs according to the histological sub type and grade and surgical operability.	Able to recognise the main histological sub types of soft tissue sarcoma.	1,5
Be able to assess patients for radical radiotherapy (I)	Understands the indications for radiotherapy and its side effects.		1,2,3
Able to assess prognosis for patients with soft tissue sarcoma (I)	Knows the effect of stage, age, co-morbidity, previous surgical intervention and histological sub type on prognosis.		1,2,3,5
Able to discuss treatment options in the light of understanding of prognosis (A)	Understands the effects of treatment on prognosis. Able to understand the potential role for pre as well as post operative radiotherapy and radical and palliative radiotherapy in the absence of surgical options. Understand potential integration of radiotherapy into programme of care using chemotherapy and surgery.	Advises patients on treatment options.	1,2,3,4
Take part in discussions in multi-disciplinary meetings (A)	Understands the indications and limitations of radiotherapy, chemotherapy and surgery in both curative and palliative treatment of soft tissue sarcoma in patients presenting in all stages.		1,4

### 2. Radiotherapy treatment (external beam radiotherapy)

Objective	Knowledge	Skills	Assessment
Be able to determine the target volume for planning field for soft tissue sarcoma radiotherapy (I)	Understands the clinical and radiological parameters associated with planning radiotherapy including CT planning. Is competent in the interpretation of diagnostic imaging (including CT and MR) for determination of target volume. Aware of normal tissue morbidity and its impact on target volume definition.	Able to define a planning target volume for different stages of soft tissue sarcoma especially pre and post operative volumes.	1,3,5
Be able to modify treatment plans according to patient's individual needs, pre-morbid conditions etc(A)	Knows how to judge the relative risks and benefits of dose gradients in the appropriate soft tissue and organs at risk (OAR)  Is able to judge how to modify treatment plans based on morbidity.		1,3,5

Be able to use special planning modalities including CT planning (A)	Understands the use of cross-sectional imaging in appropriate planning.	Able to use CT planning in the treatment of soft tissue sarcomas.	1,2,3,4,5
Be able to care for patients undergoing radiotherapy for soft tissue sarcoma (I)	Understands early reactions and their management.	Able to conduct radiotherapy review and manage appropriate reactions.	1,2,3,4,5
Be able to modify course of treatment for individual patients according to severity of reactions including adjustments for gaps in treatment (I)	Understands the radiobiology associated with radical radiotherapy for soft tissue sarcoma		
Be able to participate in protocol development in radiotherapy for soft tissue (A)	Understands developments in radiotherapy research and their application to local protocols		1,4

### 3. Systemic therapy

Objective	Knowledge	Skills	Assessment
Be able to assess patients for appropriate chemotherapy (I)	Is familiar with commonly used drug protocols and their side effects. Knows which regimes are appropriate for use in the clinical situation.	Able to prescribe common therapeutic regimes	1,2,3,4,5
Be familiar with research developments in drug therapy for soft tissue (A)	Understands the action of chemotherapeutic agents, their limitations and interactions with radiotherapy.		1,2
Be able to modify chemotherapy prescription in the light of major organ dysfunction (I)	Understands pharmacology of drugs used in treatment of soft tissue sarcoma.	Able to prescribe growth factors and other support drugs	1,2,3,5
Be able to advise on less common therapeutic regimes in particular palliative treatment for recurrent disease (A)	Understands the principles of palliative chemotherapy and the use of cytotoxic agents in heavily pre-treated patients	Able to prescribe less common cytotoxic regimes	1,2,3
Be able to participate in Phase 2 and Phase 3 clinical trials and maintain appropriate research records (A)	Understands the principles of clinical research		1
Be able to care for patients having routine neo-adjuvant, con-comitant, adjuvant and palliative chemotherapy (I)	Understands the acute side effects of chemotherapy and its interaction with radiotherapy.	Able to prescribe chemotherapy according to protocol and modify schedules for patients based on individual needs and judge when to continue or stop treatment	1,2,3,5

### 4. Assessment of response and follow-up

Objective	Knowledge	Skills	Assessment
Be able to assess and advise patients attending for follow-up after completion of treatment. Be able to advise on appropriate investigations during follow-up.(I)	Understands the natural history of the illness. Knows the common complications of treatment and how to manage them appropriately	Able to perform appropriate clinical examination in patients who have been previously treated for soft tissue sarcoma.	1,2,3,4,5
Be able to recognise less common complications of treatment and how to manage them (A)	Understand the variety of rarer complications of radical treatment and how to differentiate them from recurrence.		1,2,3,4

Be able to diagnose and investigate recurrent disease (I)	Knowledge of natural history of treated soft tissue sarcoma	Perform full physical examination and appropriate site examination	1,2,5
Understand how to manage recurrent disease and its symptoms including palliative treatment and symptom control where indicated.(A)	Understand the roles of radiotherapy, chemotherapy and surgery in the management of recurrence. Understands the contribution from the palliative care team.	Able to break news of recurrence to patients and discuss appropriate management options	1,2,4

## Soft tissue and bone sarcoma: Gastro Intestinal Stromal Tumour.

### 1. Selection and assessment of patients with GIST for radiotherapy.

Objective	Knowledge	Skills	Assessment
Be able to diagnose and stage gastro intestinal stromal tumour (I)	Understands epidemiology and aetiology and differential diagnosis of gastro intestinal stromal tumour.	To be able to perform the appropriate clinical examination in out-patients clinic and examination.	1,2,3,5
Be familiar with the diagnostic, molecular, biological markers of gastro intestinal tract tumour (I)	Understands the management of all stages of GIST and how its management will differ according to the main molecular biology profile.		1,5
Be able to assess patients for adjuvant radiotherapy (I)			
Be able to assess prognosis for patients with GIST (I)	Knows the effect of stage, age, co-morbidity and mutational status on prognosis		1,2,3
Be able to take part in discussions in multi-disciplinary meetings (A)	Understands the indications and limitations of surgery, radiotherapy and systemic therapy in both curative and palliative treatment of GIST in patients presenting in all stages		1,4

### 2. Systemic therapy

Objective	Knowledge	Skills	Assessment
Be able to assess patients for appropriate systemic therapy (I)	Is familiar with commonly used drug protocols and their side effects. Knows which regimes are appropriate for use in the clinical situation.	Able to prescribe common therapeutic regimes	1,2,3,4,5
Be able to care for patients having routine systemic therapy (I)	Understands the acute side effects of systemic therapy and its interaction with radiotherapy.	Able to prescribe systemic therapy according to protocol and modify schedules for patients based on individual needs and judge when to continue or stop treatment	1,2,3
Be familiar with research developments in drug therapy for GIST (A)	Understands the action of systemic agents, their limitations and interactions with radiotherapy.		1,2
Be able to modify prescription for systemic therapy in the light of major organ dysfunction (A)	Understands pharmacology of drugs used in treatment of soft tissue sarcoma.	Able to prescribe growth factors and other support drugs	1,2,3

Be able to advise on less common therapeutic regimes in particular palliative treatment for recurrent disease (A)	Understands the principles of palliative therapy and the use of systemic agents in heavily pre-treated patients	Able to prescribe less common systemic regimes	1,2,3
Be able to participate in Phase 2 and Phase 3 clinical trials and maintain appropriate research records (A)	Understands the principles of clinical research		1

## Soft tissue and bone sarcoma: Primary malignant tumours of bone

### 1. Selection and assessment of patients with all stages of primary bone tumours

Objective	Knowledge	Skills	Assessment
Be able to diagnose and stage primary malignant bone tumours (I)	Understands epidemiology and aetiology of primary malignant bone tumours.  Can recommend appropriate diagnostic and staging investigations for people presenting with primary malignant bone tumours		1,2,3,5
Be familiar with the main histological types of primary malignant bone tumours (I)	Understands the management of all stages of primary malignant bone tumours and how its management differs according to the main histological types.	Able to recognise the main histological types of cancer presenting.	1,5
Able to assess prognosis for patients with primary malignant bone tumours (I)	Knows the effect of stage, age, comorbidity and histological type on prognosis		1,2,3,5
Able to discuss treatment options in the light of understanding of prognosis (A)	Understands the effects of treatment on prognosis	Advises patients on treatment options	1,2,3,4
Take part in discussions in multi-disciplinary meetings (A)	Understands the indications and limitations of chemotherapy, radiotherapy and surgery in both curative and palliative treatment of primary malignant bone tumours in patients presenting in all stages of disease		1,4

### 2. Systemic therapy

Objective	Knowledge	Skills	Assessment
Be able to assess patients for appropriate chemotherapy for primary malignant bone tumours (I)	Is familiar with commonly used drug protocols and their side effects. Knows which regimes are appropriate for use in the clinical situation.	Able to prescribe common therapeutic regimes	1,2,3,4,5
Be familiar with research developments in drug therapy for primary malignant bone tumours (A)	Understands the action of chemotherapeutic agents, their limitations and interactions		1,2
Be able to modify chemotherapy prescription in the light of major organ dysfunction (A)	Understands pharmacology of drugs used in treatment of primary malignant bone tumours.	Able to prescribe growth factors and other support drugs	1,2,3
Be able to advise on less common therapeutic regimes in particular palliative treatment for recurrent disease (A)	Understands the principles of palliative chemotherapy and the use of cytotoxic agents in heavily pre-treated patients and patients with significant comorbidities	Able to prescribe less common cytotoxic regimes	1,2,3
Able to participate in Phase 2 and Phase 3 clinical trials	Understands the principles of clinical research		1

and maintain appropriate research records (A)			
Able to care for patients having routine curative and palliative chemotherapy (I)	Understands the acute side effects of chemotherapy.	Able to prescribe chemotherapy according to protocol and modify schedules for patients based on individual needs and judge when to continue or stop treatment	1,2,3,5

### 3. Radiotherapy treatment (external beam radiotherapy)

Objective	Knowledge	Skills	Assessment
Be able to explain clearly the benefits, side effects and risks of a course of radiotherapy.(A) Be able to seek informed consent for a course of treatment.(A) Be able to seek informed consent for clinical trials (A)	Understands the acute and long term complications of radiotherapy and their relation to dose and volume in the different parts of the body. Understands the legal aspects and ethics of informed consent for treatment and for clinical trials.	Able to take informed consent for radical and palliative treatment	1,3,4
Be able to determine the target volume for planning field for primary malignant bone tumour radiotherapy (A)	Understands the clinical and radiological parameters associated with planning bone radiotherapy including CT planning Is competent in the interpretation of diagnostic imaging (including CT and MR) for determination of target volume. Aware of normal tissue morbidity and its impact on target volume definition. Is able to judge how to modify treatment plans based on morbidity.	Able to define a planning target volume for radiotherapy for primary malignant bone tumours.	1,3
Be able to modify treatment plans according to patient's individual needs, pre-morbid conditions etc(A)	Knows how to judge the relative risks and benefits of dose gradients in normal tissues when treating bone tumours.		1,3,5
Be able to use special planning modalities including CT planning and BEV planning(A)	Understands the use of cross-sectional imaging in planning bone radiotherapy	Able to use CT planning and IMRT in the treatment of primary malignant bone tumours	1,2,3,4,5
Be able to care for patients undergoing radiotherapy for primary bone tumours(A)	Understands early reactions to radiotherapy and their management	Able to conduct radiotherapy review and manage early reactions	1,2,3,4
Be able to modify course of treatment for individual patients according to severity of reactions (A)	Understands the radiobiology associated with radiotherapy for primary malignant bone tumours.		

### 4. Assessment of response and follow-up

Objective	Knowledge	Skills	Assessment
Be able to assess and advise patients attending for follow-up after completion of treatment. Be able to advise on appropriate investigations during follow-up.(I)	Understands the natural history of the illness. Knows the common complications of treatment and how to manage them appropriately	Able to perform appropriate examinations in patients who have been previously treated for primary malignant bone tumours.	1,2,3,4,5
Recognise less common complications of treatment and how to manage them (A)	Understand the variety of rarer complications of radical treatment and how to differentiate them from recurrence		1,2,3,4
Able to diagnose and investigate recurrent disease (I)	Knowledge of natural history of treated primary malignant bone tumours	Perform appropriate physical examination.	1,2,5

Knows how to manage recurrent disease and its symptoms including palliative treatment and symptom control where indicated.(A)	Understand the roles of radiotherapy, chemotherapy and surgery in the management of recurrence. Understands contribution from palliative care team.	Able to break news of recurrence to patients and discuss appropriate management options	1,2,4
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## Soft tissue and Bone Sarcoma: Metastatic Skeletal Disease.

### 1. Selection and assessment of patients with solitary skeletal metastases for radiotherapy.

Objective	Knowledge	Skills	Assessment
Be able to diagnose and know and understands the usual imaging and modes and the limitation in the diagnosis	Understands the appropriateness, limitation and value of confirmatory biopsy.	Appropriate clinical examination	1,2,3,5
Able to assess patients for radiotherapy with skeletal metastasis (I)	Understand the indications for a single fraction and more prolonged fractionation and its side effects. Ability to assess prognosis. To know the effect of age, co-morbidity and mobility.		1,2,3,5
Able to assess patients for surgical intervention. Knows indications for surgery in patients with bone metastases (I)	Knows clinical and radiological indications for surgical intervention and when to refer for surgical opinion  Knowledge of role of surgical fixation for lytic metastases in long bones and unstable vertebral column		1,2,3,5
Able to discuss treatment options in the light of understanding of prognosis (I)	Understands the effects of treatment on prognosis	Advises patients on treatment options	1,2,3,4,5
Take part in discussions in multi-disciplinary meetings (A)	Understands the indications and limitations of, radiotherapy and other modalities, e.g. vertebroplasty, vertebral body fixation, use of unsealed sources, e.g. Samarium and Strontium in patients with metastatic skeletal disease.		1,4

### 2. Radiotherapy treatment (external beam radiotherapy)

Objective	Knowledge	Skills	Assessment
Be able to use external beam radiotherapy as a palliative modality for pain relief from bone metastases (I)	Understands the acute and long term complications of radiotherapy and their relation to dose and volume in the different parts of the body.	Able to take informed consent for radical and palliative treatment	1,3,4,5
Be able to explain clearly the benefits, side effects and risks of a course of radiotherapy.(I)	Understand the mechanism of radiation induced pain relief  Be aware of potential for acute pain flare		
Be able to seek informed consent for a course of treatment.(I)	Able to pre-empt radiation induced nausea diarrhoea if field is relevant to these symptoms  Understand the legal aspects and ethics of		

Be able to seek informed consent for clinical trials (A)	informed consent for treatment and for clinical trials.		
Be able to determine the target volume for planning field of skeletal metastases radiotherapy (I)	Understands the clinical and radiological parameters associated with planning skeletal radiotherapy including CT planning. Is competent in the interpretation of diagnostic imaging (including CT and MR) for determination of target volume. Aware of normal tissue morbidity and its impact on target volume definition. Is able to judge how to modify treatment plans based on morbidity.	Able to define a planning target volume for radiotherapy for skeletal metastasis.	1,3,5
Be able to modify treatment plans according to patient's individual needs, pre-morbid conditions etc(I)	Knows how to judge the relative risks and benefits of dose gradients in adjacent normal tissues		1,3,5
Be able to use special planning modalities including CT planning and BEV planning(A)	Understands the use of cross-sectional imaging in planning skeletal radiotherapy	Able to use CT planning in the treatment of skeletal metastases	1,2,3,4,5
Be able to care for patients undergoing radiotherapy for skeletal metastases (I)	Understands acute reactions to radiotherapy and their management	Able to conduct radiotherapy review and manage early reactions	1,2,3,4
Be able to modify course of treatment for individual patients according to severity of reactions (I)	Understands the radiobiology associated with radiotherapy for skeletal metastasis.		1,2,5
Able to assess patients for Bisphosphonate Therapy (I).	Understand the action of Bisphosphonate therapy, limitations, interactions and toxicity with other therapies		1,2,5

### 3. Assessment of response and follow-up

Objective	Knowledge	Skills	Assessment
Be able to assess and advise patients attending for follow-up after completion of treatment. Be able to advise on appropriate investigations during follow-up.(I)	Understands the natural history of the illness. Knows the common complications of treatment and how to manage them appropriately	Able to perform appropriate examination in patients who have been previously treated for skeletal metastases.	1,2,3,4,5
Recognise less common complications of treatment and how to manage them. (A)	Understand the variety of rarer complications of radical treatment and how to differentiate them from recurrence		1,2,3,4
Able to diagnose and investigate recurrent disease. (I)	Knowledge of natural history of skeletal metastases.	Perform appropriate examination	1,2,5
Knows how to manage progressive disease and symptom control. (I)	Understand the roles of radiotherapy, chemotherapy and surgery in the management of progressive disease. Understands the contribution from palliative care team.	Able to break news of recurrence to patients and discuss appropriate management options	1,2,4,5



## Gynaecological Cancer : Cancer of the Cervix

### 1. Selection and assessment of patients with all stages of cervical cancer for radiotherapy.

Objective	Knowledge	Skills	Assessment
Be able to diagnose and stage cervical cancer (I)	Understands epidemiology and aetiology of cervical cancer.  Understands the importance of screening and its limitations  Knows the FIGO and TNM staging for cervical cancer  Can recommend appropriate diagnostic and staging investigations for women presenting with suspected cervical cancer	Pelvic examination in out-patients clinic and examination of the female pelvis under anaesthetic. Use vaginal speculae. Take cervical smear test.	1,2,3,5
Be familiar with the main histological types of cervical cancer and their management (I)	Understands the management of all stages of cervical cancer and how its management differs according to the main histological types which present in this country	Able to recognise the main histological types of cancer presenting in the cervix	1,5
Be able to assess patients for radical radiotherapy (I)	Understands the indications for radiotherapy and its side effects		1,2,3,5
Able to assess prognosis for patients with cervical cancer(I)	Knows the effect of stage, age, co-morbidity and histological type on prognosis		1,2,3,5
Able to discuss treatment options in the light of understanding of prognosis (A)	Understands the effects of treatment on prognosis	Advises patients on treatment options	1,2,3,5
Knows the importance of smoking cessation	Able to advise on appropriate agencies for helping smoking cessation.		1,2,5
Take part in discussions in multi-disciplinary meetings (A)	Understands the indications and limitations of radiotherapy and surgery in both curative and palliative treatment of cervical cancer in patients presenting in all stages.		1,4

### 2. Radiotherapy treatment (external beam radiotherapy)

Objective	Knowledge	Skills	Assessment
Be able to explain clearly the benefits, side effects and risks of a course of radiotherapy.(I) Be able to seek informed consent for a course of treatment.(I) Be able to seek informed consent for clinical trials (A)	Understands the acute and long term complications of pelvic radiotherapy and their relation to dose and volume in the different organs in the pelvis. Understands the legal aspects and ethics of informed consent for treatment and for clinical trials	Able to take informed consent for radical and palliative treatment	1,3,4,5
Be able to determine the target volume for planning for pelvic radiotherapy (I)	Understands the clinical and radiological parameters associated with planning pelvic radiotherapy including CT planning. Is competent in the interpretation of diagnostic imaging (including CT and MR) for determination of target volume. Aware of normal tissue morbidity and its impact on target volume definition. Is able to judge how to modify treatment plans based on morbidity.	Able to define a planning target volume for different stages of cervical cancer	1,3,5
Be able to modify treatment plans according to patient's individual needs, pre-morbid conditions etc(I)	Knows how to judge the relative risks and benefits of dose gradients in the pelvis		1,3,5



Be able to use special planning modalities including CT planning and BEV planning (A)	Understands the use of cross-sectional imaging in planning pelvic radiotherapy	Able to use CT planning and IMRT in the treatment of cervical cancer	1,2,3,4
Be able to care for patients undergoing pelvic radiotherapy for cervical cancer (I)	Understands early reactions to pelvic radiotherapy and their management	Able to conduct radiotherapy review and manage early reactions	1,2,3,4,5
Be able to modify course of treatment for individual patients according to severity of reactions including adjustments for gaps in treatment (I)	Understands the radiobiology associated with radical pelvic radiotherapy for cervical cancer		
Be able to participate in protocol development in pelvic radiotherapy for cervical cancer (A)	Understands developments in radiotherapy research and their application to local protocols		1,4

### 3. Systemic therapy

Objective	Knowledge	Skills	Assessment
Be able to assess patients for appropriate chemotherapy (I)	Is familiar with commonly used drug protocols and their side effects. Knows which regimes are appropriate for use in the clinical situation.	Able to prescribe common therapeutic regimes	1,2,3,4,5
Be familiar with research developments in drug therapy for cervical cancer (A)	Understands the action of chemotherapeutic agents, their limitations and interactions with radiotherapy		1,2
Be able to modify chemotherapy prescription in the light of major organ dysfunction (I)	Understands pharmacology of drugs used in treatment of cervical cancer	Able to prescribe growth factors and other support drugs	1,2,3,5
Be able to advise on less common therapeutic regimes in particular palliative treatment for recurrent disease (A)	Understands the principles of palliative chemotherapy and the use of cytotoxic agents in heavily pre-treated patients	Able to prescribe less common cytotoxic regimes	1,2,3
Be able to participate in Phase 2 and Phase 3 clinical trials and maintain appropriate research records (A)	Understands the principles of clinical research		1,6
Be able to care for patients having routine non-adjuvant, concomitant, adjuvant and palliative chemotherapy (I)	Understands the acute side effects of chemotherapy and its interaction with radiotherapy.	Able to prescribe chemotherapy according to protocol and modify schedules for patients based on individual needs and judge when to continue or stop treatment.	1,2,3,5

### 4. Brachytherapy

Objective	Knowledge	Skills	Assessment
Understand the indications for brachytherapy in the management of cervical cancer (I)	Radiobiological and physical aspects of intracavity brachytherapy in cervical cancer.		1,2,5

Be able to administer, plan and modify brachytherapy treatment and prescriptions in the light of normal tissue tolerance (A)	Quality assurance of intracavity brachytherapy	Perform straightforward brachytherapy insertions using tube and ovoids or vaginal ovoids for cervical cancer	1,2,3
Be familiar with rarer indications for intracavity and interstitial brachytherapy (A)	Planning and physical aspects of interstitial brachytherapy	Assist with interstitial brachytherapy implants	1,2,3
Be able to participate in planning departmental brachytherapy workload and use of LDR, MDR and HDR afterloading equipment (A)	Understanding of the organisation of a brachytherapy service		1,2,3

#### 5. Assessment of response and follow-up

Objective	Knowledge	Skills	Assessment
Be able to assess and advise patients attending for follow-up after completion of treatment. Be able to advise on appropriate investigations during follow-up.(I)	Understands the natural history of the illness. Knows the common complications of treatment and how to manage them appropriately	Able to perform pelvic examination in patients who have been previously treated for cervical cancer	1,2,3,4,5
Be able to recognise less common complications of treatment and how to manage them (A)	Understand the variety of rarer complications of radical treatment and how to differentiate them from recurrence		1,2,3,4
Be able to diagnose and investigate recurrent disease (I)	Knowledge of natural history of treated cervical cancer	Perform full physical examination including pelvic examination	1,2,5
Understand how to manage recurrent disease and its symptoms including palliative treatment and symptom control where indicated.(A)	Understand the roles of radiotherapy, chemotherapy and surgery in the management of recurrence. Understands contribution from palliative care team.	Able to break news of recurrence to patients and discuss appropriate management options	1,2,4

## Gynaecological Cancer : Cancer of the Body of the Uterus

### 1. Selection and assessment of patients with all stages of uterine cancer for radiotherapy.

Objective	Knowledge	Skills	Assessment
Be able to diagnose and stage endometrial cancer (I)	Understands epidemiology and aetiology of endometrial cancer.  Knows the FIGO and TNM staging for uterine cancer  Can recommend appropriate diagnostic and staging investigations for women presenting with suspected uterine cancer	Pelvic examination in out-patients clinic and examination of the female pelvis under anaesthetic. Use vaginal speculum.	1,2,3,5
Be familiar with the main histological types of uterine cancer and their management (I)	Understands the management of all stages of uterine cancer and how its management differs according to the main histological types which present in this country.	Able to recognise the main histological types of cancer presenting in the body of the uterus	1,5
Be able to assess patients for radical radiotherapy for patients unfit for surgery (A)	Understands the indications for radiotherapy and its side effects		1,2,3

Be able to assess patients for adjuvant postoperative radiotherapy (I)			1,2,5
Be able to assess prognosis for patients with uterine cancer(I)	Knows the effect of stage, age, co-morbidity and histological type on prognosis		1,2,3,5
Be able to discuss treatment options in the light of understanding of prognosis for patients with common and uncommon types of uterine cancer (A)	Understands the effects of treatment on prognosis	Advises patients on treatment options	1,2,3,4
Be able to take part in discussions in multi-disciplinary meetings (A)	Understands the indications and limitations of radiotherapy and surgery in both curative and palliative treatment of uterine cancer in patients presenting in all stages.		1,4

## 2. Radiotherapy treatment (external beam radiotherapy)

Objective	Knowledge	Skills	Assessment
Be able to explain clearly the benefits, side effects and risks of a course of radiotherapy.(I) Be able to seek informed consent for a course of treatment.(I) Be able to seek informed consent for clinical trials (A)	Understands the acute and long term complications of pelvic radiotherapy and their relation to dose and volume in the different organs in the pelvis. Understands the legal aspects and ethics of informed consent for treatment and for clinical trials.	Able to take informed consent for radical and palliative treatment	1,3,4,5
Be able to determine the target volume for planning for pelvic radiotherapy (I)	Understands the clinical and radiological parameters associated with planning pelvic radiotherapy including CT planning. Is competent in the interpretation of diagnostic imaging (including CT and MR) for determination of target volume. Aware of normal tissue morbidity and its impact on target volume definition. Is able to judge how to modify treatment plans based on morbidity.	Able to define a planning target volume for postoperative radiotherapy for uterine cancer	1,3,5
Be able to modify treatment plans according to patient's individual needs, pre-morbid conditions etc(I)	Knows how to judge the relative risks and benefits of dose gradients in the pelvis		1,3,5
Be able to use special planning modalities including CT planning and BEV planning(A)	Understands the use of cross-sectional imaging in planning pelvic radiotherapy	Able to use CT planning and IMRT in the treatment of uterine cancer	1,2,3,4
Be able to care for patients undergoing pelvic radiotherapy for uterine cancer (I)	Understands early reactions to pelvic radiotherapy and their management	Able to conduct radiotherapy review and manage early reactions	1,2,3,4,5
Be able to modify course of treatment for individual patients according to severity of reactions (I)	Understands the radiobiological basis of radical pelvic radiotherapy for uterine cancer		1,2,5
Be able to participate in protocol development in pelvic radiotherapy for uterine cancer (A)	Understands developments in radiotherapy research and their application to local protocols		1,4

### 3. Systemic therapy

Objective	Knowledge	Skills	Assessment
Be able to assess patients for appropriate chemotherapy (I)	Is familiar with commonly used drug protocols and their side effects. Knows which regimes are appropriate for use in the clinical situation.	Able to prescribe common therapeutic regimes	1,2,3,4,5
Be familiar with research developments in drug therapy for uterine cancer (A)	Understands the action of chemotherapeutic agents, their limitations and interactions with radiotherapy		1,2
Be able to modify chemotherapy prescription in the light of major organ dysfunction (A)	Understands pharmacology of drugs used in treatment of uterine cancer	Able to prescribe growth factors and other support drugs	1,2,3
Be able to advise on less common therapeutic regimes in particular palliative treatment for recurrent disease (A)	Understands the principles of palliative chemotherapy and the use of cytotoxic agents in heavily pre-treated patients and patients with significant co-morbidities	Able to prescribe less common cytotoxic regimes	1,2,3
Able to participate in Phase 2 and Phase 3 clinical trials and maintain appropriate research records (A)	Understands the principles of clinical research		1
Able to care for patients having routine neo-adjuvant, con-comitant, adjuvant and palliative chemotherapy (I)	Understands the acute side effects of chemotherapy and its interaction with radiotherapy.	Able to prescribe chemotherapy according to protocol and modify schedules for patients based on individual needs and judge when to continue or stop treatment	1,2,3,5

### 4. Brachytherapy

Objective	Knowledge	Skills	Assessment
Understand the indications for brachytherapy in the management of uterine cancer (I)	Radiobiological and physical aspects of intracavity brachytherapy.		1,2,5
Be able to administer, plan and modify brachytherapy treatment and prescriptions in the light of normal tissue tolerance (A)	Quality assurance of intracavity brachytherapy	Perform straightforward brachytherapy insertions using tube and ovoids, vaginal ovoids or vaginal applicators for endometrial cancer	1,2,3
Be familiar with rarer indications for intracavity and interstitial brachytherapy (A)	Planning and physical aspects of interstitial brachytherapy	Assist with interstitial brachytherapy implants	1,2,3
Be able to participate in planning departmental brachytherapy workload and use of LDR, MDR and HDR afterloading equipment (A)	Understanding of the organisation of a brachytherapy service		1,2,3

### 5. Assessment of response and follow-up

Objective	Knowledge	Skills	Assessment
Be able to assess and advise patients attending for follow-up after completion of treatment. Be able to advise on appropriate investigations during follow-up.(I)	Understands the natural history of the illness. Knows the common complications of treatment and how to manage them appropriately	Able to perform pelvic examination in patients who have been previously treated for uterine cancer	1,2,3,4,5
Recognise less common complications of treatment and how to manage them (A)	Understand the variety of rarer complications of radical treatment and how to differentiate them from recurrence		1,2,3,4
Know how to manage recurrent disease and its symptoms including palliative treatment and symptom control where indicated.(I)	Understand the roles of radiotherapy, chemotherapy and surgery in the management of recurrence. Understands contribution from palliative care team.	Able to break news of recurrence to patients and discuss appropriate management options	1,2,4,5

## Gynaecological Cancer : Cancer of the Ovaries, Fallopian tubes and Primary Peritoneal Cancer

### 1. Selection and assessment of patients with all stages of ovarian, fallopian tube and primary peritoneal cancer for treatment.

Objective	Knowledge	Skills	Assessment
Be able to diagnose and stage ovarian, fallopian tube and primary peritoneal cancer (I)	Understands epidemiology and aetiology of ovarian cancer.  Knows the FIGO and TNM staging for ovarian cancer  Can recommend appropriate diagnostic and staging investigations for women presenting with suspected ovarian cancer	Abdominal and pelvic examination in out-patients clinic. Use vaginal speculum.	1,2,3,5
Be familiar with the main histological types of ovarian cancer and their management (I)	Understands the management of all stages of ovarian cancer and how its management differs according to the main histological types which present in this country	Able to recognise the main histological types of cancer presenting in the ovaries, fallopian tubes and peritoneum	1,5
Able to assess prognosis for patients with ovarian, fallopian tube and primary peritoneal cancer(I)	Knows the effect of stage, age, co-morbidity and histological type on prognosis		1,2,3,5
Able to discuss treatment options in the light of understanding of prognosis (I)	Understands the effects of treatment on prognosis	Advises patients on treatment options	1,2,3,4,5
Take part in discussions in multi-disciplinary meetings (A)	Understands the indications and limitations of chemotherapy, radiotherapy and surgery in both curative and palliative treatment of ovarian, primary peritoneal and fallopian tube cancer in patients presenting in all stages of disease		1,4

## 2. Systemic therapy

Objective	Knowledge	Skills	Assessment
Be able to assess patients for appropriate chemotherapy for ovarian, fallopian tube and primary peritoneal cancer (I)	Is familiar with commonly used drug protocols and their side effects. Knows which regimes are appropriate for use in the clinical situation.	Able to prescribe common therapeutic regimes	1,2,3,4,5
Be familiar with research developments in drug therapy for ovarian and primary peritoneal cancer (A)	Understands the action of chemotherapeutic agents, their limitations and interactions		1,2
Be able to modify chemotherapy prescription in the light of major organ dysfunction (I)	Understands pharmacology of drugs used in treatment of ovarian, primary peritoneal and fallopian tube cancer	Able to prescribe growth factors and other support drugs	1,2,3,5
Be able to advise on less common therapeutic regimes in particular palliative treatment for recurrent disease (A)	Understands the principles of palliative chemotherapy and the use of cytotoxic agents in heavily pre-treated patients and patients with significant co-morbidities	Able to prescribe less common cytotoxic regimes	1,2,3
Able to participate in Phase 2 and Phase 3 clinical trials and maintain appropriate research records (A)	Understands the principles of clinical research		1
Able to care for patients having routine curative and palliative chemotherapy (I)	Understands the acute side effects of chemotherapy.	Able to prescribe chemotherapy according to protocol and modify schedules for patients based on individual needs and judge when to continue or stop treatment	1,2,3,5

## 3. Ra diotherapy treatment (external beam radiotherapy)

Objective	Knowledge	Skills	Assessment
Be able to explain clearly the benefits, side effects and risks of a course of radiotherapy.(A) Be able to seek informed consent for a course of treatment.(A) Be able to seek informed consent for clinical trials (A)	Understands the acute and long term complications of abdominal and pelvic radiotherapy and their relation to dose and volume in the different organs in the pelvis. Understands the legal aspects and ethics of informed consent for treatment and for clinical trials.	Able to take informed consent for radical and palliative treatment	1,3,4
Be able to determine the target volume for planning pelvic or abdominal radiotherapy (A)	Understands the clinical and radiological parameters associated with planning pelvic and abdominal radiotherapy including CT planning. Is competent in the interpretation of diagnostic imaging (including CT and MR) for determination of target volume. Aware of normal tissue morbidity and its impact on target volume definition. Is able to judge how to modify treatment plans based on morbidity.	Able to define a planning target volume for radiotherapy for ovarian cancer	1,3

Be able to modify treatment plans according to patient's individual needs, pre-morbid conditions etc(A)	Knows how to judge the relative risks and benefits of dose gradients in the abdomen and pelvis		1,3
Be able to use special planning modalities including CT planning and BEV planning(A)	Understands the use of cross-sectional imaging in planning pelvic and abdominal radiotherapy	Able to use CT planning and IMRT in the treatment of cancer of the ovaries, or fallopian tubes	1,2,3,4
Be able to care for patients undergoing pelvic radiotherapy for ovarian or fallopian tube cancer (A)	Understands early reactions to pelvic radiotherapy and their management	Able to conduct radiotherapy review and manage early reactions	1,2,3,4
Be able to modify course of treatment for individual patients according to severity of reactions (A)	Understands the radiobiology associated with radical pelvic radiotherapy for ovarian, primary peritoneal and fallopian tube cancer		1,2
Be able to participate in protocol development in pelvic radiotherapy for uterine cancer (A)	Understands developments in radiotherapy research and their application to local protocols		1,4

#### 4. Assessment of response and follow-up

Objective	Knowledge	Skills	Assessment
Be able to assess and advise patients attending for follow-up after completion of treatment. Be able to advise on appropriate investigations during follow-up.(I)	Understands the natural history of the illness. Knows the common complications of treatment and how to manage them appropriately	Able to perform pelvic examination in patients who have been previously treated for ovarian cancer	1,2,3,4,5
Recognise less common complications of treatment and how to manage them (A)	Understand the variety of rarer complications of radical treatment and how to differentiate them from recurrence		1,2,3,4
Able to diagnose and investigate recurrent disease (I)	Knowledge of natural history of treated ovarian, primary peritoneal and fallopian tube cancer	Perform full physical examination including pelvic examination	1,2,5
Knows how to manage recurrent disease and its symptoms including palliative treatment and symptom control where indicated.(A)	Understand the roles of radiotherapy, chemotherapy and surgery in the management of recurrence. Understands contribution from palliative care team.	Able to break news of recurrence to patients and discuss appropriate management options	1,2,4

## Gynaecological Cancer : Cancer of the Vulva

### 1. Selection and assessment of patients with all stages of vulval cancer for treatment.

Objective	Knowledge	Skills	Assessment
Be able to diagnose and stage vulval cancer (I)	Understands epidemiology and aetiology of vulval cancer.  Knows the TNM staging for vulval cancer  Can recommend appropriate diagnostic and staging investigations for women presenting with suspected vulval cancer	Pelvic examination in out-patients clinic Assessment of regional lymph nodes.	1,2,3,5



Be familiar with the main histological types of vulval malignancy and their management (I)	Understands the management of all stages of vulval cancer and how its management differs according to the main histological types	Able to recognise the main histological types of cancer presenting in the vulva	1,5
Be able to assess patients for radical radiotherapy for patients unfit for surgery (A)	Understands the indications for radiotherapy and its side effects		1,2,3
Be able to assess patients for adjuvant postoperative radiotherapy (I)			1,2,5
Be able to assess prognosis for patients with vulval cancer(A)	Knows the effect of stage, age, co-morbidity and histological type on prognosis		1,2,3
Be able to discuss treatment options in the light of understanding of prognosis for patients with common and uncommon types of vulval cancer (A)	Understands the effects of treatment on prognosis	Advises patients on treatment options	1,2,3,4
Be able to take part in discussions in multi-disciplinary meetings (A)	Understands the indications and limitations of radiotherapy and surgery in both curative and palliative treatment of vulval cancer in patients presenting in all stages		1,4

## 2. Radiotherapy treatment (external beam radiotherapy)

Objective	Knowledge	Skills	Assessment
Be able to explain clearly the benefits, side effects and risks of a course of radiotherapy.(A) Be able to seek informed consent for a course of treatment.(A) Be able to seek informed consent for clinical trials (A)	Understands the acute and long term complications of pelvic radiotherapy and their relation to dose and volume in the different organs in the pelvis. Understands the legal aspects and ethics of informed consent for treatment and for clinical trials.	Able to take informed consent for radical and palliative treatment	1,3,4,5
Be able to determine the target volume for planning for pelvic radiotherapy for vulval cancer(A)	Understands the clinical and radiological parameters associated with planning pelvic radiotherapy including CT and conformal planning. Is competent in the interpretation of diagnostic imaging (including CT and MR) for determination of target volume. Aware of normal tissue morbidity and its impact on target volume definition. Is able to judge how to modify treatment plans based on morbidity.	Able to define a planning target volume for radiotherapy both to the primary site and regional lymph nodes for vulval cancer	1,3,5
Be able to modify treatment plans according to patient's individual needs, pre-morbid conditions etc(A)	Knows how to judge the relative risks and benefits of dose gradients in the pelvis		1,3
Be able to use special planning modalities including CT planning and BEV planning(A)	Understands the use of cross-sectional imaging in planning pelvic radiotherapy	Able to use CT planning and IMRT where appropriate in the treatment of vulval cancer	1,2,3,4
Be able to care for patients undergoing radiotherapy for vulval cancer (I)	Understands early reactions to pelvic radiotherapy and their management	Able to conduct radiotherapy review and manage early reactions	1,2,3,4,5
Be able to modify course of treatment for individual patients according to severity of reactions (I)	Understands the radiobiological basis of radical pelvic radiotherapy for vulval cancer		



Be able to participate in protocol development in pelvic radiotherapy for vulval cancer (A)	Understands developments in radiotherapy research and their application to local protocols		1,4
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### 3. Systemic therapy

Objective	Knowledge	Skills	Assessment
Be able to assess patients for appropriate neoadjuvant, concomitant and palliative chemotherapy (A)	Is familiar with commonly used drug protocols and their side effects. Knows which regimes are appropriate for use in the clinical situation.	Able to prescribe common therapeutic regimes	1,2,3,4
Be familiar with research developments in drug therapy for vulval cancer (A)	Understands the action of chemotherapeutic agents, their limitations and interactions with radiotherapy		1,2
Be able to modify chemotherapy prescription in the light of major organ dysfunction (A)	Understands pharmacology of drugs used in treatment of vulval cancer	Able to prescribe growth factors and other support drugs	1,2,3
Be able to advise on less common therapeutic regimes in particular palliative treatment for recurrent disease (A)	Understands the principles of palliative chemotherapy and the use of cytotoxic agents in heavily pre-treated patients and patients with significant co-morbidities	Able to prescribe less common cytotoxic regimes	1,2,3
Able to participate in Phase 2 and Phase 3 clinical trials and maintain appropriate research records (A)	Understands the principles of clinical research		1
Able to care for patients having routine neo-adjuvant, con-comitant, adjuvant and palliative chemotherapy (I)	Understands the acute side effects of chemotherapy and its interaction with radiotherapy.	Able to prescribe chemotherapy according to protocol and modify schedules for patients based on individual needs and judge when to continue or stop treatment	1,2,3

### 4. Brachytherapy

Objective	Knowledge	Skills	Assessment
Understand the indications for brachytherapy in the management of vulval cancer (A)	Radiobiological and physical aspects of interstitial brachytherapy.		1,2

### 5. Assessment of response and follow-up

Objective	Knowledge	Skills	Assessment
Be able to assess and advise patients attending for follow-up after completion of treatment. Be able to advise on appropriate investigations during follow-up.(I)	Understands the natural history of the illness. Knows the common complications of treatment and how to manage them appropriately	Able to perform physical examination in patients who have been previously treated for vulval cancer	1,2,3,4,5
Recognise less common complications of	Understand the variety of rarer complications of radical treatment and		1,2,3,4

<b>treatment and how to manage them (A)</b>	how to differentiate them from recurrence.		
<b>Know how to manage recurrent disease and its symptoms including palliative treatment and symptom control where indicated.(A)</b>	Understand the roles of radiotherapy, chemotherapy and surgery in the management of recurrence. Understands contribution from palliative care team.	Able to break news of recurrence to patients and discuss appropriate management options	1,2,4

## Urological Cancer : Cancer of the Prostate

### 1. Selection and assessment of patients with all stages of prostate cancer for radiotherapy.

Objective	Knowledge	Skills	Assessment
Know how to diagnose and stage cancer of the prostate(I)	Understands epidemiology and aetiology of prostate cancer.  Understands the principle of screening and its limitations  Knows TNM staging for prostate cancer  Can recommend appropriate diagnostic and staging investigations for men presenting with suspected prostate cancer	Rectal examination in out-patients clinic.	1,2,3,5
Be familiar with the main histological types of prostate cancer and their management (I)	Understands the management of all stages of prostate cancer and how its management differs according to stage and histology.  Understands Gleason scoring	Able to recognise the main histological types of cancer presenting in the prostate	1,5
Be able to assess patients for radical radiotherapy (I)	Understands the indications for radiotherapy and its side effects		1,2,3
Able to assess prognosis for patients with prostate cancer(I)	Knows the effect of stage, age, co-morbidity and histological type on prognosis		1,2,3,5
Able to discuss treatment options in the light of understanding of prognosis (I)	Understands the effects of treatment on prognosis	Advising patients on treatment options	1,2,3,4,5
Take part in discussions in multi-disciplinary meetings (A)	Understands the indications and limitations of radiotherapy and surgery in both curative and palliative treatment of prostate cancer in patients presenting in all stages		1,4

### 2. Radiotherapy treatment (external beam radiotherapy)

Objective	Knowledge	Skills	Assessment
Be able to explain clearly the benefits, side effects and risks of a course of radiotherapy.(I) Be able to seek informed consent for a course of treatment.(I) Be able to seek informed consent for clinical trials (A)	Understands the acute and long term complications of pelvic radiotherapy and their relation to dose and volume in the different organs in the pelvis. Understands the legal aspects and ethics of informed consent for treatment and for clinical trials.	Able to take informed consent for radical and palliative treatment	1,3,4,5
Be able to determine the target volume for planning radiotherapy to the prostate (I)	Understands the clinical and radiological parameters associated with planning pelvic radiotherapy including CT planning. Is competent in the interpretation of diagnostic imaging (including CT and MR) for determination of target volume. Aware of normal tissue morbidity and its impact on target volume definition. Is able to judge how to modify treatment plans based on morbidity.	Able to define a planning target volume for different stages of prostate cancer Able to interpret dose volume histograms.	1,3,5

Be able to modify treatment plans according to patient's individual needs, pre-morbid conditions etc(1)	Knows how to judge the relative risks and benefits of dose gradients in the pelvis		1,3,5
Be able to use special planning modalities including CT planning and BEV planning (A)	Understands the use of cross-sectional imaging in planning radiotherapy to the prostate	Able to use CT planning and be aware of the role of IMRT in the treatment of prostate cancer	1,2,3,4
Be able to care for patients undergoing pelvic radiotherapy for prostate cancer (1)	Understands early reactions to pelvic radiotherapy and their management	Able to conduct radiotherapy review and manage early reactions	1,2,3,4
Be able to modify course of treatment for individual patients according to severity of reactions (1)	Understands the radiobiology associated with radical pelvic radiotherapy for prostate cancer		
Be able to participate in protocol development in pelvic radiotherapy for prostate cancer (A)	Understands developments in radiotherapy research and their application to local protocols		1,4

### 3. Systemic therapy

Objective	Knowledge	Skills	Assessment
Be able to assess patients for appropriate hormone therapy (1)	Is familiar with commonly used hormonal agents and their side effects. Knows which regimes are appropriate for use in the clinical situation.	Able to prescribe common therapeutic regimes	1,2,3,4,5
Be familiar with research developments in drug therapy for prostate cancer (A)	Understands the action of chemotherapeutic agents and potential side effects.		1,2
Be able to modify chemotherapy prescription in the light of major organ dysfunction (1)	Understands pharmacology of drugs used in treatment of prostate cancer	Able to prescribe growth factors and other support drugs	1,2,3,5
Be able to advise on less common therapeutic regimes in particular palliative treatment for recurrent disease (A)	Understands the principles of palliative chemotherapy and hormone therapy and the use of cytotoxic agents in heavily pre-treated patients	Able to prescribe common cytotoxic regimes and hormones	1,2,3
Be able to participate in Phase 2 and Phase 3 clinical trials and maintain appropriate research records (A)	Understands the principles of clinical research		1,4
Be able to care for patients having routine neo-adjuvant, adjuvant and palliative chemotherapy and hormone therapy (1)	Understands the acute side effects of chemotherapy and hormone therapy and its interaction with radiotherapy.	Able to prescribe chemotherapy and hormone therapy according to protocol and modify schedules for patients based on individual needs and judge when to continue or stop treatment	1,2,3,5

#### 4. Brachytherapy

Objective	Knowledge	Skills	Assessment
Understand the indications for brachytherapy in the management of prostate cancer (I)	Radiobiological and physical aspects of interstitial brachytherapy in prostate cancer.		1,2,5
Have a working knowledge of planning departmental brachytherapy workload and the relative merits of LDR implants, and HDR afterloading equipment (A)	Understanding of the organisation of a brachytherapy service		1,2,3
Understand how to administer, plan and modify brachytherapy treatment and prescriptions in the light of normal tissue tolerance (A)	Quality assurance of intracavity brachytherapy	Assist at straightforward brachytherapy insertions for prostate cancer	1,2,3

#### 5. Assessment of response and follow-up

Objective	Knowledge	Skills	Assessment
Be able to assess and advise patients attending for follow-up after completion of treatment. Be able to advise on appropriate investigations during follow-up.(I)	Understands the natural history of the illness. Knows the common complications of treatment and how to manage them appropriately	Able to perform rectal examination in patients who have been previously treated for prostate cancer	1,2,3,4,5
Be able to recognise less common complications of treatment and how to manage them (A)	Understand the variety of rarer complications of radical treatment and how to differentiate them from recurrence.		1,2,3,4
Be able to diagnose and investigate recurrent disease (I)	Knowledge of natural history of treated prostate cancer	Perform full physical examination including rectal examination	1,2,5
Understand how to manage recurrent disease and its symptoms including palliative treatment and symptom control where indicated.(A)	Understand the roles of radiotherapy, including hemibody radiotherapy and the role of Sr89, chemotherapy and surgery in the management of recurrence. Understands contribution from palliative care team.	Able to break news of recurrence to patients and discuss appropriate management options	1,2,4

### Urological Cancer : Urothelial Cancer

#### 1. Selection and assessment of patients with all stages of urothelial cancer for radiotherapy.

Objective	Knowledge	Skills	Assessment
Be able to diagnose and stage bladder cancer (I), cancer of the ureter and urethra (A)	Understands epidemiology and aetiology of bladder cancer.  Knows the TNM staging for urothelial cancer  Can recommend appropriate diagnostic and staging investigations for patients presenting with suspected bladder cancer	Attendance at a cystoscopy including examination of the pelvis under anaesthetic.	1,2,3,5

Be familiar with the main histological types of urothelial cancer and their management (I)	Understands the management of all stages of urothelial cancer and how its management differs according to the main histological types which present in this country	Able to recognise the main histological types of cancer presenting in the bladder, ureter or urethra.	1,5
Be able to assess and advise patients of the relative merits of and indications for radical radiotherapy and surgery. (A)	Understands the indications for radiotherapy and surgery and their side effects		1,2,3
Be able to assess prognosis for patients with bladder cancer(I) or cancer of the ureter or urethra (A)	Knows the effect of stage, age, co-morbidity and histological type on prognosis		1,2,3,5
Be able to discuss treatment options in the light of understanding of prognosis for patients with common and uncommon types of bladder cancer, urethral or ureteric cancer (A)	Understands the effects of treatment on prognosis	Advises patients on treatment options	1,2,3,4,5
Be able to take part in discussions in multi-disciplinary meetings (A)	Understands the indications and limitations of radiotherapy and surgery in both curative and palliative treatment of urothelial cancer in patients presenting in all stages.		1,4

## 2. Radiotherapy treatment (external beam radiotherapy)

Objective	Knowledge	Skills	Assessment
Be able to explain clearly the benefits, side effects and risks of a course of radiotherapy.(I) Be able to seek informed consent for a course of treatment.(I) Be able to seek informed consent for clinical trials (A)	Understands the acute and long term complications of pelvic radiotherapy and their relation to dose and volume in the different organs in the pelvis. Understands the legal aspects and ethics of informed consent for treatment and for clinical trials.	Able to take informed consent for radical and palliative treatment	1,3,4,5
Be able to determine the target volume for planning radiotherapy for bladder cancer(I) Be aware of the treatment options for cancer of the ureter or urethra (A)	Understands the clinical and radiological parameters associated with planning pelvic radiotherapy including CT planning. Is competent in the interpretation of diagnostic imaging (including CT and MR) for determination of target volume. Aware of normal tissue morbidity and its impact on target volume definition. Is able to judge how to modify treatment plans based on morbidity.	Able to define a planning target volume for radiotherapy for bladder cancer.	1,3,5
Be able to modify treatment plans according to patient's individual needs, pre-morbid conditions etc(I)	Knows how to judge the relative risks and benefits of dose gradients in the pelvis		1,3,5
Be able to use planning modalities including CT planning and conformal techniques(I)	Understands the use of cross-sectional imaging in planning pelvic radiotherapy	Able to use CT planning and have knowledge of IMRT in the treatment of bladder cancer.	1,2,3,4,5
Be able to care for patients undergoing pelvic radiotherapy for bladder cancer (I)	Understands early reactions to pelvic radiotherapy and their management	Able to conduct radiotherapy review and manage early reactions	1,2,3,4,5

Be able to modify course of treatment for individual patients according to severity of reactions (I)	Understands the radiobiological basis of radical pelvic radiotherapy for bladder cancer		
Be able to participate in protocol development in radiotherapy for bladder cancer or cancer of the ureter or urethra (A)	Understands developments in radiotherapy research and their application to local protocols		1,4

### 3. Systemic therapy

Objective	Knowledge	Skills	Assessment
Be able to assess patients for appropriate chemotherapy (I)	Is familiar with commonly used drug protocols and their side effects. Knows which regimes are appropriate for use in the clinical situation	Able to prescribe common therapeutic regimes	1,2,3,4,5
Be familiar with research developments in drug therapy for urothelial cancer (A)	Understands the action of chemotherapeutic agents, their limitations and interactions with radiotherapy		1,2
Be able to modify chemotherapy prescription in the light of major organ dysfunction (I)	Understands pharmacology of drugs used in treatment of urothelial cancer	Able to prescribe growth factors and other support drugs	1,2,3,5
Be able to advise on less common therapeutic regimes in particular palliative treatment for recurrent disease (A)	Understands the principles of palliative chemotherapy and the use of cytotoxic agents in heavily pre-treated patients and patients with significant co-morbidities	Able to prescribe less common cytotoxic regimes	1,2,3
Able to participate in Phase 2 and Phase 3 clinical trials and maintain appropriate research records (A)	Understands the principles of clinical research		1

### 4. Assessment of response and follow-up

Objective	Knowledge	Skills	Assessment
Be able to assess and advise patients attending for follow-up after completion of treatment. Be able to advise on appropriate investigations during follow-up.(I)	Understands the natural history of the illness. Knows the common complications of treatment and how to manage them appropriately	Able to perform rectal examination in patients who have been previously treated for bladder cancer	1,2,3,4,5
Recognise less common complications of treatment and how to manage them (A)	Understand the variety of rarer complications of radical treatment and how to differentiate them from recurrence.		1,2,3,4
Able to diagnose and investigate recurrent disease (I)	Knowledge of natural history of treated bladder cancer	Perform full physical examination including rectal examination	1,2,5
Know how to manage recurrent disease and its symptoms including palliative treatment and symptom control where indicated.(A)	Understand the roles of radiotherapy, chemotherapy and surgery in the management of recurrence. Understands contribution from palliative care team.	Able to break news of recurrence to patients and discuss appropriate management options	1,2,4

## Urological Cancer : Renal Cell Carcinoma

### 1. Selection and assessment of patients with all stages of renal cancer for treatment.

Objective	Knowledge	Skills	Assessment
Be able to diagnose renal cancer (I)	Understands epidemiology and aetiology of renal cancer.  Knows the TNM staging for renal cancer  Can recommend appropriate diagnostic and staging investigations for patients presenting with suspected renal cancer	Abdominal examination in out-patients clinic.	1,2,3,5
Be familiar with the main histological types of renal cancer and their management (I)	Understands the management of all stages of renal cancer and how its management differs according to the main histological types which present in this country	Able to recognise the main histological types of cancer presenting in the kidney	1,5
Able to assess prognosis for patients with renal cancer(I)	Knows the effect of stage, age, co-morbidity and histological type on prognosis		1,2,3,5
Able to discuss treatment options in the light of understanding of prognosis (I)	Understands the effects of treatment on prognosis	Advises patients on treatment options	1,2,3,4,5
Take part in discussions in multi-disciplinary meetings (A)	Understands the indications and limitations of chemotherapy, radiotherapy immunotherapy and surgery in both curative and palliative treatment of renal cancer in patients presenting in all stages of disease		1,4

### 2. Systemic therapy

Objective	Knowledge	Skills	Assessment
Be able to assess patients for appropriate hormone therapy, biological therapy or chemotherapy for renal cancer (I)	Is familiar with commonly used drug protocols and their side effects. Knows which regimes are appropriate for use in the clinical situation.	Able to prescribe common therapeutic regimes	1,2,3,4,5
Be familiar with research developments in drug therapy for renal cancer (A)	Understands the action of systemic agents, their limitations and interactions		1,2
Be able to modify systemic therapy prescription in the light of major organ dysfunction (A)	Understands pharmacology of drugs used in treatment of renal cancer	Able to prescribe growth factors and other support drugs	1,2,3
Be able to advise on less common therapeutic regimes in particular palliative treatment for recurrent disease (A)	Understands the principles of systemic treatments used in the palliation of symptoms from renal cancer.	Able to prescribe systemic therapies.	1,2,3
Able to participate in Phase 2 and Phase 3 clinical trials and maintain appropriate research records (A)	Understands the principles of clinical research and the currently extant studies available for patients with renal cancer.		1



<b>Able to care for patients having routine curative and palliative immunotherapy(I)</b>	Understands the acute side effects of commonly used immunotherapy agents.	Able to prescribe immunotherapy according to protocol and modify schedules for patients based on individual needs and judge when to continue or stop treatment	1,2,3,5
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### 3. Radiotherapy treatment (external beam radiotherapy)

Objective	Knowledge	Skills	Assessment
<b>Understand the indications for radiotherapy to the renal bed and palliative radiotherapy(I)</b>	Knows the advantages and disadvantages of radiotherapy in renal cancer		1,2,3,5
<b>Be able to seek informed consent for clinical trials (A)</b>	Understands the legal aspects and ethics of informed consent for treatment and for clinical trials.	Able to take informed consent for radical and palliative treatment and clinical trials	1,3,4,5

### 4. Assessment of response and follow-up

Objective	Knowledge	Skills	Assessment
<b>Be able to assess and advise patients attending for follow-up after completion of treatment. Be able to advise on appropriate investigations during follow-up.(I)</b>	Understands the natural history of the illness. Knows the common complications of treatment and how to manage them appropriately	Able to perform clinical examinations in patients who have been previously treated for renal cancer	1,2,3,4,5
<b>Recognise less common complications of treatment and how to manage them (A)</b>	Understand the variety of rarer complications of radical treatment and how to differentiate them from recurrence		1,2,3,4
<b>Able to diagnose and investigate recurrent disease (I)</b>	Knowledge of natural history of treated renal cancer	Perform full physical examination .	1,2,5
<b>Knows how to manage recurrent disease and its symptoms including palliative treatment and symptom control where indicated.(A)</b>	Understand the roles of radiotherapy, chemotherapy immunotherapy and surgery in the management of recurrence. Understands contribution from palliative care team	Able to break news of recurrence to patients and discuss appropriate management options	1,2,4

## Urological Cancer : Carcinoma of the penis

### 1. Selection and assessment of patients with all stages of penile cancer for radiotherapy.

Objective	Knowledge	Skills	Assessment
<b>Know how to diagnose and stage cancer of the penis(I)</b>	Understands epidemiology and aetiology of penile cancer.  Knows TNM staging for penile cancer  Can recommend appropriate diagnostic and staging investigations for men presenting with suspected penile cancer	Competent examination of the male genitalia lymph node drainage regions and abdomen	1,2,3,5
<b>Be familiar with the main histological types of penile cancer and their management (I)</b>	Understands the management of all stages of penile cancer and how its management differs according to stage and histology.	Able to recognise the main histological types of cancer presenting in the penis	1,5

Be able to assess patients for radical radiotherapy (A)	Understands the indications for radiotherapy and its side effects		1,2,3
Able to assess prognosis for patients with penile cancer(A)	Knows the effect of stage, age, co-morbidity and histological type on prognosis		1,2,3
Able to discuss treatment options in the light of understanding of prognosis (A)	Understands the effects of treatment on prognosis	Advises patients on treatment options	1,2,3,4
Take part in discussions in multi-disciplinary meetings (A)	Understands the indications and limitations of radiotherapy and surgery in both curative and palliative treatment of penile cancer in patients presenting in all stages		1,4

## 2. Radiotherapy treatment (external beam radiotherapy)

Objective	Knowledge	Skills	Assessment
Be able to explain clearly the benefits, side effects and risks of a course of radiotherapy.(A) Be able to seek informed consent for a course of treatment.(A) Be able to seek informed consent for clinical trials (A)	Understands the acute and long term complications of radiotherapy to the penis. Understands the legal aspects and ethics of informed consent for treatment and for clinical trials.	Able to take informed consent for radical and palliative treatment	1,3,4
Be able to determine the target volume for planning radiotherapy to the penis (A)	Understands the clinical and radiological parameters associated with planning radiotherapy . Is competent in the interpretation of diagnostic imaging (including CT and MR) for determination of target volume. Aware of normal tissue morbidity and its impact on target volume definition. Is able to judge how to modify treatment plans based on morbidity.	Able to define a planning target volume for different stages of penile cancer	1,3
Be able to modify treatment plans according to patient's individual needs, pre-morbid conditions etc.(A)	Knows how to judge the relative risks and benefits of dose gradients in the pelvis		1,3
Be able to use special planning modalities including CT planning and BEV planning (A)	Understands the use of cross-sectional imaging in planning radiotherapy to the penis	Able to use CT planning and be aware of the potential for IMRT in the treatment of penile cancer	1,2,3,4
Be able to care for patients undergoing radiotherapy for penile cancer (I)	Understands early reactions to radiotherapy and their management	Able to conduct radiotherapy review and manage early reactions	1,2,3,4
Be able to modify course of treatment for individual patients according to severity of reactions including gaps in treatment (A)	Understands the radiobiology associated with radical radiotherapy for penile cancer		
Be able to participate in protocol development in radiotherapy for penile cancer (A)	Understands developments in radiotherapy research and their application to local protocols		1,4

### 3. Systemic therapy

Objective	Knowledge	Skills	Assessment
Be able to assess patients for appropriate chemotherapy (A)	Is familiar with commonly used systemic agents and their side effects. Knows which regimes are appropriate for use in the clinical situation.	Able to prescribe common therapeutic regimes	1,2,3,4
Be familiar with research developments in drug therapy for penile cancer (A)	Understands the action of chemotherapeutic agents, their limitations and interactions with radiotherapy.		1,2
Be able to modify chemotherapy prescription in the light of major organ dysfunction (A)	Understands pharmacology of drugs used in treatment of penile cancer	Able to prescribe growth factors and other support drugs	1,2,3
Be able to advise on less common therapeutic regimes in particular palliative treatment for recurrent disease (A)	Understands the principles of palliative chemotherapy and the use of cytotoxic agents in heavily pre-treated patients	Able to prescribe less common cytotoxic regimes and hormones	1,2,3
Be able to care for patients having routine adjuvant, concomitant, and palliative chemotherapy (A)	Understands the acute side effects of chemotherapy and its interaction with radiotherapy.	Able to prescribe chemotherapy according to protocol and modify schedules for patients based on individual needs and judge when to continue or stop treatment	1,2,3

### 4. Brachytherapy

Objective	Knowledge	Skills	Assessment
Understand the indications for and principles of brachytherapy in the management of penile cancer (I)	Radiobiological and physical aspects of interstitial brachytherapy in penile cancer.		1,2,5

### 5. Assessment of response and follow-up

Objective	Knowledge	Skills	Assessment
Be able to assess and advise patients attending for follow-up after completion of treatment. Be able to advise on appropriate investigations during follow-up.(I)	Understands the natural history of the illness. Knows the common complications of treatment and how to manage them appropriately	Able to perform clinical examination in patients who have been previously treated for penile cancer	1,2,3,4,5
Be able to recognise less common complications of treatment and how to manage them (A)	Understand the variety of rarer complications of radical treatment and how to differentiate them from recurrence.		1,2,3,4
Be able to diagnose and investigate recurrent disease (I)	Knowledge of natural history of treated penile cancer	Perform full physical examination.	1,2,5
Understand how to manage recurrent disease and its symptoms including palliative treatment and symptom control where indicated.(A)	Understand the roles of radiotherapy, chemotherapy and surgery in the management of recurrence. Understands contribution from palliative care team.	Able to break news of recurrence to patients and discuss appropriate management options	1,2,4

## Urological Cancer : Testicular tumours

### 1. Selection and assessment of patients with all stages of testicular cancer for treatment

Objective	Knowledge	Skills	Assessment
Know how to diagnose and stage cancer of the testes(I)	Understands epidemiology and aetiology of testis cancer  Knows TNM/RMI staging and prognostic groupings for testis cancer  Can recommend appropriate diagnostic and staging investigations for men presenting with suspected testis cancer	Competence in examination of the male genitalia, nodal drainage regions and abdomen.	1,2,3,5
Be familiar with the main histological types of testis cancer and their management (I)	Understands the management of all stages of testis cancer and how its management differs according to stage and histology.	Able to recognise the main histological types of cancer presenting in the testis	1,5
Be able to assess patients for treatment including radiotherapy or chemotherapy (I)	Understands the indications for surveillance, radiotherapy and chemotherapy and their side effects		1,2,3,5
Able to assess prognosis for patients with testis cancer(I)	Knows the effect of stage, age, co-morbidity and histological type on prognosis		1,2,3,5
Able to discuss treatment options in the light of understanding of prognosis (I)	Understands the effects of treatment on prognosis and the influence of tumour stage on choice of therapy	Advises patients on treatment options	1,2,3,4,5
Take part in discussions in multi-disciplinary meetings (A)	Understands the indications and limitations of radiotherapy, chemotherapy and surgery at presentation, at relapse and the role of surgery for post chemotherapy residual masses.		1,4

### 2. Radiotherapy treatment (external beam radiotherapy)

Objective	Knowledge	Skills	Assessment
Be able to explain clearly the benefits, side effects and risks of adjuvant radiotherapy and chemotherapy.(I) Be able to seek informed consent for a course of treatment.(I) Be able to seek informed consent for clinical trials (A)	Understands the acute and long term complications of radiotherapy. Understands the legal aspects and ethics of informed consent for treatment and for clinical trials.	Able to take informed consent for radical and palliative treatment	1,3,4,5
Be able to determine the target volume for planning field for radiotherapy in testicular cancer (I)	Understands the clinical and radiological parameters associated with planning abdomino-pelvic radiotherapy including CT planning	Able to define a planning target volume for adjuvant radiotherapy to a PA	1,3,5

	Is competent in the interpretation of diagnostic imaging (including CT and MR) for determination of target volume. Aware of normal tissue morbidity and its impact on target volume definition. Is able to judge how to modify treatment plans based on morbidity.	strip and dog-leg field.	
Be able to care for patients undergoing radiotherapy for testis cancer (I)	Understands early reactions and their management.	Able to conduct radiotherapy review and manage early reactions	1,2,3,4,5

### 3. Systemic therapy

Objective	Knowledge	Skills	Assessment
Be able to assess patients for appropriate chemotherapy (I)	Is familiar with commonly used cytotoxic regimens.	Able to prescribe common therapeutic regimens	1,2,3,4,5
Be familiar with research developments in drug therapy for testicular cancer (A)	Understands the action of chemotherapeutic agents and their side effects.	Able to take informed consent for cytotoxic chemotherapy	1,2
Be able to modify chemotherapy prescription in the light of major organ dysfunction (A)	Understands pharmacology of drugs used in treatment of testicular cancer	Able to prescribe growth factors and other support drugs	1,2,3
Be able to advise on less common therapeutic regimens in particular palliative treatment for recurrent disease (A)	Understands the principles of monitoring response and adjusting chemotherapy depending on prognostic group and response to treatment both primary and at relapse. Understand the principles and potential role of high dose chemotherapy with PBSC support.	Able to prescribe less common cytotoxic regimens and hormones	1,2,3
Be able to participate in Phase 2 and Phase 3 clinical trials and maintain appropriate research records (A)	Understands the principles of clinical research		1
Be able to care for patients having curative and palliative chemotherapy (I)	Understands the acute side effects of chemotherapy.	Able to prescribe chemotherapy according to protocol and modify schedules for patients based on individual needs and judge when to continue or stop treatment	1,2,3,5

### 4. Assessment of response and follow-up

Objective	Knowledge	Skills	Assessment
Be able to assess and advise patients attending for follow-up after completion of treatment. Be able to advise on appropriate investigations during follow-up.(I)	Understands the natural history of the illness. Knows the common complications of treatment and how to manage them appropriately	Ability to interpret results of imaging techniques and tumour markers.	1,2,3,4,5
Be able to recognise less common complications of treatment and how to manage them (A)	Understand the variety of rarer complications of radical treatment and how to differentiate them from recurrence		1,2,3,4
Be able to diagnose and investigate recurrent disease (I)	Knowledge of natural history of treated testicular cancer	Perform full physical examination.	1,2,5

<p><b>Understand how to manage recurrent disease and its symptoms including palliative treatment and symptom control where indicated.(A)</b></p>	<p>Understand the roles of radiotherapy, chemotherapy and surgery in the management of recurrence. Understands contribution from palliative care team</p>	<p>Able to break news of recurrence to patients and discuss appropriate management options</p>	<p>1.2.4</p>
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## CNS tumours

### 1. Generic neuro-oncology skills

Objective	Knowledge	Skills	Assessment
Can assess patients with brain and spinal tumours (1)	Potential impact of brain and spinal lesions on patients neurological function	Can perform neurological examination of a patient with a brain tumour or spinal cord tumour	1,2,3,4,5
Be familiar with the types of surgery for brain and spinal tumours(1)	Understands the different surgical options for patients with these lesions and the more common potential morbidities	Able, in broad terms, explain surgery to a patient	1,2,4,5
Be able to optimise patients' performance status and quality of life by adjusting steroid dosage (1)	Understands the principals of optimisation of steroid dosage, the acute and long term side-effects of these drugs	Manages patients' steroid dosage effectively	1,2,4,5
Be able to manage patients with seizures (1)	Has knowledge of the indications, pharmacology and side-effects of the commonly used anticonvulsants. Knows when to refer patient for specialist neurology opinion	Manages anticonvulsant therapy	1,2,4,5
Be able to explain clearly the benefits, side effects and risks of a course of radiotherapy. Be able to seek informed consent for a course of treatment. (1)	Knows the process involved in the planning of radiotherapy for tumours of brain and spinal cord (patient positioning and immobilisation, image acquisition etc)  Understands the acute and long term complications of cranial radiotherapy and their relation to dose and volume	Able to take informed consent for radical and palliative treatment of intracranial and spinal tumours	1,2,3,4,5
Be able to care for patients undergoing cranial and spinal radiotherapy (1)	Understands early reactions to cranial and spinal radiotherapy and their management	Able to conduct radiotherapy review and manage early reactions	1,2,3,4,5
Be able to care for patients having routine concomitant, adjuvant and palliative chemotherapy for brain and spinal cord tumours (1)	Understands the acute and long-term side effects of chemotherapy	Able to prescribe chemotherapy according to protocol and modify schedules for patients based on individual needs and judge when to continue or stop treatment	1,2,3,4,5

## CNS tumours: Gliomas

### 1. Selection of patients for treatment

Objective	Knowledge	Skills	Assessment
Basic features of glioma (1)	Understands epidemiology, aetiology and presenting features of the common gliomas of brain and spinal cord (glioblastoma multiforme, anaplastic astrocytoma, grade II glioma, grade I glioma, oligodendroglioma, anaplastic oligodendroglioma)	Able to assess patients with glioma	1,2,5
Be familiar with radiology of glioma (1)	Knows the radiological appearances of the common gliomas on CT and MRI imaging	Able to distinguish the features of the common gliomas	1,2,3,5
Be familiar with the histology of glioma (1)	Knows the histological features of the common types of glioma and how management differs according to these histological types. Knows the common genetic changes seen in glioma and their impact on prognosis and treatment	Able to recognise the main histological features of these lesions Appreciates the different biology and behaviour of these tumours	1,2,5

Be able to assess patients with a glioma for radiotherapy (I)	Understands the indications for radiotherapy for glioma and the evidence underlying the selection of the different fractionation schedules	Able to select optimal treatment for patient	1,2,3,5
Able to assess prognosis for patients with glioma (I)	Knows the effect of age, performance status and histological type on prognosis	Advises patients on prognosis	1,2,3,4,5
Able to discuss treatment options in the light of understanding of prognosis (I)	Understands the effects of treatment on prognosis	Advises patients on treatment options	1,2,3,4,5
Take part in discussions in multi-disciplinary meetings (A)	Understands the indications and limitations of surgery, radiotherapy and chemotherapy in the treatment of glioma	Able to participate in meetings	3

## 2. Radiotherapy treatment (external beam radiotherapy)

Objective	Knowledge	Skills	Assessment
Be able to determine the target volume for planning field for radiotherapy for gliomas (I)	Understands the clinical, pathological and radiological features which dictate the planning target volumes (GTV,CTV, PTV) for cranial and spinal glioma Be conversant with the commonly used radiotherapy techniques e.g. conventional simulation, virtual simulation and 3D conformal planning Is competent in the interpretation of diagnostic imaging (including CT and MR) for determination of target volume. Aware of normal tissue dose constraints and their impact on target volume definition. Is able to judge how to modify treatment plans based on morbidity.	Able to plan treatment for cranial (I) and spinal cord glioma (A)	2,3,5

## 3. Systemic therapy

Objective	Knowledge	Skills	Assessment
Be able to assess patients for appropriate chemotherapy (I)	Is familiar with commonly used drug protocols for glioma and their side effects. Knows the indications for the different chemotherapy protocols used. Has knowledge of the potential benefits and side-effects of intra-operatively placed chemotherapy wafers Understands pharmacology of drugs used in treatment of glioma	Able to prescribe common therapeutic regimes and modify doses where appropriate	1,2,3,4,5
Be familiar with research developments in drug therapy for gliomas (A)	Understands biological premise on which these agents have been are being developed		3
Be able to participate in clinical trials and maintain appropriate research records (A)	Understands the principles of clinical research		1,2,3



#### 4. Assessment of response and follow-up

Objective	Knowledge	Skills	Assessment
Be able to assess and advise patients attending for follow-up after completion of treatment. Be able to advise on appropriate investigations during follow-up. (I)	Understands the natural history of the different types of glioma. Knows the common complications of treatment and how to manage them appropriately		1,2,3,5
Be able to recognise less common complications of treatment and how to manage them (A)	Understand the variety of rarer complications of radical treatment and how to differentiate them from recurrence.		1,2,3,4
Be able to diagnose and investigate recurrent disease (I)	Knowledge of natural history of treated glioma		1,2,5
Understand how to manage recurrent disease and its symptoms including palliative treatment and symptom control where indicated. (I)	Understand the roles of chemotherapy, surgery and palliative care in the management of recurrent glioma. Understands contribution from palliative care team.	Able to break news of recurrence to patients and discuss appropriate management options	1,2,3,4,5

### CNS tumours: Meningiomas and Vestibular Schwannoma (VS)

#### 1. Selection of patients for treatment

Objective	Knowledge	Skills	Assessment
Basic features of meningiomas and VS (I)	Understands epidemiology, aetiology and presenting features of meningiomas and VS		1,2,5
Be familiar with radiology of meningiomas (A)	Knows the radiological appearances of meningiomas and VS on CT and MRI imaging	Able to distinguish the features of meningioma and VS	1,2,3,5
Be familiar with the histological features of meningiomas (A)	Knows the histological features of the common types of meningiomas and how management differs according to these histological types	Able to recognise the main histological features of these lesions Appreciate the different biology and behaviour of these tumours	1,2
Be able to assess patients for radiotherapy (A)	Understands the indications for radiotherapy and the common radiotherapy schedules used. Understands the role of stereotactic radiotherapy for these lesions	Able to select optimal treatment for patient	1,2,3,4
Able to assess prognosis for patients with meningiomas and VS (A)	Knows the effect of histological type, age, performance status and co-morbidity on prognosis and treatment selection	Advises patient on prognosis and treatment	1,2,3,4
Take part in discussions in multi-disciplinary meetings (A)	Understands the indications and limitations of surgery and radiotherapy in the treatment of meningioma and VS	Able to participate in meetings	2,3

## 2. Radiotherapy treatment (external beam radiotherapy)

Objective	Knowledge	Skills	Assessment
Be able to determine the target volume for planning field for radiotherapy for meningioma (A)	Understands the clinical, histological and radiological parameters used to determine the target volumes (GTV,CTV,PTV) for meningiomas Is competent in the interpretation of diagnostic imaging (including CT and MR) for determination of target volumes. Aware of normal tissue tolerance doses, morbidity and its impact on target volume definition. Is able to judge how to modify treatment plans based on morbidity. Knows how to judge the relative risks of injury to critical structures	Able to define a treatment volume for meningioma  Able to use CT planning in the treatment of meningioma	2,3

## 3. Assessment of response and follow-up

Objective	Knowledge	Skills	Assessment
Be able to assess and advise patients attending for follow-up after completion of treatment. Be able to advise on appropriate investigations during follow-up. (A)	Understands the natural history of meningiomas and VNS. Knows the common complications of treatment and how to manage them appropriately		1,2
Be able to diagnose and investigate recurrent disease (A)	Knowledge of natural history of treated and untreated meningioma and VS		1,2
Understand how to manage recurrent disease and its symptoms including palliative treatment and symptom control where indicated. (A)	Understand the roles of surgery, stereotactic radiotherapy and palliative care in the management of recurrence. Understands contribution from palliative care team	Able to break news of recurrence to patients and discuss appropriate management options	1,2,3,4

## CNS tumours: pituitary adenoma and craniopharyngiomas

### 1. Selection of patients for treatment

Objective	Knowledge	Skills	Assessment
Basic features of pituitary adenoma and craniopharyngiomas (I)	Understands epidemiology and presenting features of pituitary adenoma and craniopharyngiomas	Able to assess a patient presenting with a pituitary adenoma or craniopharyngioma	1,2,3,5
Be familiar with radiology of pituitary adenoma and craniopharyngiomas (I)	Knows the radiological appearances of pituitary adenoma and craniopharyngiomas on CT and MRI imaging	Able to distinguish the common features of pituitary adenoma and craniopharyngiomas	1,2,3,5
Be familiar with the main histological features of pituitary adenoma and craniopharyngiomas (I)	Knows the main histological features of secreting and non-secreting pituitary adenoma and of craniopharyngiomas	Able to recognise the main histological features of these lesions Appreciate the different biology and behaviour of these tumours	1,2,5
Be able to assess patients for radiotherapy (I)	Understands the indications for radiotherapy and the acute and long-term side effects Knows commonly used radiotherapy schedules for these lesions	Able to select optimal treatment for patient	1,2,3,4,5
Able to discuss treatment options in the light of understanding of side-effects (I)	Understands the benefits and potential toxicities of radiotherapy	Advises patients on treatment options	1,2,3,4,5

Take part in discussions in multi-disciplinary meetings (A)	Understands the indications and limitations of surgery, radiotherapy and drug treatment in the management of pituitary adenoma and craniopharyngiomas	Able to participate in meetings	3,4
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## 2. Radiotherapy treatment (external beam radiotherapy)

Objective	Knowledge	Skills	Assessment
Be able to determine the target volume for planning field for radiotherapy for pituitary adenomas and craniopharyngiomas (I)	Understands the clinical and radiological parameters associated with planning of radiotherapy for pituitary adenomas and craniopharyngiomas Is competent in the interpretation of diagnostic imaging (including CT and MR) for determination of target volume.	Able to define a treatment volume for pituitary adenoma and craniopharyngiomas	2,3,5

## 3. Assessment of response and follow-up

Objective	Knowledge	Skills	Assessment
Be able to assess and advise patients attending for follow-up after completion of treatment. Be able to advise on appropriate investigations during follow-up.(I)	Understands the natural history of pituitary adenomas and craniopharyngiomas. Knows the common complications of treatment and how to manage them appropriately Able to monitor routine hormone replacement but knows when to refer for specialist endocrinology opinion		2,3,4,5

## CNS tumours: ependymomas

### 1. Selection of patients for treatment

Objective	Knowledge	Skills	Assessment
Basic features and diagnosis of ependymomas (I)	Understands epidemiology and basic clinical features of supra-tentorial, infra-tentorial and spinal Grade I, II and III ependymomas Knows the staging procedures required for ependymomas	Knows how to assess a patient with an ependymoma	1,2,5
Be familiar with radiology of ependymomas (A)	Knows the radiological appearances of the ependymomas on CT and MRI imaging	Able to distinguish the features of ependymomas	1,2
Be familiar with the histological features of ependymomas (A)	Knows the histological features of ependymoma	Able to recognise the main histological features of these lesions Appreciate the different biology and behaviour of these tumours	1,2
Be able to assess patients for radiotherapy (A)	Understands the indications for radiotherapy and the evidence underlying the selection of the treatment volume	Able to select optimal treatment for patient	1,2
Able to assess prognosis for patients with ependymomas (A)	Knows the effect of age, performance status, extent of surgery and histological type on prognosis	Advise patients on prognosis	1,2,4
Take part in discussions in multi-disciplinary meetings (A)	Understands the indications and limitations of radiotherapy, chemotherapy and surgery in the treatment of ependymoma	Able to participate in meetings	3

## 2. Radiotherapy treatment (external beam radiotherapy)

Objective	Knowledge	Skills	Assessment
Be able to determine the target volume for planning radiotherapy for ependymomas (A)	Understands the clinical, pathological and radiological features which dictate the radiotherapy volume Be conversant with the commonly used techniques e.g. cranial, spinal and cranio-spinal radiotherapy Is competent in the interpretation of diagnostic imaging (including CT and MR) for determination of target volume. Aware of normal tissue dose constraints and morbidity, and its impact on target volume definition. Is able to judge how to modify treatment plans based on morbidity	Able to define a planning target volume for the various grades and locations of ependymomas  Able to use CT planning in the treatment of ependymomas	1,2

## 3. Systemic therapy

Objective	Knowledge	Skills	Assessment
Use of chemotherapy in ependymomas (A)	Be aware of the limitations of chemotherapy in the treatment of ependymoma		1,2

## 4. Assessment of response and follow-up

Objective	Knowledge	Skills	Assessment
Be able to assess and advise patients attending for follow-up after completion of treatment. Be able to advise on appropriate investigations during follow-up. (A)	Understands the natural history of ependymoma. Knows the common complications of treatment and how to manage them appropriately		1,2
Be able to diagnose and investigate recurrent disease (A)	Knowledge of natural history of treated ependymoma		1,2
Understand how to manage recurrent disease and its symptoms including palliative treatment and symptom control where indicated. (A)	Understand the roles of chemotherapy, surgery, stereotactic radiotherapy and palliative care in the management of recurrence	Able to break news of recurrence to patients and discuss appropriate management options	1,2,4

## CNS tumours: pineal lesions

### 1. Selection of patients for treatment

Objective	Knowledge	Skills	Assessment
Basic features and diagnosis of pineal lesions (1)	Understands epidemiology and presenting features of pineal tumours (germinomas, teratomas, pineocytomas and pineoblastoma). Knows the staging procedures required for these lesions	Able to clinically assess patient with a pineal tumour	1,2,5

Be familiar with radiology of pineal lesions (A)	Knows the radiological appearances of these lesions on CT and MRI imaging	Able to distinguish the features of the pineal lesions	1,2
Be familiar with the histological features of pineal lesions (A)	Knows the main histological features of pineal lesions	Able to recognise the main histological features of these lesions Appreciate the different biology and behaviour of these tumours	1,2
Be able to assess patients for chemotherapy and radiotherapy (A)	Understands the indications for chemotherapy and/or radiotherapy for germ cell lesions.	Able to select optimal treatment for patient	1,2
Able to assess prognosis for patients with pineal lesion (A)	Knows the effect of histological type on prognosis	Advises patients on prognosis	1,2,3,4
Take part in discussions in multi-disciplinary meetings (A)	Understands the indications for chemotherapy and/or radiotherapy in the treatment of pineal lesions	Able to participate in meetings	3

## 2. Radiotherapy treatment (external beam radiotherapy)

Objective	Knowledge	Skills	Assessment
Be able to determine the target volume for planning field for radiotherapy for intra-cranial germ cell lesions (A)	Understands the clinical, pathological and radiological features which dictate the choice of radiotherapy volume Be conversant with the commonly used techniques craniospinal, ventricular and involved field radiotherapy Is competent in the interpretation of diagnostic imaging (including CT and MR) for determination of target volume. Aware of normal tissue dose constraints and their impact on target volume definition. Is able to judge how to modify treatment plans based on morbidity.	Able to plan cranio-spinal, ventricular and involved field radiotherapy	2,3

## 3. Systemic therapy

Objective	Knowledge	Skills	Assessment
Be able to assess patients for appropriate chemotherapy (A)	Is familiar with commonly used drug protocols for intra-cerebral germ cell lesions and their side effects. Understands pharmacology of drugs used in treatment of germ cell lesions	Able to prescribe common therapeutic regimens Able to modify regimens appropriately	1,2,3,4

## 4. Assessment of response and follow-up

Objective	Knowledge	Skills	Assessment
Be able to assess and advise patients with pineal lesions attending for follow-up after completion of treatment. Be able to advise on appropriate investigations during follow-up. (A)	Understands the natural history of the illness. Knows the common complications of treatment and how to manage them appropriately	Able to perform neurological examination in patients with pineal lesion	1,2,3,4

## CNS tumours: Primitive neuro-ectodermal tumours of the CNS

### 1. Selection of patients for treatment

Objective	Knowledge	Skills	Assessment
Basic features and diagnosis of CNS PNET (A)	Understands epidemiology and clinical features of the common types of CNS primitive neuro-ectodermal (CNS PNET) lesions (medulloblastoma, pineoblastoma and supra-tentorial PNET)	Able to assess a patient presenting with a CNS PNET	1,2
Be familiar with radiology of CNS PNET (A)	Knows the radiological appearances of CNS PNET on CT and MRI imaging	Able to distinguish the features of medulloblastoma	1,2
Be familiar with the histological features of CNS PNET (A)	Knows histological features of medulloblastoma and the other CNS PNETs and the indications for the different treatment options. Understands the staging procedures required for medulloblastoma	Able to recognise the main histological features of PNETs Appreciate the different biology and behaviour of these tumours	1,2
Be able to assess patients with CNS PNET for radiotherapy +/- chemotherapy (A)	Understands the indications for radiotherapy and the possible role for chemotherapy.	Able to select optimal treatment for patient	1,2
Able to assess prognosis for patients with CNS PNET (A)	Knows the effect of age, performance status and extent of resection on prognosis		1,2,3
Take part in discussions in multi-disciplinary meetings (A)	Understands the indications and limitations of radiotherapy, chemotherapy and surgery in the treatment of CNS PNETS	Able to participate in meetings	3

### 2. Radiotherapy treatment (external beam radiotherapy)

Objective	Knowledge	Skills	Assessment
Be able to determine the target volume for planning field for radiotherapy for CNS PNETS (A)	Understands the clinical and radiological parameters associated with planning radiotherapy for medulloblastoma and other CNS PNETS	Able to plan crano-spinal radiotherapy and define a posterior fossa boost for medulloblastoma	2

### 3. Systemic therapy

Objective	Knowledge	Skills	Assessment
Be able to assess patients with CNS PNET for chemotherapy	Is familiar with the issues regarding the use of chemotherapy in the treatment of adult and paediatric medulloblastoma		1,2

### 4. Assessment of response and follow-up

Objective	Knowledge	Skills	Assessment
Be able to assess and advise patients with CNS PNET attending for follow-up after completion of treatment. Be able to	Understands the natural history of the illness. Knows the common complications of treatment and how to manage them appropriately		1,2,4

advise on appropriate investigations during follow-up. (A)			
Be able to diagnose and investigate recurrent disease (A)	Knowledge of natural history of treated CNS PNETs		1,2
Understand how to manage recurrent disease and its symptoms including palliative treatment and symptom control where indicated. (A)	Understand the roles of surgery, chemotherapy, stereotactic radiotherapy and palliative care in the management of recurrence	Able to break news of recurrence to patients and discuss appropriate management options	1,2,4

## CNS tumours: primary cerebral lymphoma

### 1. Selection of patients for treatment

Objective	Knowledge	Skills	Assessment
Be able to diagnose primary cerebral lymphoma (A)	Understands epidemiology and aetiology of primary cerebral lymphoma (PCNSL)	Able to assess a newly diagnosed patient with PCNSL	1,2,3
Be familiar with radiology of PCNSL (A)	Knows the radiological appearances of PCNSL on CT and MRI imaging	Able to distinguish the features of the common PCNSL	1,2
Be familiar with the histological of PCNSL (A)	Knows histological features of primary cerebral lymphoma Understands the staging procedures required for PCNSL	Able to recognise the main histological features of PCNSL. Appreciate the different biology and behaviour of these tumours	1,2
Be able to assess patients for chemotherapy and/or radiotherapy for PCNSL (A)	Understands the indications for chemotherapy and the different protocols used. Understands the indications for primary and post-chemotherapy radiotherapy in PCNSL	Able to select optimal treatment for patient	1,2,3,4
Able to assess prognosis for patients with PCNSL (A)	Knows the effect of age, performance status and immune status on prognosis	Advises patient on prognosis	1,2,3,4
Able to discuss treatment options in the light of understanding of prognosis in PCNSL (A)	Understands the effects of treatment on prognosis Understands the issues of potential long term morbidity of cranial radiotherapy in PCNSL	Advises patients on treatment options	1,2,3,4
Take part in discussions in multi-disciplinary meetings (A)	Understands the indications and limitations of radiotherapy, chemotherapy and surgery in the treatment of PCNSL	Able to participate in meetings	3

### 2. Radiotherapy treatment (external beam radiotherapy)

Objective	Knowledge	Skills	Assessment
Be able to determine the target volume for planning field for radiotherapy for PCNSL (A)	Understands the clinical and radiological parameters associated with planning radiotherapy for PCNSL	Able to define a treatment volume for PCNSL	2,3

### 3. Systemic therapy

Objective	Knowledge	Skills	Assessment
Be able to assess patients with PCNSL for chemotherapy (A)	Is familiar with commonly used drug protocols and their side effects. Understands pharmacology of drugs used in treatment of PCNSL Is familiar with the management of patients receiving intrathecal treatment	Able to prescribe common therapeutic regimes	2,3



#### 4. Assessment of response and follow-up

Objective	Knowledge	Skills	Assessment
Be able to assess and advise patients with PCNSL attending for follow-up after completion of treatment. Be able to advise on appropriate investigations during follow-up. (A)	Understands the natural history of the illness. Knows the common complications of treatment and how to manage them appropriately		1,2,4
Be able to diagnose and investigate recurrent PCNSL. (A)	Knowledge of natural history of treated PCNSL.		1,2

### CNS tumours: solitary and multiple brain metastases

#### 1. Selection of patients for treatment

Objective	Knowledge	Skills	Assessment
Basic features of brain metastases (I)	Understands epidemiology, aetiology and presenting features of the common disease sites that metastasize to the brain.	Can perform neurological examination of a patient with a brain metastases	1,2,3,4,5
Be familiar with radiology of metastases (I)	Knows the radiological appearances of metastases and the importance of MRI in establishing if lesions are solitary	Able to distinguish the features of brain metastases	1,2,5
Be familiar with the presentation of solitary and multiple metastases (I)	Knows the histological features of the common types of metastases. Understands how management is influenced by the time interval from primary disease, performance status of the patient and absence (or stability) of systemic disease and the importance of restaging for systemic disease	Able to recognise the main features of these lesions. Appreciates the different biology and behaviour of different tumour sites. Understands the restaging assessments needed prior to considering treatment	1,2,3,5
Be familiar with the types of surgery for metastases (I)	Understands the different surgical options for patients with solitary and multiple metastases and the common potential morbidities	Able, in broad terms, explain surgery for patients with metastases	1,2,3,5
Be able to assess patients for radiotherapy (I) and to understand the principles of stereotactic radiotherapy (A)	Understands the indications for stereotactic radiotherapy and the role of whole brain radiotherapy. Understands the principles of stereotactic localisation. Understands the use of steroid in preparation for radiosurgery. Aware of the differences between LINAC based SRT and the gamma knife	Able to select optimal treatment for patient	1,2
Able to assess prognosis for patients with solitary and multiple metastases (I)	Knows the effect of age, performance status and status of systemic disease on prognosis	Advises patients on prognosis	1,2,3,5
Able to discuss treatment options in the light of understanding of prognosis (I)	Understands the effects of treatment on prognosis	Advises patients on treatment options	1,2,3,4,5
Take part in discussions in multi-disciplinary meetings (A)	Understands the indications and limitations of surgery, radiotherapy in the management of solitary and multiple metastases. Understands contribution from palliative care team	Able to participate in meetings	3



## Skin Cancer : Basal cell carcinoma and squamous carcinoma (Non-Melanoma Skin Cancer - NMSC)

### 1. Selection and assessment of patients for radiotherapy.

Objective	Knowledge	Skills	Assessment
Be able to diagnose primary NMSC (I)	Understands epidemiology and risk factors for non-melanoma skin cancer  Is able to recognise a typical NMSC and distinguish it from common benign skin lesions.	Able to recognise a typical basal cell carcinoma and distinguish it from common benign skin lesions	1,2,5
Be familiar with the main variants of NMSC (I)	Understands the different appearances of basal cell carcinoma and squamous cancer of the skin  Understands the role of histological assessment	Requests biopsy appropriately and correctly interprets the results of histology	1,2,5
Be able to assess patients for radical radiotherapy (I)	Understands the indications and contraindications for radiotherapy  Takes into account age, skin type, co-morbidity, tumour site and size	Advises patient appropriately on the role of radiotherapy	1,2,5
Take part in discussions in multi-disciplinary meetings (A)	Understands the indications for and limitations of radiotherapy, plastic surgery and dermatological techniques in the management of basal cell carcinoma	Advises patient on treatment options	1,2

### 2 Radiotherapy treatment (external beam radiotherapy)

Objective	Knowledge	Skills	Assessment
Be able to explain clearly the benefits, side effects and risks of a course of radiotherapy.(I) Be able to seek informed consent for a course of treatment.(I) Be able to seek informed consent for clinical trials (A)	Understands the acute radiation reaction and the long term cosmetic effects of treatment Understands the legal aspects and ethics of informed consent for treatment and for clinical trials.	Able to take informed consent for radiation treatment	1,2,5
Be able to determine the target volume and treatment margins for radiotherapy(I)	Understands how to plan external beam radiotherapy using photons and electrons Is able to judge how to modify treatment plans based on patient and tumour factors  Chooses appropriate machine energy, modality, dose, fractionation, shielding	Able to plan treatment appropriately	1,2,5
Be able to care for patients undergoing radiotherapy for NMSC (I)	Understands early reactions to skin irradiation, and their management	Able to conduct radiotherapy review and manage early reactions	1,2,5

### 3 Assessment of response and follow-up

Objective	Knowledge	Skills	Assessment
Be able to assess and advise patients attending for follow-up after the completion of treatment (I)	Understands the natural history of the illness. Knows the common complications of treatment and how to manage them appropriately	Able to recognise complete response Able to recognise the normal cosmetic results of treatment	1,2,5
Be able to diagnose and manage recurrent disease (I)	Knowledge of risk or recurrence of necrosis	Able to recognise possible recurrence or necrosis	1,2,5
Understand how to manage recurrent disease (A)	Understand the roles of alternative modalities of treatment in recurrent persistent disease, and the role of the MDI	Able to break news of recurrence to patients and discuss appropriate management options	1,2,

## Skin Cancer : Malignant Melanoma

### 1. Selection and assessment of patients for treatment

Objective	Knowledge	Skills	Assessment
Be able to diagnose primary malignant melanoma (I)	Understands epidemiology and risk factors for malignant melanoma  Is able to recognise a typical malignant melanoma and distinguish it from common benign skin lesions.	Able to recognise a typical malignant melanoma and distinguish it from common benign skin lesions	1,2,5
Take part in discussions in multi-disciplinary meetings (A)	Understands the indications for and limitations of surgical techniques in the management of malignant melanoma including management of the primary tumour and regional nodes eg node dissection, sentinel node biopsy.	Advices patient on treatment options	1,2

### 2. Systemic therapy

Objective	Knowledge	Skills	Assessment
Be able to assess patients for appropriate chemotherapy, biological therapy and immunotherapy in both adjuvant setting and metastatic disease (I)	Is familiar with commonly used drug protocols and their side effects. Knows which regimes are appropriate for use in the clinical situation.	Able to prescribe common therapeutic regimes	1,2,3,4,5
Be familiar with research developments in drug therapy for melanoma (A)	Understands the action of chemotherapeutic agents, their limitations and interactions with radiotherapy		1,2
Be able to modify chemotherapy prescription in the light of major organ dysfunction (A)	Understands pharmacology of drugs used in treatment of melanoma	Able to prescribe growth factors and other support drugs	1,2,3
Be able to advise on less common therapeutic regimes in particular palliative treatment for recurrent disease (A)	Understands the principles of palliative chemotherapy and the use of cytotoxic agents in heavily pre-treated patients and patients with significant co-morbidities	Able to prescribe less common cytotoxic regimes	1,2,3
Able to participate in Phase 2 and Phase 3 clinical trials and	Understands the principles of clinical research		1

maintain appropriate research records (A)			
Able to care for patients having chemotherapy (I)	Understands the acute side effects of chemotherapy and its interaction with radiotherapy.	Able to prescribe chemotherapy according to protocol and modify schedules for patients based on individual needs and judge when to continue or stop treatment	1,2,3,5

## Skin cancer :Cutaneous Lymphoma

### 1. Assessment of patients with Cutaneous Lymphoma

Objective	Knowledge	Skills	Assessment
Be able to diagnose and stage Cutaneous Lymphoma (A)	Understands histopathological classification of Cutaneous Lymphoma.  Understands epidemiology.  Knows the staging systems for both B and T cell cutaneous lymphomas.  Understands prognostic factors	Able to examine and accurately document the full extent of skin involvement.  Able to examine other relevant organs including the lymphatic system  Interpretation of x-rays and CT scan images  Can recommend appropriate diagnostic and staging investigations	1,2,5
Be able to assess patients for appropriate therapy (I)	Understands the management of the both B and T cell cutaneous lymphomas  Understands potential toxicity of therapy including skin directed, (including PUVA and radiotherapy) and systemic therapy.  Understands the role of multidisciplinary working with dermatology and haematology.	Clinical assessment, including assessing comorbidity and its effect on outcome	1,2,5
Be able to discuss treatment options (A)	Understands prognosis and how treatment affects this	Advise patient on appropriate management	1,2,3,4
Take part in MDM discussions(A)	Understands indications for and limitations of treatment for cutaneous lymphomas	MDM interaction	1,2,3,4

### 2. Systemic Therapy

Objective	Knowledge	Skills	Assessment
Be able to assess patients for systemic treatment including chemotherapy, steroids, interferon and retinoids (A)	Knowledge of common drug protocols for cutaneous lymphomas, B and T cell, low and high grade, and their toxicity  Understand which regimes are appropriate in which clinical situation	Clinical Assessment	1,2
Look after patients undergoing radical and palliative treatment regimes (A)	Understands the acute side-effects of systemic treatments used including chemotherapy	Able to prescribe common chemo protocols, interferon and retinoids (in cooperation with a dermatologist) modify	1,2,3

		prescriptions, judge when to stop or continue treatment, and prescribe supportive treatment eg. Antibiotics	
Be able to modify drug prescription in the light of response and side effects (A)	Understands the pharmacology of drugs used in the treatment of cutaneous lymphomas	Able to adjust dose as appropriate	1,2,4
Be familiar with research developments in cutaneous lymphomas (A)	Knows details of recently published and ongoing research	Able to discuss involvement in clinical trials	2,4
Be able to participate in ph I, II and III trials and maintain appropriate research records (A)	Understands the principles of clinical research		2,3,6

### 3. Skin Directed Treatment, including Radiotherapy

Objective	Knowledge	Skills	Assessment
Be able to assess patients suitability for skin directed treatments including topical medication, PUVA and radiotherapy(A)	Understand benefits, side effects and risks of topical medication (including steroids and chemotherapy), PUVA and radiotherapy.	Multidisciplinary team working with dermatology  Obtain informed consent	1,2,3
Be able to plan radiotherapy treatment, including use of SXT, electrons and total skin electron treatment (A)	Aware of indications for SXT and electrons and mould room preparation required. Aware of appropriate dose fractionation regimes Aware of acute and late normal tissue reactions.	Plan radiotherapy using electrons or SXT with appropriate shielding of normal tissues.	1,2,3
Be able to manage and care for patients undergoing Total Skin electron treatment (A)	Understands physics and radiobiology of Total skin electrons. Understands early reactions to total skin electrons and their management	Clinic review of on-treatment patients and management of early reactions	1,2
Be able to enter patients into clinical trials (A)	Good knowledge of rationale for on-going clinical trials	Obtain consent for entry into clinical trials	1,2,3
Be able to modify treatment plans according to patients individual needs pre-morbid conditions etc (A)	Judge relative risks and benefits	Prescribe and review treatment	1,2,3

### 4. Assessment of response and follow up

Objective	Knowledge	Skills	Assessment
Be able to assess response to systemic and skin directed treatments (A)	Knowledge of clinical features of cutaneous lymphoma related to stage and histological subtype.	Discuss response and current disease status with patients in clinic	1,2
Be able to advise on follow-up schedule and appropriate investigations (A)	Understanding of natural history of cutaneous lymphoma related to stage and histological subtype.	Able to clinically assess cutaneous lymphoma and distinguish from other skin conditions	1,2

Objective	Knowledge	Skills	Assessment
Be able to recognise and manage long-term toxicity (A)	Knowledge of late effects of treatment	Detect at follow-up	1,2
Be able to manage advanced disease (A)	Understanding the roles of chemotherapy, radiotherapy and supportive measures in the management of advanced disease	Breaking bad news, Integration of palliative, supportive care	1,2,4

## Lymphomas and leukaemias including myeloma, Hodgkin's and non-Hodgkin's Lymphoma

### 1. Selection and assessment of patients with NHL and Hodgkin's Lymphoma for treatment.

Objective	Knowledge	Skills	Assessment
To relate clinical and radiological anatomy to diagnosis and therapy (I)	Understand clinical and radiological anatomy	Be able to identify anatomical landmarks, key structures including vessels, lymph nodes on CT and MRI	1, 3, 5
Be able to diagnose and stage NHL and Hodgkin's Lymphoma (I)	Understands epidemiology and aetiology of NHL and HL.  Knows the indications for urgent referral by GP.  Knows the staging and prognostic indices used in the management of NHL and HL.  Understands the technique and limitations of histology- and of immuno-histo-chemistry and other specialist techniques in lymphoma diagnosis.	Examination in out-patients clinic with particular attention to lymph nodes sites.  Able to interpret X-ray, CT, MRI and PET imaging  Can recommend appropriate diagnostic and staging investigations for patients presenting with suspected NHL and HL.	1,2,3,5
Be able to assess patients for radical radiotherapy (I)  Be able to assess patients for combined modality therapy (A)  Be able to assess patients for palliative treatment (I)	Understands the indications for radical radiotherapy in NHL and HL and its side effects  Understands literature on combined modality therapy in NHL and HL and the circumstances in which this might be considered  Knows stage and scoring systems and their value in predicting prognosis  Understands benefits and toxicity of palliative treatment with both radiotherapy and chemotherapy	Able to assess performance state (WHO or Karnofsky)  Able to discuss the role of radiotherapy and risk/benefit with individual patients	1,2,3,5
Able to assess prognosis for patients with NHL and Hodgkin's Lymphoma (I)	Knows the effect of performance state, stage, age, co-morbidity and histological type on prognosis		1,2,3,5
Able to discuss treatment options in the light of understanding of prognosis (I)	Understands the effects of treatment on prognosis	Able to inform patients on treatment options and discuss individual risk/benefit	1,2,3,4,5
Take part in discussions in multi-disciplinary meetings (A)	Understands the indications for treatment of HL, and the risks and benefits of different treatment options	Can contribute to MDT discussions	1,3,4

### 2. Systemic therapy in the management of NHL and Hodgkin's Lymphoma

Objective	Knowledge	Skills	Assessment
Be able to assess patients for chemotherapy (I)	Knowledge of common drug protocols for NHL and HL and their toxicity  Understand which regimes are appropriate in the clinical situation	Clinical Assessment	1,2,5

Look after patients undergoing radical and palliative treatment regimes (I)	Understands the acute side-effects of chemotherapy	Able to prescribe common chemo protocols, modify prescriptions, judge when to stop or continue treatment, and prescribe supportive treatment eg. Antibiotics	1,2,3
Be familiar with research developments in NHL and HL (A)	Knows details of recently published and ongoing trials	Able to discuss involvement in clinical trials	2,4
Be able to participate in phase I, II and III trials and maintain appropriate research records (A)	Understands the principles of clinical research		2,3,6

### 3. Radiotherapy treatment in the management of NHL and Hodgkin's Lymphoma

Objective	Knowledge	Skills	Assessment
Be able to explain clearly the benefits, side effects and risks of a course of radiotherapy.(I)	Understands the acute and long term risks complications of radiotherapy and their relation to dose and volume irradiated	Able to communicate about these issues with the patient.  Able to take informed consent	1,3,4,5
Be able to determine the target volume for radiotherapy in NHL and HL (I)	Is competent in the interpretation of diagnostic imaging (including CT, PET and MR) for determination of target volume.  Understands the clinical and radiological parameters associated with planning 2D conventional and 3D conformal radiotherapy.  Understands the issues in defining target volume for those patients who have received initial chemotherapy which has resulted in tumour response	Able to define a treatment volume for NHL and HL.  Can define DVH (dose volume histogram) based 3D conformal planning constraints.	1,2,3,5
Be able to advise on and prescribe palliative radiotherapy in NHL and HL (A)	Understand that wide field radiotherapy may rarely be an appropriate second line therapy which in rare cases does cure NHL and HL patients  Understands the palliative role of radiotherapy in NHL and HL.	Able to define the appropriate treatment volume for second line therapy or for palliation	1,2
Be able to prescribe appropriate dose and fractionation schedule for palliative and radical radiotherapy (I)	Understands evidence base for dose fractionation schedules commonly used in NHL and HL	Is able to define appropriate treatment schedule according to stage of disease, performance status of patients and concomitant systemic therapy	1,3,4,5
Be able to modify treatment plans according to patient's individual needs, pre-morbid conditions etc.(A)	Aware of normal tissue morbidity and its impact on target volume definition.  Understands risks of re-treatment with radiation based on normal tissue tolerance limits	Is able to judge how to modify treatment plans based on patient co-morbidity.  Able to assess when re-treatment is acceptable and prescribe appropriate dose and fractionation	1,3

Be able to use special planning modalities including CT planning and BEV planning (A)	Understands the use of cross-sectional imaging in planning NHL and HL radiotherapy (I)	Able to use CT planning in the treatment of NHL and HL.	1,2,3,4
Be able to verify treatment plan (A)	Understands use of digitally reconstructed radiographs and beam's eye views Understands use of portal imaging	Able to assess accuracy of patient set-up and recommend adjustments	1,2,3
Be able to care for patients undergoing radiotherapy for NHL and HL (I)	Understands early reactions to radiotherapy and their management	Able to conduct radiotherapy review and manage early reactions	1,2,3,4,5
Be able to modify course of treatment for individual patients according to severity of reactions including adjustments for gaps in treatment (I)	Understands the radiobiology associated with radical radiotherapy and its importance in the management of NHL and HL.		
Be able to participate in protocol development in radiotherapy for NHL and HL (A)	Understands developments in radiotherapy research and their application to local protocols		1,4

#### 4. Management of relapsed Hodgkin's and Non-Hodgkin's Lymphoma

Objective	Knowledge	Skills	Assessment
To be able to diagnose relapse of Hodgkin's and NHL	Knowledge of signs and symptoms of relapse, markers and imaging To understand the indications for node/tissue biopsy where appropriate and restaging	Examination in out-patient clinics Able to interpret imaging (CT, MRI, PET, US) Can recommend appropriate diagnostic and staging investigations for patients suspected of having relapsed Hodgkin's and NHL.	1,2,3,5
Take part in treatment discussions in multi-disciplinary meetings (A)	Understands the indications for 2 <sup>nd</sup> line treatments in relapsed Hodgkin's and NHL and the risks and benefits of different treatment options	Can contribute to MDT discussions	1,3,4
Be able to assess patients for appropriate 2 <sup>nd</sup> line chemotherapy (I)  Able to adjust choice of chemotherapy regimen according to patient fitness (A)	Is familiar with 2 <sup>nd</sup> line drug protocols and their side effects. Including antibody therapy, high dose chemotherapy and bone-marrow transplant, and mini-allograft Understand different patient motives (coping, survival enhancement, quality of life improvement) for receiving chemotherapy (A) Understand the literature of which regimes are appropriate for use in relapsed lymphoma. This should include knowledge of appropriate regimes in pre-treated patients, the elderly, those with comorbidity and the PS2 patient	Able to prescribe common therapeutic regimes. Able to assess patient's fitness eg by ECOG performance status  Able to assess and discuss whether outcomes of therapy are meeting patients' needs (A)	1,2,3,5  1,2
Be able to assess patients for radical	Understands the indications for radiotherapy in relapsed Hodgkin's and NHL and its side effects	Able to assess performance status	1,2,3,5



or palliative radiotherapy in relapsed Hodgkin's and NHL. (I)	Understands the radiobiological consequences of retreatment if appropriate	Able to discuss the role of radiotherapy and risk benefit with individual patients	
Be familiar with research developments in drug therapy for relapsed Hodgkin's and NHL. (A)	Is aware of recent literature and licensing status of new agents to allow a full discussion of options Knowledge of reliable sources of information for patients to access eg BACUP, NCI website.	Able to discuss developments in treatment knowledgeably, or know where to direct patients to find information	1,2,6
Be able to modify chemotherapy prescription in the light of toxicity (I)	Understands pharmacology of drugs used in treatment of NHL and Hodgkin's lymphoma Understands when it is inappropriate to prescribe chemotherapy due to risk of toxicity.	Able to prescribe growth factors and other support drugs and able to dose reduce if appropriate. Able to organise and interpret investigations such as EDTA MUGA	1,2,3,5
Be able to identify when patients with relapsed lymphoma require referral to a tertiary centre (A)	Understand the indications for super-specialist intervention or advice for patients with relapsed lymphoma, eg high dose chemotherapy with ASCT, or radiolabelled monoclonal therapy	Able to discuss indications and procedure from knowledge of literature and protocols	1,2,3,5
Be able to participate in Phase 1, Phase 2 and Phase 3 clinical trials (A)	Understands the principles of clinical research. Understands the risk benefit ratio to individual patient.	Able to obtain informed consent for a clinical trial. Able to record toxicity and response accurately.	1,2,6
Be able to assess response to chemotherapy (I).	Understands the aim of treatment and is able to assess response according to recognised criteria	Able to prescribe chemotherapy according to protocol and modify schedules for patients based on individual needs and judge when to continue or stop treatment	1,2,3,5
Be able to recognise when further/continuing chemotherapy is inappropriate (A)	Understands the palliative care options available to a patient who is not responding to tolerating chemotherapy	Breaking bad news. Integration of palliative, supportive care.	1,2,4

## Plasma cell tumours – Plasmacytoma and multiple myeloma

### 1. Assessment of patients with Plasma cell tumours – Solitary Plasmacytoma of Bone (SPB), Solitary Extramedullary Plasmacytoma (SEP) and multiple myeloma (MM)

Objective	Knowledge	Skills	Assessment
Be able to diagnose and stage plasma cell tumours (I)	Understands histological features of plasma cell tumours and biochemical markers  Knows staging system required to distinguish Solitary Plasmacytoma of Bone (SPB) and Solitary Extramedullary Plasmacytoma (SEP) from multiple myeloma (MM)  Understands natural history of plasma cell tumours and prognostic factors	Interpretation of X-rays and CT scan images  Can recommend appropriate diagnostic and staging investigations	1,2,5

Be able to assess patients for appropriate therapy (I)	Understands the management SBP, SEP and MM Understands potential toxicity of therapy (systemic and radiotherapy)	Clinical assessment, including assessing co-morbidity and its effect on outcome	1,2,5
Be able to discuss treatment options (A)	Understands prognosis and how treatment affects this	Advise patient on appropriate management	1,2,3,4
Take part in MDM discussions(A)	Understands indications for and limitations of treatment of SBP, SEP, and MM	MDM interaction	1,2,3,4

2. Systemic Therapy – Usually supervised by a consultant haematologist within the multidisciplinary team.

Objective	Knowledge	Skills	Assessment
Be able to assess patients for chemotherapy (I)	Knowledge of common drug protocols for plasma cell tumours and their toxicity  Understand which regimes are appropriate in the clinical situation	Clinical Assessment	1,2,5
Look after patients undergoing radical and palliative treatment regimes (I)	Understands the acute side-effects of chemotherapy	Able to prescribe common chemo protocols, modify prescriptions, judge when to stop or continue treatment, and prescribe supportive treatment eg. Antibiotics	1,2,3,5
Be familiar with research developments in plasma cell tumours (A)	Knows details of recently published and ongoing trials	Able to discuss involvement in clinical trials	2,4,5
Be able to participate in ph I, II and III trials and maintain appropriate research records (A)	Understands the principles of clinical research		2,3,6

3. Radiotherapy Treatment

Objective	Knowledge	Skills	Assessment
Be able to assess patients' suitability for radical or palliative RT (I)	Understands principles of radical radiotherapy for SBP and SEP. Understands principles of palliative radiotherapy for MM	Obtain informed consent	1,2,3,5
Be able to determine planning target volume for radical RT for SPB and SEP and palliative treatment for MM (I)	Aware of optimal dose fractionation for radical RT for SPB and SEP and of palliative RT for MM. Aware of normal tissue toxicity and its impact on target volume definition.	Plan radical radiotherapy for SPB and SEP including CT planning Plan palliative radiotherapy	1,2,3,5
Be able to manage and care for patients undergoing radical or palliative RT (I)	Understands early and late reactions to RT and their management	Clinic review of on-treatment patients and management of early reactions	1,2,5
Be able to modify treatment plans according to patients individual needs pre-morbid conditions etc (I)	Judge relative risks and benefits	Prescribe and review radical treatment	1,2,3,5

Objective	Knowledge	Skills	Assessment
Be able to verify radical treatment plan (I)	Understands verification options and use of portal imaging	Able to assess accuracy of patient set-up and recommend adjustment as required	1,2,3,5

#### 4. Assessment of response and follow up

Objective	Knowledge	Skills	Assessment
Be able to assess response to chemo and radiotherapy (I)	Imaging interpretation Interpretation of biochemical markers	Discuss response and current disease status with patients in clinic	1,2,5
Be able to advise on follow-up schedule and appropriate investigations (I)	Knowledge of patterns of relapse of SPB, SEP and MM		1,2,5
Be able to diagnose recurrent disease (I)	Knowledge of likely symptoms and signs of relapse.	Clinical assessment and selecting appropriate investigations, eg imaging - biochemical markers	1,2,5
Be able to recognise and manage long-term toxicity (A)	Knowledge of late effects of treatment	Detect at follow-up	1,2
Be able to manage recurrent disease (A)	Understanding the roles of chemotherapy, radiotherapy and supportive measures in the management of recurrence	Breaking bad news. Integration of palliative, supportive care. Ability to discuss roles of alternative therapies	1,2,4

### Lymphomas and leukaemias including myeloma. Radiotherapy in the treatment of leukaemia, including Total Body Irradiation.

Systemic treatment of leukaemia is the responsibility of haematologists and is not included in this curriculum.

#### 1. Selection and assessment of patients with leukaemia for radiotherapy.

Objective	Knowledge	Skills	Assessment
Be able to assess patients for radiotherapy (A)	Understands the indications for radiotherapy in leukaemia (including involvement of CNS or testis, splenic RT, Total Body Irradiation (TBI) for Bone Marrow Transplantation)  Understands the role of palliative radiotherapy in leukaemia	Able to discuss role of radiotherapy with haematologist multidisciplinary team.	1,2,3
Able to discuss treatment options in the light of understanding of prognosis (A)	Understands the effects of treatment on prognosis	Informs patient and discusses treatment options	1,2,3,4
Take part in discussions in multi-disciplinary meetings (A)	Understands the indications and limitations of radiotherapy in the management of leukaemia Understands the long term effects of radiotherapy	Can contribute to MDT discussions (A)	1,3,4

## 2. Radiotherapy treatment (external beam radiotherapy)

Objective	Knowledge	Skills	Assessment
<p>Be able to explain clearly the benefits, side effects and risks of a course of radiotherapy.(A)</p> <p>Be able to seek informed consent for a course of treatment.(A)</p> <p>Be able to seek informed consent for clinical trials (A)</p>	<p>Understands the acute and long term complications of radiotherapy and their relation to dose and volume irradiated.</p> <p>Understands the need for long term surveillance following TBI to minimise late effects by early detection and treatment.</p> <p>Understands the legal aspects and ethics of informed consent for treatment and for clinical trials.</p>	<p>Able to take informed consent for radiotherapy, including TBI</p>	1,3,4
<p>Be able to determine the target volume for planning radical radiotherapy to CNS, testes, spleen or other sites(A)</p>	<p>Is competent in the interpretation of clinical findings, diagnostic imaging (including CT, PET and MR) and laboratory results for determination of target volume for planning.</p>	<p>Able to define a treatment volume for relevant site(s).</p>	1,2,3
<p>Be able to plan a patient for TBI in cooperation with physicists(A)</p>	<p>Aware of need for dose homogeneity.</p> <p>Able to select appropriate dose fractionation.</p> <p>Understands effects on normal tissue morbidity.</p>	<p>Able to judge how to modify treatment parameters to achieve optimal dose homogeneity.</p>	1,3
<p>Be able to care for patients undergoing radiotherapy for leukaemia (A)</p>	<p>Understands early reactions to radiotherapy and their management</p> <p>Understands verification and correction procedures for radical radiotherapy</p>	<p>Able to conduct radiotherapy review and manage early reactions</p>	1,2,3,4
<p>Be able to participate in protocol development in radiotherapy for leukaemia(A)</p>	<p>Understands developments in radiotherapy research and their application to local protocols</p>		1,4
<p>Be able to participate in follow-up for patients who have had TBI (A)</p>	<p>Understand late complications of therapy, including endocrine effects and increased risk of 2<sup>nd</sup> tumours and the need for surveillance policies for early detection and treatment to minimise late complications</p>		

## Paediatric and Adolescent Oncology

Childhood and adolescent cancer is rare, and its management is centralised to relatively few cancer networks. It is not necessary or indeed practicable for all trainees in Radiotherapy (clinical oncology) to get practical experience in the management of children and adolescents with cancer.

Nonetheless all trainees should have a basic understanding of childhood and adolescent cancer management. This should include the range of cancers encountered in children and young people, how the diseases may present and are diagnosed, how and why individual cases are assigned to risk groups, the principles of multidisciplinary management including surgery, chemotherapy and radiotherapy. Knowledge of radiotherapy should include principles of target volume definition and recognition of the importance of normal tissue tolerance including the avoidance of organs at risk. Basic knowledge of the interactions between different treatments, the acute and late treatment related morbidity including the development of second malignant neoplasms, likely outcome and the importance of long term follow-up is required. There needs to be an understanding of the organisation of children's and young people's cancer services at local, regional, national and international levels. There needs to be some knowledge of how the evidence base relating to children's and young people's cancers has been accrued and is expanded, together with its limitations.

A minority of trainees will have an opportunity during higher training to gain experience through a clinical attachment with a consultant or consultants specialising in paediatric and adolescent Radiotherapy (clinical oncology), and will build on the basic knowledge base outlined above, and develop practical skills in childhood cancer management. These individuals will be well equipped to become consultants with an interest in paediatric and adolescent oncology.

Paediatric and adolescent oncology is a site specialty defined by the age of the patient, not by the anatomical site of the tumour or the histological variety of the cancer. There is therefore significant overlap between the curriculum for paediatric and adolescent oncology and those for some other areas including neuro-oncology, sarcomas and haematological malignancy.

### 1. Basic principles of radiotherapy

Objective	Knowledge	Skills	Assessment
To understand the various childhood and adolescent cancer types, their incidence and epidemiology (1)	The various types of cancer including leukaemia and lymphoma, brain tumours and extracranial solid tumours which occur in children and young people. The relative incidence of cancer in childhood and adolescence compared with in adults, and how the incidence of different cancer types varies with age, sex, race and geography. The causes, where known, of cancer in childhood and young people, including the genetic basis of some cancers and the association with congenital syndromes.		5
To understand the presentation and principles of diagnosis and initial assessment of cancer in childhood and adolescents (1)	The symptoms and signs which may indicate the presence of cancers of different types in a child or young person, especially those which should trigger referral for specialist assessment, and the principal differential diagnosis associated with these clinical features. The diagnostic pathway following specialist referral, including multidisciplinary discussion, and appropriate imaging and collection of tumour tissue, blood, bone marrow, cerebrospinal fluid and urine necessary for diagnosis and assessment of different tumour types.		5

<b>To understand at a basic level the imaging appearances of the common childhood and adolescent tumour types, and their significance (1)</b>	The indications for, information revealed by and limitations of different imaging modalities including plain radiographs, computed tomography, magnetic resonance, ultrasound and nuclear medicine scans for the common tumours. This includes their roles in diagnosis, staging, response assessment, target volume definition and follow-up.		5
<b>To understand at a basic level the pathology of the common childhood and adolescent tumour types (1)</b>	This includes macroscopic appearances and microscopic appearances including immunohistochemistry and molecular biology where clinically relevant.		5
<b>To understand in principle the reasons for and requirements of risk stratification of the common childhood and adolescent tumour types (1)</b>	How factors such as pathological type, stage, age, molecular features and other factors are combined to allocate patients into risk groups which are both of prognostic significance and indicate appropriate levels of intensity of treatment Examples including medulloblastoma, acute lymphoblastic leukaemia, Hodgkin's lymphoma, neuroblastoma, rhabdomyosarcoma, hepatoblastoma, Wilms' tumour, Ewing's tumour and osteosarcoma		5
<b>To understand in principle the standard treatments used for the common tumours of childhood and adolescence in different risk groups (1)</b>	How surgery, radiotherapy, chemotherapy and biological treatments are scheduled in different tumours and different risk groups		5
<b>To understand in principle normal tissue tolerance in children, the potential acute and late toxicities of these treatments, and how they may be minimised (1)</b>	Normal tissue tolerance to cancer treatments in children and young people varies with age and development, and the differences with adults. The likely acute side effects of different treatments. What types of supportive care may be required. The likely late side effects of different treatments. How different treatments may interact adversely. How scheduling may reduce side effects. How careful follow-up may minimise sequelae in the long term.		5
<b>To understand the principles of radiotherapy treatment planning for children and adolescents with the more common types of childhood and adolescent cancer (1)</b>	How patients are immobilised. How target volumes are defined. How organs at risk are identified How treatment related morbidity is minimised. Examples include craniospinal radiotherapy for brain tumours, involved field radiotherapy for Hodgkin's lymphoma, total body irradiation prior to bone marrow transplantation, treatment of tumours affecting abdominal viscera, treatment of extremity sarcomas		5
<b>To understand in principle the organisation of cancer services for children and young people</b>	The organisation of services into specialist paediatric oncology centres and paediatric oncology shared care units. The requirement for specialised medical		5

(1)	multidisciplinary teams for diagnosis and treatment. The requirement for multiprofessional involvement including specialist nurses, outreach nurses, pharmacists, play specialists, social workers, radiographers, psychologists and others in addition to medical professionals. The role of long-term follow-up. The role of the Children's Cancer and Leukaemia Group in treatment.		
To understand in principle how national guidance affects service delivery for children and young people with cancer (1)	The role of the National Service Framework for Children NICE Improving Outcomes Guidance Recommendations of the Royal College of Radiologists		5
To understand how the evidence base for treatment has been gathered and how it is improved (1)	The role of national research organisations. The role of international research organisations such as SIOP. The types of questions being addressed in current clinical research protocols.		5

### Cancer in children and adolescents: Brain and spinal cord tumours

Objective	Knowledge	Skills	Assessment
Understand normal neuroanatomy and physiology and development of function throughout childhood (A)	Know normal brain anatomy as demonstrated by clinical imaging, CT and MRI Know normal neurological function and how it changes with age	Able to recognise MR and CT brain and spine images as normal. Able to take a history, and perform a physical examination of neurological function appropriate to the patient's age.	1, 2, 3
Understand the presentation, evaluation, and initial surgical management of paediatric and adolescent brain and spinal tumours and their complications (A)	Typical and less common symptoms associated with brain and spinal tumours at presentation Indications for surgery to relieve raised intracranial pressure, obtain tissue for histology, remove tumour	Able to recognise raised intracranial pressure, convulsions, altered-consciousness, and focal neurological deficits Able to access urgent neurosurgical opinion as necessary	1, 2, 3
Understand the need to classify brain and spine tumours in children and adolescents by site, extent of disease and pathology (A)	Know the main histological types of brain and spinal tumours in children and adolescents, and their common locations Know staging and grading systems for tumours where relevant	Able to give a provisional differential diagnosis of a tumour from imaging Able to understand a neuropathology report	1, 2, 3
Formulate a management plan with colleagues in a multi-disciplinary team meeting (A)	Know how tumour related factors including grade, stage and pathology of CNS tumours are combined with patient related factors including age and co-morbidity are combined to allocate a risk stratification.	Able to allocate patients to a risk group to guide management Able to discuss treatments and	1, 2, 3, 4



	Know that surgery, chemotherapy and radiotherapy may all be indicated in childhood brain and spine tumour management	sequencing of combined modality therapy with colleagues	
<b>Know standard management of more common tumour types by age, site, grade and stage (A)</b>	Know standard treatment approaches for: 1 medulloblastoma and intracranial primitive neuroectodermal tumours 2 gliomas including brain stem gliomas, optic pathway gliomas, low grade cerebellar and optic pathway gliomas and high grade glial tumours 3 ependymomas 4 craniopharyngioma 5 intracranial germ cell tumours	Able to decide when surgery, chemotherapy or radiotherapy are indicated	1, 2, 3, 6
<b>Assessment of a paediatric patient with a brain or spinal tumour for radiotherapy (A)</b>	Know when radiotherapy is indicated Know whether anaesthesia will be required Know about duration and extent of radiotherapy indicated Know about likely acute and late side effects of treatment Know risks and benefits of treatment Know likely prognosis	Able to have a consultation with patient and family, explain principles and practicalities of treatment and seek informed consent for treatment	1, 2, 3, 6
<b>Know current clinical trials in paediatric neuro-oncology (A)</b>	Know portfolio of open trials, principal eligibility criteria and key questions	Able to decide eligibility of an individual patient Able to seek informed consent for trials	1, 2, 3, 6
<b>Plan and prescribe radiotherapy for brain tumours (A)</b>	Know patient positioning, immobilisation, image co-registration, target volume definition, dose and fractionation, beam modification and arrangement, tolerance doses and avoidance of organs at risk, plan approval and verification for commonly used techniques including craniospinal radiotherapy, boost to primary tumour site, and treatment of smaller volumes	Able to work with radiographers, physicists, play specialists, anaesthetists and other professionals to design and deliver a safe and effective radiotherapy plan for more common tumour types	1, 2, 3, 4, 6
<b>Support a patient and family through a course of treatment in conjunction with colleagues (A)</b>	Know expected acute side effects of radiotherapy Know medical management of side effects and associated symptoms including nausea and vomiting, headache, convulsions	Able to manage steroid therapy, anticonvulsants, antiemetics and analgesia. Able to recognise possible complications which may need urgent referral to colleagues such as shunt blockage.	1, 2, 3, 4, 6
<b>Understand follow-up for brain and spinal tumours in children and adolescents (A)</b>	Know when scans are indicated and the likely findings Know how to recognise symptoms of possible relapse Know when to refer to colleagues for endocrine, neuropsychometric, neurological or other specialist care Know when to bring back to multidisciplinary team meeting for further discussion	Able to do follow-up consultations, in conjunction with colleagues Able to allay anxieties while recognising complications which require intervention	1, 2, 3, 4, 6



<b>Understand neuro-rehabilitation, living with disability, management of relapsed disease, palliative and terminal care (A)</b>	Know the importance of functional outcome and how it may be optimised Know the importance of symptom control and palliative treatments Know the importance of psychosocial and physical supportive care	Able to recognise patients' and families' needs in these areas, and interact with other health care professionals to meet patients' needs	1, 2, 3, 6
<b>Cancer in children and adolescents. Leukaemia, lymphoma and bone marrow transplantation</b>			
<b>Objective</b>	<b>Knowledge</b>	<b>Skills</b>	<b>Assessment</b>
<b>Understand the pathology, imaging and management of haematological malignancy in children and adolescents (A)</b>	Know the main types of leukaemia, their natural history, standard treatment and indications for radiotherapy Know the main types of lymphoma, their pathology and risk stratification, and indications for radiotherapy Know the indications for radiotherapy in bone marrow transplantation for non-malignant disease	Able to recognise when radiotherapy is required in the management of haematological malignancy	1, 2, 3
<b>Understand the effects of age and co-morbidity on radiotherapy and its side effects (A)</b>	Know when radiotherapy should be avoided or modified because of age or co-morbidity	Able to discuss radiotherapy in the management of haematological malignancy in the multidisciplinary team setting	1, 2, 3
<b>Assessment of a paediatric patient with haematological disease for radiotherapy (A)</b>	Know when radiotherapy is indicated Know whether anaesthesia will be required Know about duration and extent of radiotherapy indicated Know about likely acute and late side effects of treatment Know risks and benefits of treatment Know likely prognosis	Able to have a consultation with patient and family, explain principles and practicalities of treatment and seek informed consent for treatment	1, 2, 3, 6
<b>Know current clinical trials in paediatric haematological disease (A)</b>	Know portfolio of open trials, principal eligibility criteria and key questions	Able to decide eligibility of an individual patient Able to seek informed consent for trials	1, 2, 3, 6
<b>Plan and prescribe radiotherapy for haematological disease (A)</b>	Know patient positioning, immobilisation, interpretation of cross sectional and functional imaging, target volume definition, dose and fractionation, beam modification and arrangement, tolerance doses and avoidance of organs at risk, plan approval and verification for commonly used techniques including cranial radiotherapy, total body irradiation, testicular irradiation, involved field radiotherapy for Hodgkin's lymphoma	Able to work with radiographers, physicists, play specialists, anaesthetists and other professionals to design and deliver a safe and effective radiotherapy plan for more common tumour types	1, 2, 3, 4, 6
<b>Support a patient and family through a course of treatment in conjunction with colleagues (A)</b>	Know expected acute side effects of radiotherapy Know medical management of side effects and associated complications including myelosuppression	Able to manage side effects of treatment Able to recognise possible complications which may need urgent referral to colleagues such as line infection	1, 2, 3, 4, 6

Understand follow-up for haematological disease in children and adolescents (A)	Know when scans are indicated and the likely findings Know how to recognise symptoms of possible relapse Know when to refer to colleagues for endocrine, or other assessment Know when to bring back to multidisciplinary team meeting for further discussion	Able to do follow-up consultations, in conjunction with colleagues Able to allay anxieties while recognising complications which require intervention	1, 2, 3, 4, 6
<b>Cancer in children and adolescents. Extracranial solid tumours</b>			
<b>Objective</b>	<b>Knowledge</b>	<b>Skills</b>	<b>Assessment</b>
Understand normal anatomy and physiology and development of function throughout childhood (A)	Know normal anatomy as demonstrated by clinical imaging, CT, MRI and nuclear medicine imaging Know normal organ function and how it changes with age Know normal somatic growth and development	Able to recognise MR and CT images as normal Able to take a history, and perform a physical examination of children as appropriate to the patient's age	1, 2, 3
Understand the presentation and diagnostic evaluation of extracranial solid tumours in childhood and adolescence (A)	Typical and less common symptoms of these tumours, and imaging, pathological and other assessments required to make a diagnosis	Able to recognise whether all relevant information is available	1, 2, 3
Understand the need to classify extracranial solid tumours in children and adolescents by site, extent of disease and pathology (A)	Know the main histological types of extracranial solid tumours in children and adolescents, and their common locations Know staging and grading systems for tumours where relevant	Able to give a provisional differential diagnosis of a tumour from imaging Able to understand a pathology report	1, 2, 3
Formulate a management plan with colleagues in a multi-disciplinary team meeting (A)	Know how tumour related factors including pathology, histological subtype, molecular characteristic, and stage of extracranial solid tumours are combined with patient related factors including age and co-morbidity are combined to allocate a risk stratification. Know that surgery, chemotherapy, biological treatments and radiotherapy may all be indicated in their management	Able to allocate patients to a risk group to guide management Able to discuss treatments and sequencing of combined modality therapy with colleagues	1, 2, 3, 4
Know standard management of more common tumour types by age, site, pathology and stage (A)	Know standard treatment approaches for different risk stratifications of: 1 childhood and adolescent renal tumours 2 neuroblastoma 3 rhabdomyosarcoma and other soft tissue sarcomas 4 Ewing's sarcoma, osteosarcoma, peripheral primitive neuro-ectodermal tumours 5 germ cell tumours 6 retinoblastoma 7 liver tumours 8 the histiocytoses 9 epithelial cancers including thyroid and nasopharyngeal carcinomas	Able to decide when surgery, chemotherapy, radiotherapy or other treatments are indicated	1, 2, 3, 6

<b>Assessment of a paediatric patient with an extracranial solid tumour for radiotherapy (A)</b>	<p>Know when radiotherapy is indicated</p> <p>Know whether anaesthesia will be required</p> <p>Know about duration and extent of radiotherapy indicated</p> <p>Know about likely acute and late side effects of treatment</p> <p>Know risks and benefits of treatment</p> <p>Know likely prognosis</p>	<p>Able to have a consultation with patient and family, explain principles and practicalities of treatment and seek informed consent for treatment</p>	1, 2, 3, 6
<b>Know current clinical trials in paediatric oncology (A)</b>	<p>Know portfolio of major open trials, principal eligibility criteria and key questions</p>	<p>Able to decide eligibility of an individual patient</p> <p>Able to seek informed consent for trials</p>	1, 2, 3, 6
<b>Plan and prescribe radiotherapy for extracranial solid tumours (A)</b>	<p>Know patient positioning, immobilisation, image co-registration, target volume definition, dose and fractionation, beam modification and arrangement, tolerance doses and avoidance of organs at risk, plan approval and verification for commonly used techniques including flank radiotherapy for renal tumours, whole abdominal and pelvic radiotherapy for renal tumours, whole lung irradiation for pulmonary metastases, tumour bed irradiation for neuroblastoma, primary tumour irradiation for soft tissue and bone sarcomas at common sites.</p> <p>Know acceptable compromises to dose or volume which may be required when critical organs at risk must be irradiated or co-morbidity is a factor</p>	<p>Able to work with radiographers, physicists, play specialists, anaesthetists and other professionals to design and deliver a safe and effective radiotherapy plan for more common tumour types</p>	1, 2, 3, 4, 6
<b>Support a patient and family through a course of treatment in conjunction with colleagues (A)</b>	<p>Know expected acute side effects of radiotherapy</p> <p>Know medical management of side effects and associated symptoms</p>	<p>Able to manage symptom control and supportive care</p> <p>Able to recognise possible complications which may need urgent referral to colleagues</p>	1, 2, 3, 4, 6
<b>Understand follow-up for extracranial solid tumours in children and adolescents (A)</b>	<p>Know when scans are indicated and the likely findings</p> <p>Know how to recognise symptoms of possible relapse</p> <p>Know when to refer to colleagues for other specialist care</p> <p>Know when to bring back to multidisciplinary team meeting for further discussion</p>	<p>Able to do follow-up consultations, in conjunction with colleagues</p> <p>Able to allay anxieties while recognising complications which require intervention</p>	1, 2, 3, 4, 6
<b>Understand rehabilitation, living with disability, management of relapsed disease, palliative and terminal care (A)</b>	<p>Know the importance of late effects on functional outcome and how it may be optimised.</p> <p>Know the importance of symptom control and palliative treatments</p> <p>Know the importance of psychosocial and physical supportive care</p>	<p>Able to recognise patients' and families' needs in these areas, and interact with other health care professionals to meet patients' needs</p>	1, 2, 3, 6

<b>Cancer in children and adolescents. Other aspects of care</b>			
<b>Objective</b>	<b>Knowledge</b>	<b>Skills</b>	<b>Assessment</b>
<b>Understand need for referral to other centres (A)</b>	<p>Know the indications for treatments which are not available at most paediatric radiotherapy centres including paediatric brachtherapy, paediatric radionuclide therapy, proton beam therapy, radiotherapy for retinoblastoma</p> <p>Know when patients and their families have a need or desire for broader consultation including second opinions within or outside the Country</p>	<p>Able to discuss unusual treatments with local multidisciplinary team and with quaternary specialist team</p> <p>Able to gather together all necessary information to make a referral to a quaternary centre for treatment</p> <p>Able to discuss with multidisciplinary team colleagues the need for referral to another centre for a second opinion</p>	1, 2, 6
<b>Understand the interactions between tertiary paediatric oncology centres and local care at primary or secondary level (A)</b>	<p>Knowledge of what treatments and care need to be delivered in a specialist centre, and what can reasonably be delivered close to the patient's home</p>	<p>Able to liaise effectively with community and paediatric oncology shared care centre health care professionals</p> <p>Able to explain the roles of different health care providers to patients and their families</p>	1, 2, 6
<b>Understand the role of national and international organisations in setting standards, evidence based medicine and protocol development (A)</b>	<p>Knowledge of Children's Cancer and Leukaemia Group and international clinical trials groups</p>	<p>Use of CCLG website and protocols</p> <p>Able to contribute constructively at national and international meetings</p> <p>Able to participate in clinical research</p>	1, 6

DEPARTMENT OF ONCOLOGY  
ZIAUDDIN MEDICAL UNIVERSITY

**PERIODIC M.C.Q. TEST SUMMARY SHEET**  
**CLINICAL ONCOLOGY AND RADIOTHERAPY**

Name of Resident :				
Subject	NO.	DATE	TIME	LECTURES
CANDIDATES ATTENDING	DRS. →	Dr. Ayesha Javed Bhutta, Dr. Nayyer Naqvi		
LECTURER'S COMMENT:				

	Signature	Date
Dr. Jawaid A. Mallick - Associate Professor & Head Cancer Hospital		
Dr. Abn - e - Hassan - Consultant Radiation Oncologist		
Attested by: Professor Ejaz A. Vohra - Chairman Department of Medicine & Dean, Postgraduate Education (Clinical)		

**NOTE:** This Periodic MCQ Test evaluation form is CONFIDENTIAL. Original is to be maintained in resident's file. No photocopying is allowed without prior approval from the Department of Postgraduate & Academic Affairs

DEPARTMENT OF ONCOLOGY  
Ziauddin Medical University  
**PERIODIC M.C.Q. TEST SUMMARY SHEET**  
**E.N.T.**

Name of Resident :				
Subject	NO.	DATE	TIME	LECTURES
CANDIDATES ATTENDING		DRS. →	Dr. Ayesha Javed Bhutta, Dr. Nayyer Naqvi	
LECTURER'S COMMENT:				

	Signature	Date
Prof. Abbas Zafar		
Dr. Jawaid Mallick		
Attested by:  Prof. E. Vohra, Chairman Department of Medicine & Dean Postgraduate Education (Clinical)		

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**DEPARTMENT OF ONCOLOGY  
ZIAUDDIN MEDICAL UNIVERSITY**

**PERIODIC M.C.Q. TEST SUMMARY SHEET**  
**SURGERY**

Name of Resident :				
Subject	NO.	DATE	TIME	LECTURES
CANDIDATES ATTENDING		DRS. →	Dr. Ayesha Javed Bhutta, Dr. Nayyer Naqvi	
LECTURER'S COMMENT:				

	Signature	Date
Dr. Harris Rasheed – Asst. Professor Laparoscopic Surgery		
Dr. Nusrat Anis – Consultant Gen. Surgeon		
Attested by:  Program Director – Muhammad Jawaid A. Mallick, MD		

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DEPARTMENT OF ONCOLOGY  
ZIAUDDIN MEDICAL UNIVERSITY

**PERIODIC M.C.Q. TEST SUMMARY SHEET**  
**HAEMATOLOGICAL ONCOLOGY**

Name of Resident :				
Subject	NO.	DATE	TIME	LECTURES
CANDIDATES ATTENDING	DRS. →	Dr. Ayesha Javed Bhutta, Dr. Nayyer Naqvi		
LECTURER'S COMMENT:				

	Signature	Date
Dr. Saba Jamal – Assoc. Professor & Consultant Hematologist & Pathologist		
Attested by: Program Director – Muhammad Jawaid A. Mallick, MD		

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**DEPARTMENT OF ONCOLOGY  
ZIAUDDIN MEDICAL UNIVERSITY**

**PERIODIC M.C.Q. TEST SUMMARY SHEET  
PAEDIATRIC ONCOLOGY**

<b>Name of Resident :</b>				
<b>Subject</b>	<b>NO.</b>	<b>DATE</b>	<b>TIME</b>	<b>LECTURES</b>
<b>CANDIDATES ATTENDING</b>	<b>DRS. →</b>	<b>Dr. Ayesha Javed Bhutta, Dr. Nayyer Naqvi</b>		
<b>LECTURER'S COMMENT:</b>				

	<b>Signature</b>	<b>Date</b>
<b>Dr. Shamvil Ashraf</b>		
<b>Attested by:</b>		
<b>Program Director – Muhammad Jawaid A. Mallick, MD</b>		

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**DEPARTMENT OF ONCOLOGY  
ZIAUDDIN MEDICAL UNIVERSITY**

**PERIODIC M.C.Q. TEST SUMMARY SHEET**  
**PATHOLOGY (Genetics)**

<b>Name of Resident :</b>				
<b>Subject</b>	<b>NO.</b>	<b>DATE</b>	<b>TIME</b>	<b>LECTURES</b>
<b>CANDIDATES ATTENDING</b>	<b>DRS. →</b>	Dr. Ayesha Javed Bhutta, Dr. Nayyer Naqvi		
<b>LECTURER'S COMMENT:</b>				

	<b>Signature</b>	<b>Date</b>
Dr. Javed A. Qazi – Consultant Histopathologist		
Dr. Fauzia – Consultant Histopathologist		
Dr. Saba Jamal – Assoc. Professor & Consultant Hematologist & Pathologist		
Attested by: Program Director – Muhammad Jawaid A. Mallick, MD		

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**DEPARTMENT OF ONCOLOGY  
ZIAUDDIN MEDICAL UNIVERSITY**

**PERIODIC M.C.Q. TEST SUMMARY SHEET**  
**PATHOLOGY (Histopathology)**

Name of Resident :				
<b>Subject</b>	<b>NO.</b>	<b>DATE</b>	<b>TIME</b>	<b>LECTURES</b>
<b>CANDIDATES ATTENDING</b>		<b>DRS. → Dr. Ayesha Javed Bhutta, Dr. Nayyer Naqvi</b>		
<b>LECTURER'S COMMENT:</b>				

	Signature	Date
Dr. Javed A. Qazi – Consultant Histopathologist		
Dr. Fauzia – Consultant Histopathologist		
Dr. Saba Jamal – Assoc. Professor & Consultant Hematologist & Pathologist		
Attested by: Program Director – Muhammad Jawaid A. Mallick, MD		

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DEPARTMENT OF ONCOLOGY  
ZIAUDDIN MEDICAL UNIVERSITY  
**PERIODIC M.C.Q. TEST SUMMARY SHEET**  
**PATHOLOGY (Clinical Pathology)**

Name of Resident :				
Subject	NO.	DATE	TIME	LECTURES
CANDIDATES ATTENDING		DRS. →	Dr. Ayesha Javed Bhutta, Dr. Nayyer Naqvi	
LECTURER'S COMMENT:				

	Signature	Date
Dr. Adnan Zuberi – Asst. Professor Clinical Pathology		
Dr. Saba Jamal – Assoc. Professor & Consultant Hematologist & Pathologist		
Attested by: Program Director – Muhammad Jawaid A. Mallick, MD		

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DEPARTMENT OF ONCOLOGY  
ZIAUDDIN MEDICAL UNIVERSITY  
**MOCK EXAMINATION FORM**

<b>Name of Resident :</b>							
<b>Evaluation Period:</b>		<b>Level of Residency</b>		<b>R1</b>	<b>R2</b>	<b>R3</b>	<b>R4</b>
<b>From</b>	<b>To</b>						
(indicate by checking box in the appropriate column, then put the mark acquired by the Resident at the mark Column).							
<b>Subject</b>	<b>1</b> (Un)	<b>2</b> (S)	<b>3</b> (G)	<b>4</b> (VG)	<b>5</b> (E)	<b>Marks</b>	
A. Clinical Oncology							
B. Pathology							
C. Oncological & Medical Physics Sciences							
D. Medical Statistics & Epidemiology							
<b>Total Marks</b>							

THE SCORE \_\_\_\_\_

EQUIVALENT RATING:

Unsatisfactory below

Satisfactory

Excellent

Good

Very Good

<b>Comments:</b>		
<b>Mock Evaluation Done By:</b>		
<b>Dr.</b>	<b>Post:</b>	<b>Date:</b>
<b>Certified By:</b>		
<b>Clinical Tutor:</b>		
<b>Professor Ejaz A. Vohra - Chairman Department of Medicine &amp; Dean Postgraduate Education (Clinical)</b>		

**NOTE:**

Residents' Mock Examination and Forms is to be completed 3 – 4 months prior to taking MD Training In Radiotherapy (Clinical Oncology) Part I Examination. This evaluation form is CONFIDENTIAL. Original is to be maintained in resident's file in the Department of Postgraduate & Academic Affairs. No photocopying is allowed without prior approval from the Director of the Department of Postgraduate & Academic Affairs

**DEPARTMENT OF ONCOLOGY  
ZIAUDDIN MEDICAL UNIVERSITY**

**PERIODIC M.C.Q. TEST SUMMARY SHEET**  
**ONCOLOGICAL & MEDICAL PHYSICS SCIENCES LECTURES**  
**(Radiobiology)**

Name of Resident :				
Subject	NO.	DATE	TIME	LECTURES
CANDIDATES ATTENDING		DRS. →	Dr. Ayesha Javed Bhutta, Dr. Nayyer Naqvi	
LECTURER's COMMENT:				

	Signature	Date
Mr. Aziz Siddique – HoD, Physics		
Muhammad Jawaid A. Mallick, MD - Associate Professor & Head Cancer Hospital		
Attested by:		

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**DEPARTMENT OF ONCOLOGY  
ZIAUDDIN MEDICAL UNIVERSITY**

**PERIODIC M.C.Q. TEST SUMMARY SHEET**  
**ONCOLOGICAL & MEDICAL PHYSICS SCIENCES LECTURES**

Name of Resident :				
Subject	NO.	DATE	TIME	LECTURES
CANDIDATES ATTENDING	DRS. →	Dr. Ayesha Javed Bhutta, Dr. Nayyer Naqvi		
LECTURER'S COMMENT:				

	Signature	Date
Mr. Arshad Mahmood – Lecturer, Med. Phys.		
Mr. Aziz Siddique – HoD, Physics		
Attested by:  Program Director – Muhammad Jawaid A. Mallick, MD		

**NOTE:** This Periodic MCQ Test evaluation form is CONFIDENTIAL. Original is to be maintained in resident's file. No photocopying is allowed without prior approval from the Department of Postgraduate & Academic Affairs

**DEPARTMENT OF ONCOLOGY  
ZIAUDDIN MEDICAL UNIVERSITY  
RESIDENT EVALUATION FORM**

<b>Name of Resident :</b>							
<b>Evaluation Period: From</b>		<b>To</b>	<b>Level of Residency</b>	<b>R1</b>	<b>R2</b>	<b>R3</b>	<b>R4</b>
<i>(Indicate by checking box in the appropriate column, then put the mark acquired by the Resident at the mark Column).</i>							
<b>Criteria</b>	<b>1 (Un)</b>	<b>2 (S)</b>	<b>3 (G)</b>	<b>4 (VG)</b>	<b>5 (E)</b>	<b>Marks</b>	
A. Attendance at Clinical Meeting							
B. Participation							
C. Assignments (Reading Course Work)							
D. Ability to Learn							
E. Attendance at Posting/Schedules Punctually							
F. Report & Feedback to Consultant							
G. Practical Participation at scheduled posting especially at Radiotherapy Procedures							
H. Judgment at Film Sessions							
I. Interpretation of Films							
J. Communication in English							
K. Communication in Professional Language							
L. Relationship with Patients							
M. Interpersonal Relationship							
<b>Total Marks</b>							

THE SCORE \_\_\_\_\_

EQUIVALENT RATING:

Unsatisfactory below

Satisfactory

Excellent

Good

Very Good

<b>Comments:</b>		
<b>Evaluation Done By:</b>	<b>Post:</b>	<b>Date:</b>
<b>Checked By:</b>	<b>Signature</b>	<b>Date</b>
Clinical Tutor		
Program Director – Muhammad Jawaid A. Mallick, MD		

**NOTE:** Residents' Evaluation is to be done every 6-month. This evaluation form is CONFIDENTIAL. Original is to be maintained in resident's file. No photocopying is allowed without prior approval from the Department of Postgraduate & Academic Affairs