الهيئة السعودية للتخصصات الصحية
Saudi Commission for Health Specialties

Radiation Oncology Curriculum

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بسم الله الرحمن الرحيم

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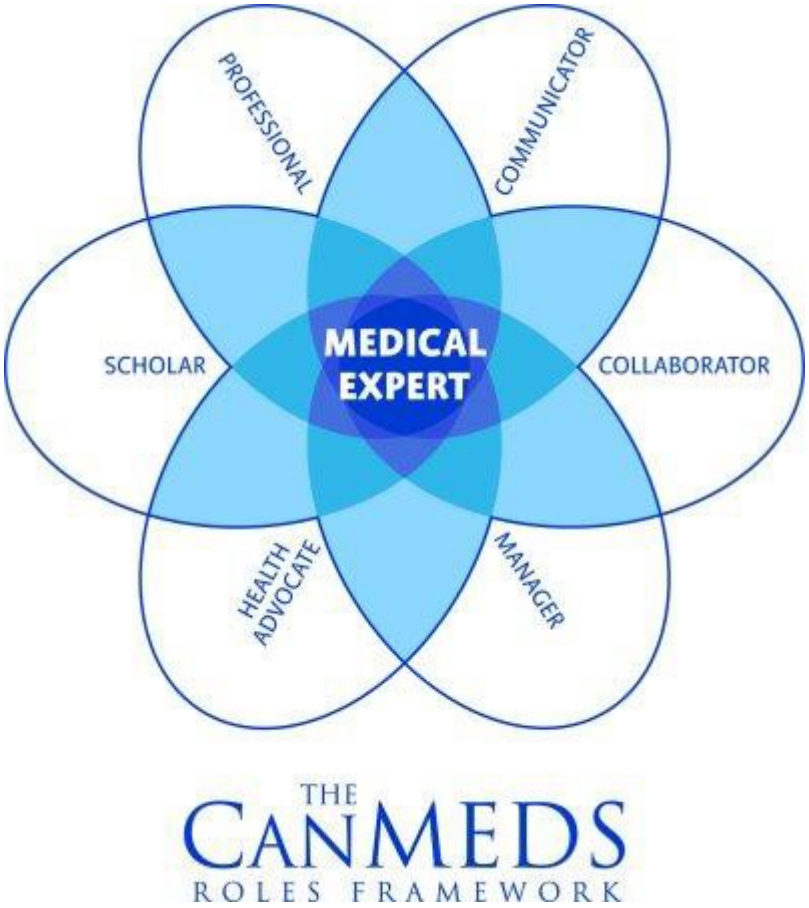

The CanMEDS Roles Framework. Copyright.
Frank JR (ed). 2005. The CanMEDS 2005 Physician Competency Frameworks. Better Standards. Better Physicians. Better Care. Ottawa: Royal College of Physicians and Surgeons. Canada.

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WHAT IS NEW IN THIS EDITION?

The rotations during the first three years of training were revised, with emphasis on increasing the exposure to radiation oncology during those years. The assessment methods were also revised to reflect the most recent changes implemented by the Scientific Council.

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INTRODUCTION

Definition

Radiation oncology is the medical specialty that involves the use of a wide variety of ionizing radiation for medical reasons (x-rays, gamma rays, or electrons) to treat cancer. Radiation can be produced using a machine which delivers radiation from outside the body (external beam radiation therapy), or it may come from radioactive source that can be placed inside the body in proximity to the target (internal radiation therapy or brachytherapy).

The radiation oncologist is a physician specialized in the use of ionizing radiation for medical purposes, mainly in the treatment of cancer. Radiation oncology is one of the three primary specialties, the other two being surgical and medical oncology, involved in the treatment of cancer. Radiation can be given as a curative modality, either alone or in combination with surgery and/or chemotherapy. It may also be used for palliation, to relieve symptoms in patients with incurable cancers. A radiation oncologist may also use radiation to treat some benign diseases, including benign tumors. Radiation oncologists work closely with other physicians such as surgical oncologists, interventional radiologists, internal medicine subspecialists, and medical oncologists, as well as medical physicists and technicians as part of the multidisciplinary cancer team.

Vision

Being a national residency program in Saudi Arabia, we recognize our responsibility to the public we serve in terms of providing the best quality training in our centers. Our aim is that the radiation oncology residency program will become a prominent national academic program recognized by our peers for exceptional clinical care, the conduct and reporting of important research, and the practice of effective teaching.

Mission

Our mission is to provide our residents with an educational environment which provides learning opportunities in clinical radiation oncology, medical physics, and radiobiology as pertinent to the field of radiation oncology. The curriculum is designed to enable residents to optimize their learning experience throughout their five years of training. As part of our mission, we always aim to meet the need of highly qualified radiation oncology specialists in the kingdom. By the completion of the program we expect our graduated residents to be full competent radiation oncologists, capable of safely delivering radiation treatment as indicated to our patients.

FORWARD

In this curriculum, we are adopting the CanMEDS framework, as it is an innovative, competency-based framework that describes the core knowledge, skills, and attitude of physicians. This curriculum is intended to provide a broad framework for residents and faculty to focus on teaching and learning as well as clinical experience and professional development during the training program. This does not intend to be the sole source of defining what is to be taught and learned during the residency training. Residents are expected to acquire knowledge and skills as well as develop appropriate attitude and behavior throughout their training program and take personal responsibility in learning. They must learn from every patient encounter whether or not that particular condition or disease is mentioned in this curriculum.

This curriculum is part of the strategic planning of Saudi Commission for Health Specialties (SCFHS) to review and update the curricula of the training programs; it was developed and reviewed by The Scientific Council of Saudi Radiation Oncology Board and international and local advisors.

The Saudi Commission for Health Specialties, as it is represented by The Scientific Board, Radiation Oncology Regional Training Committee, and Central Accreditation Committee are committed to providing full support for the implementation of the curriculum by way of allocating necessary resources, providing faculty development, and establishing a monitoring system. Further reinforcements and continuous quality improvement process through feedback from residents, trainers, and program directors, and site visits will be conducted by the Central Accreditation Committee and The Radiation Oncology Scientific Board.

CONTEXT OF PRACTICE

The health services in Saudi Arabia started with limited medical resources, and gradually reached specialized modern hospitals, medical centers, and medical cities. The rapid growth of health services has also been accompanied by a planned process of developing manpower to run such services. This is evident in the investment in overseas scholarships and local training, especially after establishing the Saudi Commission for Health Specialties, and the implementation of structured training programs.

Radiation oncology is one of the newly developed specialties in Saudi Arabia. However, in over 20 years, it has rapidly grown to become a well-recognized specialty with more than 40 radiation oncologists in the kingdom.

Despite the low cancer incidence in Saudi Arabia, the country must be ready to face the challenge of a foreseeable increase in the cancer burden mainly attributed to the growth and aging of the population.
Over 50–60% of cancer patients will require radiation therapy as part of their treatment; however, in developing countries, less than 20% of cancer patients will have access to radiotherapy.

Residency training in radiation oncology will provide educational experiences that prepare residents to be competent radiation oncologists able to provide comprehensive, coordinated care to a broad range of cancer patients.

Residents will become sufficiently familiar with the fields of radiation oncology to enable them to participate as team members in the care of cancer patients with simple and complex cases.

Residents will be given the opportunity to function with other members of the health care team in both in-patient and outpatient care to become proficient as leaders in the organization and bring systematic improvement of the processes of patient care.

Residents will have a progressive educational experience with increasing patient care responsibility over the 5-year period of their training. Supervisory responsibilities will involve both in-patient and outpatient experiences.

Throughout the five years of training, emphasis will be placed on developing the residents' competence in assessment and management, communication, and interpersonal skills.
Training will be conducted at regular intervals under the supervision of general and subspecialty radiation oncology faculty, to maintain a high level of competencies.

PROFILE OF PRACTICE

Radiation Oncology is a discipline that involves the use of ionizing radiation for therapeutic purposes, mostly in patients with malignant diseases. Typically, the treatment of most patients with malignant disease involves multiple anti-cancer treatment modalities such as surgery, chemotherapy, hormonal therapy and/ or biological agents. The radiation oncologist role involves evidence-based-integration of radiotherapy with the various treatment modalities in the management of cancer patients. This requires detailed knowledge of the pathology and natural history of common malignant diseases as well as basic understanding of the role and interaction of other treatment modalities such as surgery and systemic therapy. A unique set of knowledge and skills is needed for the appropriate and safe prescription of radiation treatment. It involves good understanding of cancer biology, radiation physics and radiobiology. This is to complement accurate evaluation and staging of cancer patients and sensible balance of the risks and benefits of radiation therapy considering various patient-, tumor- and treatment-related factors.

A radiation oncologist usually practices in a multidisciplinary team with collaboration with oncologists involved in the treatment of cancer surgically or medically. Ambulatory patient care at cancer centers is the typical practice set up in Saudi Arabia. Cancer care is usually carried out at tertiary health care centers located in major cities within academic health science centers.

Current Challenges

- Radiation oncology specialty is often associated with high-cost technology. However, radiation is a critical treatment modality for the majority of cancers whether the intent is curative or palliative.

Future Directions

- The Radiation Oncology Residency Training Program will continue as the main training program in the near future; however, there will be further integration of evidence-based training and more research activities.

OUTCOMES AND COMPETENCIES

Adapted from the Royal College of Physicians and Surgeons of Canada – Objective of Training in the Specialty of Radiation Oncology

GOALS

Upon completing training, a resident is expected to be a competent radiation oncologist capable of assuming a consultant's role in the specialty. The resident must acquire a working knowledge of the theoretical basis of the specialty, including its foundations in the basic medical sciences and research.

The specialist in radiation oncology must possess clinical competence in oncology and technical proficiency in therapeutic uses of radiation. The radiation oncologist must have a sound background in the sciences basic to the understanding of malignant diseases and their treatment by radiation therapy and other modalities. The acquisition of clinical skills in-patient assessment and management, developed by assuming responsibility for the care of both hospitalized and ambulatory patients, must be accompanied by proficiency in planning and executing radiation treatments utilizing external beam, intra-cavitary and interstitial radioactive sources, and systemically administered radioisotopes.

Residents must demonstrate the requisite knowledge, skills, and attitudes for effective patient-centered care and service to a diverse population. In all aspects of specialist practice, the graduate must be able to address issues of age, gender, sexual orientation, culture, ethnicity, and ethics in a professional manner.

RADIATION ONCOLOGY COMPETENCIES

At the completion of training, the resident will have acquired the following competencies and will function effectively as a:

Medical Expert

Definition
As *medical experts*, radiation oncologists integrate all of the CanMEDS Roles, applying medical knowledge, clinical skills, and professional attitudes in their provision of patient-centered care. *Medical Expert* is the central role of the physician in the CanMEDS framework.

Key and enabling competencies: radiation oncologists are able to…

1. **Function effectively as consultants, integrating all of the CanMEDS roles to provide optimal, ethical, and patient-centered medical care**
    - Perform a consultation effectively, including the presentation of well-documented assessments and recommendations in written and/or verbal form in response to a request from another healthcare professional
    - Give an expert opinion about the use of ionizing radiation in the treatment of the patient, including the manner in which this should be integrated with other modalities of treatment
    - Demonstrate the use of all CanMEDS competencies relevant to radiation oncology

- Identify and appropriately respond to relevant ethical issues arising in patient care
- Demonstrate the ability to prioritize professional duties effectively when faced with multiple patients and problems
- Demonstrate empathetic and patient-centered care
- Recognize and respond to the ethical dimensions in medical decision-making
- Demonstrate medical expertise in situations other than patient care, including but not limited to providing expert legal testimony or advising governments, as needed

2. **Establish and maintain clinical knowledge, skills, and attitudes appropriate to radiation oncology**
   - Apply knowledge of the clinical, socio-behavioral, and fundamental biomedical sciences relevant to radiation oncology. These include but are not limited to the following:
   - Natural history of the full range of malignant diseases, including the etiology, pathology and molecular aspects of such diseases and preventive measures
   - Natural history and pathology of those benign conditions which may be treated by radiation
   - Anatomy of normal and tumor tissue, including its demonstration by diagnostic imaging
   - Radiation physics
   - Radiobiology
   - Histopathological features associated with radiation's effect on normal tissues
   - Principles of radiation protection and how these are applied to the safety of patients, health care workers, and the general public
   - The role and availability of clinical trial participation as a therapeutic option in appropriate situations
   - Describe the CanMEDS framework of competencies relevant to radiation oncology
   - Apply the lifelong learning skills of the Scholar Role to implement a personal program to keep up-to-date and enhance areas of professional competence
   - Contribute to the enhancement of quality care and patient safety in radiation oncology, integrating the available best evidence and best practices
3. **Perform a complete and appropriate assessment of a patient**
   - Identify and explore issues to be addressed in a patient encounter effectively, including the patient's context and preferences
   - Elicit a history that is relevant, concise, and accurate to context and preferences for the purposes of prevention and health promotion, diagnosis, and/or management
   - Perform a focused physical examination that is relevant and accurate for the purposes of prevention and health promotion, diagnosis and/or management
   - Select medically appropriate investigations in a resource-effective and ethical manner
   - Demonstrate effective clinical problem-solving and judgment to address patient problems, including interpreting available data and integrating information to generate differential diagnoses and management plans
   - Demonstrate independent care of ambulatory and hospitalized patients in all aspects of radiation oncology, including investigation, diagnosis, treatment planning, supervision of radiation therapy, and the ongoing care of patients who have received radiation therapy and/or treatment for malignant disease
   - Recognize and treat oncologic emergencies effectively
4. **Use preventive and therapeutic interventions effectively**
   - Implement an effective management plan in collaboration with a patient and the patient's family

- Apply knowledge of the outcomes of various treatment methods, including the interpretation of clinical trials and statistical analysis, to the management of the patient
- Demonstrate competent planning and execution of radiation therapy, which involves, but is not limited to, the following components:
  - Integrate knowledge from relevant clinical examinations and imaging to define the tissue volumes to be treated and tissues to be spared
  - Use treatment simulation equipment effectively
  - Collaborate with medical physics and radiation therapy planning personnel
  - Prepare and interpret radiation treatment plans
- Select the appropriate type of external beam radiation equipment, intra-cavitary and interstitial radiation techniques, and radioisotopes for therapeutic use
- Demonstrate effective, appropriate, and timely application of preventive and therapeutic interventions relevant to radiation oncology
- Describe the indications for and complications of various interventions employed alone or in combination in the management of patients, including recognition of the curative and palliative outcomes of specific treatment modalities, including but not limited to the following:

  Surgery
  Cytotoxic chemotherapy
  Hormone therapy
  Immunotherapy and targeted therapies
- Pain and symptom management
- Plan, prescribe, and supervise a course of radiation therapy for patient treatment of superficial and deep-seated tumors
- Plan, prescribe, and supervise external beam treatments, including inverse planned intensity-modulated radiation therapy (IMRT) and stereotactic radiation treatments for intracranial sites
- Demonstrate an understanding of the procedures, immobilization, volume determination, and dose schedules for stereotactic body radiotherapy (SBRT)
- Plan, prescribe and supervise brachytherapy procedures, including cervical, and endometrial brachytherapy
- Describe the management of other disease sites that may be treated with brachytherapy
- Describe the management of emergencies and complications of this therapy
- Describe the management of neoplastic diseases
- Describe the management of emergencies and complications of this therapy
- Ensure informed consent is obtained and appropriately documented for therapies
- Ensure patients receive appropriate management of co-morbidities and end-of-life care, including assisting patients and families in accessing relevant community resources
- Recognize the opportunity and demonstrate the ability to offer clinical trial participation as a therapeutic option in an appropriate and ethical manner

5. **Demonstrate the proficient and appropriate use of procedural skills for diagnosis and therapy**
   - Demonstrate effective, appropriate, and timely use and interpretation of diagnostic procedures relevant to radiation oncology, including but not limited to the following:
     - Ear, nose, and throat endoscopy
     - Gynecologic examination

- Demonstrate effective, appropriate, and timely performance of therapeutic procedures relevant to radiation oncology
- Ensure informed consent is obtained and appropriately documented for procedures
- Document and describe information related to procedures performed and their outcomes
- Ensure adequate follow-up is arranged for procedures performed

6. **Recognize the limits of their own expertise and seek appropriate consultation from other health professionals**
   - Demonstrate insight into their own limits of expertise
   - Demonstrate effective, appropriate, and timely consultation with other health professionals as needed for optimal patient care
   - Arrange appropriate follow-up care for patients and their families

Communicator

Definition:
As *communicators*, radiation oncologists effectively facilitate the doctor-patient relationship and the dynamic exchanges that occur before, during, and after the medical encounter.

Key and enabling competencies: radiation oncologists are able to…

1. **Develop rapport, trust, and ethical therapeutic relationships with patients and families**
   - Recognize that good communication is an essential clinical skill for physicians, and that effective physician-patient communication can foster patient satisfaction, physician satisfaction, adherence to recommended therapies and improved clinical outcomes
   - Establish positive therapeutic relationships with patients and their families that are characterized by understanding, trust, respect, honesty, and empathy
   - Respect patient confidentiality, privacy and autonomy
   - Listen effectively
   - Be aware of and responsive to non-verbal cues
   - Facilitate a structured clinical encounter effectively
2. **Accurately elicit and synthesize relevant information and perspectives of patients and families, colleagues, and other professionals**
   - Gather information about a disease and about a patient's beliefs, concerns, expectations, and illness experience
   - Describe the impact of such factors as age, gender, disability, ethno-cultural background, social support, and emotional influences on a patient's illness
   - Support and counsel a patient about end-of-life care and appropriate palliative care referral, and identify the need for and strategies to access bereavement counseling
   - Seek out and synthesize relevant information from other sources, including a patient's family, caregivers, and other professionals
3. **Convey relevant information and explanations accurately to patients and families, colleagues and other professionals**
   - Deliver information to a patient and family, colleagues, and other professionals in a humane manner and in such a way that it is understandable and encourages discussion and participation in decision-making
   - Describe the opportunity to participate in a clinical trial, including the ability to convey and manage medical uncertainty

4. **Develop a common understanding of issues, problems, and plans with patients, families, and other professionals to develop a shared plan of care**
   - Identify and explore problems to be addressed from a patient encounter effectively, including the patient's context, responses, concerns, and preferences
   - Respect diversity and difference, including but not limited to the impact of gender, religion, and cultural beliefs on decision-making
   - Encourage discussion, questions, and interaction in the encounter
   - Engage patients, families, and relevant health professionals in shared decision-making to develop a plan of care
   - Address challenging communication issues effectively, including obtaining informed consent, delivering bad news, and addressing anger, confusion, and misunderstanding
5. **Convey effective oral and written information about a medical encounter**
   - Produce clear, concise, accurate, reasoned, timely, and appropriate records of clinical encounters and plans
   - Present verbal reports of clinical encounters and plans effectively
   - Present the patient's problems clearly, concisely, and correctly in a clinical setting or formal presentation
   - Present medical information effectively to the public or media about a medical issue

Collaborator

Definition
As *collaborators*, radiation oncologists effectively work within a health care team to achieve optimal patient care.

Key and enabling competencies: radiation oncologists are able to…
1. **Participate effectively and appropriately in an inter-professional health care team**
   - Describe the radiation oncologist's roles and responsibilities to other professionals
   - Describe the roles and responsibilities of other professionals within the health care team, including but not limited to treatment planners, medical physicists, radiation therapists, radiation therapy nurses, and other physician specialists
   - Recognize and respect the diversity of roles, responsibilities, and competencies of other professionals in relation to their own
   - Demonstrate open-mindedness in the consideration of alternative and complementary healthcare practices
   - Work with others to assess, plan, provide, and integrate care for individuals and groups of patients
   - Work with others to assess, plan, provide, and review other tasks, including research problems, educational work, program review or administrative responsibilities
     - Participate effectively in inter-professional team meetings including tumor boards
     - Enter into interdependent relationships with other professions for the provision of quality care
     - Describe the principles of team dynamics
     - Respect team ethics, including confidentiality, resource allocation, and professionalism
     - Demonstrate leadership in a health care team, as appropriate

2. **Work with other health professionals effectively to prevent, negotiate, and resolve inter-professional conflict**
   - Demonstrate a respectful attitude toward other colleagues and members of an inter-professional team
   - Work with other professionals to prevent conflicts
   - Employ collaborative negotiation to resolve conflicts
   - Respect differences and address misunderstandings and limitations in oneself and other professionals
   - Recognize one's own differences, misunderstandings, and limitations that may contribute to inter-professional tension
   - Reflect on inter-professional team functions and suggest or implement appropriate changes

Manager

Definition
As *managers*, radiation oncologists are integral participants in health care organizations, organizing sustainable practices, making decisions about allocating resources, and contributing to the effectiveness of the health care system.

Key and enabling competencies: radiation oncologists are able to…

1. **Participate in activities that contribute to the effectiveness of their health care organizations and systems**
   - Work collaboratively with others in their organizations
   - Explain the importance of shared responsibility for health care provision in a multidisciplinary and inter-professional setting, and in continuing care in the community
   - Participate in systematic quality process evaluation and improvement, including patient safety initiatives
   - Contribute to the enhancement of quality care and patient safety in radiation oncology, integrating the available best evidence and best practices
   - Describe the process required for a facility to be accredited to use ionizing radiation
   - Participate in audits, quality improvement, risk management, occurrence/incident reporting, and complaint management in a hospital and ambulatory setting
   - Define cost/benefit ratios, cost containment, effectiveness, and efficiency as they relate to the choice of preventive or diagnostic/therapeutic interventions
   - Describe the structure and function of the health care system as it relates to radiation oncology, including the roles of physicians
   - Describe principles of health care financing, including physician remuneration, budgeting, and organizational funding
   - Describe factors that need to be considered in planning for the population's needs for human and facility resources relevant to ensuring appropriate access to radiation therapy services
2. **Manage their radiation oncology practice and career effectively**
   - Set priorities and manage time to balance patient care, practice requirements, outside activities, and personal life
   - Demonstrate the importance of punctuality and time management, especially when working in a team environment
   - Manage a practice, including finances and human resources

- Implement strategies to ensure personal practice improvement
- Employ information technology appropriately for patient care

3. **Allocate finite health care resources appropriately**
   - Recognize the importance of just allocation of healthcare resources, balancing effectiveness, efficiency, and access with optimal patient care
   - Discuss the advantages, disadvantages, and relative costs of prevention, screening, and therapeutic cancer programs
   - Compare the advantages, disadvantages, and relative costs of care in different settings, including the role of the various forms of health care provision, including hospitals, regional cancer centers, ambulatory clinics, private offices, home care, chronic care, and palliative care
   - Avoid unnecessary investigations and hospitalization
   - Apply evidence and management processes for cost-appropriate care
   - Participate in cost-effectiveness and quality assurance programs
   - Make judicious use of complex technologies
   - Demonstrate an understanding of the relative cost of newer technologies and the supportive evidence for their application
4. **Serve in administration and leadership roles, as appropriate**
   - Chair or participate effectively in committees and meetings
   - Lead or participate in the implementation of change in healthcare
   - Plan relevant elements of health care delivery (e.g., work schedules)

Health Advocate

Definition
As *health advocates*, radiation oncologists responsibly use their expertise and influence to advance the health and well-being of individual patients, communities, and populations.

Key and enabling competencies: radiation oncologists are able to…

1. **Respond to individual patient health needs and issues as part of patient care**
   - Identify the health needs of an individual patient
   - Identify opportunities for advocacy, health promotion and disease prevention with individuals to whom they provide care, including but not limited to smoking cessation, preventing and managing obesity, and exercise programs
   - Identify opportunities for advocacy with regard to patient safety
   - Describe strategies to facilitate access to relevant community resources for patients and families
   - Appreciate the possibility of competing interests between individual advocacy issues and the community at large
2. **Respond to the health needs of the communities that they serve**
   - Describe the practice communities that they serve
   - Identify opportunities for advocacy, health promotion, and disease prevention in the communities that they serve, and respond appropriately
   - Appreciate the possibility and problems of competing interests, including their own, within the communities served

3. **Identify the determinants of health for the populations that they serve**
   - Identify the determinants of health, including barriers to access to care and resources
   - Identify vulnerable or marginalized populations within those served and respond appropriately
4. **Promote the health of individual patients, communities, and populations**
   - Describe an approach to implementing change in a determinant of the health of the population they serve
   - Describe how public policy impacts on the health of the populations served
   - Identify points of influence in the health care system and its structure
   - Describe the ethical and professional issues inherent in health advocacy, including altruism, social justice, autonomy, integrity, idealism, and conflicts of interest
   - Appreciate the possibility of a conflict of interest between the role of a health advocate for a patient or community and that of a manager or gatekeeper
   - Describe the role of the medical profession in advocating collectively for health and patient safety
   - Describe the advocacy role of the profession for issues related to radiation protection

Scholar

Definition
As *scholars*, radiation oncologists demonstrate a lifelong commitment to reflective learning, as well as the creation, dissemination, application, and translation of medical knowledge.

Key and enabling competencies: radiation oncologists are able to…
1. **Maintain and enhance professional activities through ongoing learning**
   - Describe the principles of maintenance of competence
   - Describe the principles and strategies for implementing a personal knowledge-management system
   - Recognize and reflect upon learning issues in practice
   - Conduct a personal practice audit
   - Pose an appropriate learning question
   - Access and interpret the relevant evidence
   - Integrate new learning into practice
   - Evaluate the impact of a change in practice
   - Document the learning process
2. **Critically evaluate medical information and its sources, and apply this appropriately to practice decisions**
   - Describe the principles of critical appraisal
   - Critically appraise retrieved evidence in order to address a clinical question
   - Integrate critical appraisal conclusions into clinical care
3. **Facilitate the learning of patients, families, students, residents, other health professionals, the public, and others, as appropriate**
   - Describe principles of learning relevant to medical education
   - Identify the learning needs and desired learning outcomes of others collaboratively
   - Select effective teaching strategies and content to facilitate others' learning
   - Demonstrate an effective lecture or presentation
   - Assess and reflect on a teaching encounter

- Provide effective feedback
- Describe the principles of ethics with respect to teaching

4. **Contribute to the development, dissemination, and translation of new knowledge and practices**
   - Describe the principles of research and scholarly inquiry
   - Describe the principles of research ethics
   - Pose a scholarly question
   - Conduct a systematic search for evidence
   - Select and apply appropriate methods to address the question
   - Disseminate the findings of a study
   - Recognize and offer participation in a clinical trial in appropriate situations
   - Demonstrate knowledge of the principles of radiation oncology through completion of a scholarly project related to radiation oncology

Professional

Definition:
As *professionals*, radiation oncologists are committed to the health and well-being of individuals and society through ethical practice, profession-led regulation, and high personal standards of behavior.

Key and enabling competencies: radiation oncologists are able to…

1. **Demonstrate a commitment to their patients, profession, and society through ethical practice**
   - Exhibit appropriate professional behaviors in practice, including honesty, integrity, commitment, compassion, respect, and altruism
   - Demonstrate trustworthiness (honesty, confidentiality) toward patients, families, and colleagues
   - Demonstrate a commitment to delivering the highest quality care and maintenance of competence, including involvement in peer review processes
   - Recognize and respond appropriately to ethical issues encountered in practice
   - Describe the basic principles and problems in medical ethics, including respect for persons/autonomy, beneficence, non-maleficence, justice, confidentiality, the best interest of the patient, truth-telling, conflict of interest, end-of-life care, advance directives, and resource allocation
   - Demonstrate tolerance for ambiguity and uncertainty, and the possibility of error in ethical decision-making
   - Recognize and manage conflicts of interest
   - Recognize the principles and limits of patient confidentiality as defined by professional practice standards and the law
   - Maintain appropriate relations with patients
2. **Demonstrate a commitment to their patients, profession and society through participation in profession-led regulation**
   - Demonstrate knowledge and an understanding of the professional, legal and ethical codes of practice
   - Fulfill the regulatory and legal obligations required of current medico-legal practice
   - Describe the principles of medico-legal liability, including fiduciary responsibility, duty of care, breach of duty, standard of care and harm

- Explain the principles of research ethics
- Demonstrate accountability to professional regulatory bodies
- Recognize and respond to others' unprofessional behaviors in practice
- Participate in peer review

3. **Demonstrate a commitment to physician health and sustainable practice**
   - Balance personal and professional priorities to ensure personal health and a sustainable practice
   - Strive to heighten personal and professional awareness, and insight
   - Demonstrate a willingness to accept peer and supervisor reviews of professional competence
   - Recognize other professionals in need and respond appropriately

TRAINING DURATION AND ROTATIONS

Training Duration

The radiation oncology program is a five-year residency program. Each year includes 13 four-week blocks.

Schedule of Rotations

The rotations throughout the five-year program will include clinical core specialty rotations and off-service rotations relevant to the specialty oncology. For each of the clinical core specialty rotations in radiation oncology, one resident is assigned to one preceptor.

The residency program is structured as follows.

PGY-1 - Basic Clinical Training

The first year involves an introduction to radiation oncology in addition to rotations aimed at improving competence in primary medical and surgical problems, particularly those commonly encountered in oncology. It will also include exposure to subspecialties related to oncology. This year will also cover the Radiation Therapy Physics Course (details shown below).

# OF BLOCKS	PGY-1 ROTATIONS
4	Radiation Oncology
1	General Internal Medicine
1	Emergency Medicine
1	Palliative Care
3	Surgical Oncology Selective (Breast, Colorectal, Gyne-onc, Urology, Thoracic, Neurosurgery, ENT)
1	Radiology
1	Research
1	Medical Oncology

PGY-2

The PGY-2 will include rotations in oncological subspecialties to better understand the roles of the different oncology disciplines. The latter half will focus on radiation oncology to have a broad understanding of radiation therapy. The resident will focus on assessment and reporting of basic principles (patient factors, tumor factors and treatment factors) in a patient presenting with cancer. He/ she should be able to obtain a relevant focused history and perform a reliable examination, should be able to request and interpret basic staging investigations, and should learn the epidemiology and natural history of common malignancies. The resident will learn using treatment planning software and learn how to contour normal structures and define the clinical target.

This year will also cover treatment planning course I (details are shown below).

# OF BLOCKS	PGY-2 ROTATIONS
2	Medical Oncology
1	Malignant Hematology
7	Radiation Oncology
1	Radiobiology
1	Treatment Planning
1	Palliative Care

PGY-3

The PGY-3 will be focused on radiation oncology. The resident should be able to adequately interpret diagnostic and staging investigations, accurately stage a cancer patient, outline evidence-based treatment options, make a treatment recommendation, and obtain informed consent for common conditions. The resident will work with radiation therapy planning and treatment delivery staff to synthesize optimal patient-specific radiation treatment. The resident should be able to review, critique, and accept the presented treatment plans. The resident will also learn to detect and treat early radiation side effects.

# OF BLOCKS	PGY-3 ROTATIONS
12	Radiation Oncology
1	Elective

PGY-4 & PGY-5

During the final two years of the training, the resident will focus on the practice of radiation oncology. The resident should expand the knowledge acquired as a junior resident and have a thorough and critical understanding of the literature as applied to radiation oncology. The resident will learn to outline evidence-based treatment options, make a treatment recommendation, and obtain informed consent for complex and/or less common conditions. The resident will work with radiation therapy planning and treatment delivery staff to synthesize more complex radiation treatment plans (e.g., re-irradiation, target overlapping with critical structures). The resident will also learn to detect and manage late radiation side effects. Three rotations will be dedicated to a specialized radiation therapy technique (e.g., advanced brachytherapy, proton therapy, and stereotactic radiation).

# OF BLOCKS	PGY 4-5 ROTATIONS
22	Radiation Oncology
1	Pediatric Oncology
3	Radiation Oncology Electives

CONTINUUM OF LEARNING

The aforementioned competencies will progress gradually throughout the residency such that the expected level of competency will increase according to the level of training.

Adapted from University of Alberta Radiation Oncology Curriculum and American Board of Radiology

Junior residents (PGY1-3): *Focus on assessment and reporting of basic principles (patient factors, tumor factors, and treatment factors) in a patient presenting with cancer.*

- Gain expertise in obtaining a focused history and performing a reliable examination. Be able to present findings of the history and exam.
- Learn the epidemiology, anatomy, pathology, diagnostic imaging, clinical presentation, and staging of all cancer sub-sites listed in the core clinical problem list.
- Be able to outline treatment options and make a treatment recommendation; describe the role, rationale, benefits, and side effects of radiation therapy; and obtain informed consent.
- Recognize situations with a need for urgent or emergent medical care, including life-threatening conditions.
- Design blocks, contour target(s), and contour normal tissue with minimal inaccuracies; state appropriate dose planning objectives for normal tissues and target(s) of all cancer sub-sites listed in the core clinical problem list.
- Work with radiotherapy planning and treatment delivery staff for palliative, adjuvant, and radical radiation treatment of all cancer sub-sites listed in the core clinical problem list.

Senior residents (PGY4-5): *Focus on interpreting and synthesizing basic principles based on thorough understanding of published literature as well as accumulated clinical experience. Build on the knowledge and skills acquired as a junior resident.*

- Be able to outline treatment options and make a treatment recommendation; describe the role, rationale, benefits, and side effects of radiation therapy and obtain informed consent for complex cases and re-irradiation cases.
- Design blocks, contour target(s), and contour normal tissues accurately; critically evaluate treatment plan options for complex cases and re-irradiation cases.
- Work with radiotherapy planning and treatment delivery staff on complex cases and re-irradiation cases.
- Be able to manage acute and late effects of radiation.
- Have detailed knowledge of literature relevant to all cancer sub-sites listed in the core clinical problem list.

CORE SPECIALTY ROTATIONS

Basic Core Specialty Rotations

These are developed with consideration to the Royal College of Physicians and Surgeons of Canada's *Specialty Training Requirements in Radiation Oncology* (v. 2012) and the American Board of Radiology *Certification Requirements.* Competencies of core specialty topics are described below:

Basic Core Specialty Rotation: Radiobiology Course

Radiation Oncology Objectives for Competency in Radiobiology

Medical Expert

The resident will develop a good understanding of radiation biology underlying the practice of radiation oncology. The aim of the course is for the resident to:

1. Understand how ionizing radiation interacts with matter, and its direct and indirect action
2. Understand the molecular and cellular damage induced by radiation and how it can be measured.
3. Understand the molecular and cellular response to radiation damage including mechanisms of DNA damage repair, mechanisms of cell death, cell survival, and models for quantifying cell survival
4. Understand linear energy transfer (LET), relative biological effectiveness (RBE), oxygen effect and influence of the tumor microenvironment.
5. Learn the linear-quadratic model for measuring cell survival and its application to radiation fractionation; apply the knowledge to modified fractionation and understand its clinical implication.
6. Understand the dose-response relationship in radiotherapy: tumor control probability (TCP), normal tissue complication probability (NTCP), and maximizing the therapeutic index.
7. Develop a practical understanding of the radiobiological aspects of different radiation modalities (e.g., protons, high LET sources, stereotactic radiotherapy) as well as the dose-rate effects of brachytherapy.
8. Develop comprehensive understating of the effect of radiation on normal tissue, its pathogenesis, clinically relevant manifestations (early and late effects, radiation-induced malignancies), and its management.
9. Understand the interaction of radiation with chemotherapy and other biological response modifiers.

Communicator

The resident will be able to:

1. Develop a professional rapport with the radiobiologist
2. Accurately convey relevant information and explanations to colleagues and coworkers
3. Effectively convey oral and written information about the knowledge acquired during the course

Collaborator

The resident will be able to:
1. Share knowledge and information with other residents
2. Develop organizational structures that facilitate effective learning of the course objective
3. Understand the roles of the radiobiologist in the field of radiation oncology

Manager

The resident will be able to:
1. Develop time management skills allowing him/her to achieve the objectives stated within the specified time frame

Scholar

The resident will be able to:
1. Apply the knowledge acquired to clinical radiation oncology
2. Accept feedback received

Professional

The resident will be able to:
1. Exhibit a professional approach with staff
2. Be punctual and dependable

Structure

One block during PGY-2. The course will be delivered by SCFHS certified radiation oncologists, radiobiologists, or medical physicists involved in the field of therapeutic radiation. It will be delivered to all residents under the central city-based program as organized by the program director.

A refresher course (e.g., https://www.radonc.utoronto.ca/clinical-and-experimental-radiobiology-course, https://www.estro.org/school/2018-course-programme-pages/2018-australia--basic-clinical-radiobiology--programme) during PGY-4 or PGY-5 is recommended.

Evaluation

Written formative assessment will be conducted after completion of the course. All trainees must attain minimum competency in the summative assessment.

Basic Core Specialty Rotation: Radiation Therapy Physics Course

Radiation Oncology Objectives for Competency in Radiation Therapy Physics

Medical Expert

The resident will develop a good understanding of radiation physics underlying the practice of radiation oncology. The aim of the first course is to develop a good understanding of the principles of radioactivity, radiation production, radiation measurement and dosimetry, and radiation safety and protection.

The resident should develop adequate knowledge to explain the following concepts (adapted from American Board of Radiology (ABR) requirements):

1. Atomic and nuclear structure
    a. Bohr model of the atom, electron transitions, and characteristic radiation
    b. Nuclear structure, nuclear forces, and mass/energy relationships
    c. Factors affecting nuclear stability
    d. Nuclear nomenclature
2. Radioactivity
    a. Modes of radioactive decay
    b. Decay schemes and properties for therapeutic isotopes
    c. Mathematics of radioactive decay
    d. Naturally occurring radioisotopes
    e. Nuclear activation, fusion, fission
3. Particle interactions and production of radiation
    a. Mass, energy, and charge relationships
    b. Electromagnetic radiation
    c. Production of radiation
    d. Interactions of particulate radiation with matter
4. Treatment machines
    a. Linear accelerators
    b. Other particle accelerators
    c. Cobalt units
    d. Low energy therapeutic x-rays (< 300 kV)
    e. Treatment machine quality assurance
5. Photon interactions
    a. Coherent scatter
    b. Photoelectric effect
    c. Compton effect
    d. Pair production
    e. Photonuclear disintegration
    f. Relative dependence on Z, E, and density
6. Radiation measurement and calibration
    a. Exposure (air kerma)
    b. Absorbed dose and kerma
    c. Dose equivalent/effective dose equivalent (radiation quality and tissue weighting factors)
    d. Calculation of absorbed dose from exposure (e.g., f-factor)
    e. Bragg-Gray cavity theory
    f. Ionization chambers
    g. Calibration of photon and electron beams (e.g., TG-51)
    h. Other dosimetry techniques (thermoluminescen dosimetry/optically stimulated luminescence dosimetry, film, solid-state diodes, other gas-filled detectors, scintillation detectors, chemical dosimetry, calorimetry)
    i. Measurement techniques

7. Radiation beam quality
    a. Mathematics of exponential attenuation
    b. Beam quality for heteroenergetic beams
8. Dosimetry of photon beams in a homogeneous water phantom
    a. Dose distributions
    b. Flattening filters and flattening-filter free beams
    c. Dose distributions for multiple unshaped beams
    d. Tissue-air ratio (TAR), tissue-maximum ratio (TMR), and tissue-phantom ratio (TPR)
    e. Relationships between percent depth dose (PDD), TAR, TMR, and TPR
    f. Point-dose and treatment-time calculation methods for single unshaped fields
    g. Point-dose and treatment-time calculations for single-shaped fields
    h. Isodose distributions for multiple fields, including arc therapy
9. Dosimetry of photon beams in a patient
    a. Corrections for patient contour
    b. Corrections for tissue inhomogeneities
    c. Dose within and around an inhomogeneity
    d. Matching of adjacent fields
    e. Wedges
    f. Parallel-opposed beams
    g. Entrance dose and exit dose, including beam-modifying devices
    h. Isodose distributions for multiple beams, including mixed modality and arc therapy
    i. Compensators for photon beams
    j. Off-axis factors
10. Electron beam characteristics and dosimetry
    a. Dose distributions
    b. Factors affecting dose distributions
    c. Energy specification
    d. Choice of energy and field size
    e. Air gaps and oblique incidence
    f. Tissue inhomogeneities
    g. Bolus, absorbers, and spoilers
    h. Matching adjacent fields
    i. Point-dose and treatment-time calculations
    j. Field-shaping techniques
    k. Electron arc
    l. Total skin electron therapy
11. Imaging for radiation oncology
    a. Plane radiography and fluoroscopy for simulation
    b. Portal imaging
    c. Imaging for radiation therapy planning
    d. Isotope imaging
    e. Image processing, digitally reconstructed radiographs (DRRs), and volume rendering
    f. Image registration
12. Brachytherapy
    a. Calculation of dose from a point source
    b. Calculation of dose from a line source
    c. Physical and dosimetric properties of commercial sealed sources and applicators
    d. Implant instrumentation and techniques for low dose rate
    e. Implant instrumentation and techniques for high dose rate, including PDR
    f. Biological implications of dose, dose rate, and fractionation

g. Calibration and specification of sources
h. Disseminated (unsealed) sources/total body and organ dosimetry
i. Acceptance testing and quality assurance

13. Radiation protection
    a. Principles, biological effect models, personnel dose limits, rules, and regulations
    b. Structural shielding design for external beam therapy
    c. Radiation protection for brachytherapy procedures
    d. Leak testing of sealed sources
    e. Routine radiation surveys
    f. Personnel monitoring
    i. Protection against non-ionizing radiation
14. Informatics
    a. DICOM
    b. PACS
    c. Networks, storage, and archives
15. Particle beam therapy
    a. Heavy charged particles
    b. Light charged particles, protons
    c. Neutrons
    d. Relative biological effectiveness (RBE) and RBE-weighted dose
    e. Physical and biological implications of particle therapy

Communicator

The resident will be able to:

1. Develop a professional rapport with other colleagues involved in treatment planning including the radiation oncologist, medical physicist, dosimetrist, and radiation therapist
2. Accurately convey relevant information and explanations to colleagues and coworkers
3. Convey effective oral and written information about the knowledge acquired during the course

Collaborator

The resident will be able to:

1. Share knowledge and information with other residents
2. Develop organizational structures that facilitate learning the course objective effectively
3. Understand the roles of the medical physicist in the field of radiation oncology

Manager

The resident will be able to:

1. Develop time management skills allowing him/her to achieve the objectives stated within the specified time frame

Scholar

The resident will be able to:

1. Apply the knowledge acquired to clinical radiation oncology
2. Accept feedback received
3. Teach other residents

Professional

The resident will be able to:
1. Exhibit a professional approach with staff
2. Be punctual and dependable

Structure

An average of one hour per week of didactic lectures during the academic half day during PGY-1.

Evaluation

Written formative assessment will be performed after completion of the course. All trainees must attain minimum competency in the summative assessment and in laboratory reports.

Basic Core Specialty Rotation: Radiation Treatment Planning I [Principles of Treatment Planning]

Radiation Oncology Objectives for Competency in Radiation Treatment Planning Principles

Medical Expert

The resident will develop a good understanding of the principles of treatment simulation, treatment planning, and radiation delivery. The resident will also learn common treatment techniques for different disease sub-sites.

The resident should develop adequate knowledge to explain the following concepts.
1. Imaging for radiation oncology
   a. Plane radiography and fluoroscopy for simulation
   b. Portal imaging
   c. Imaging for radiation therapy planning
   d. Isotope imaging
   e. Image processing, digitally reconstructed radiographs (DRRs), and volume rendering
   f. Image registration
2. Treatment planning, international commission on radiation units and measurements (ICRU), and beam-related biology
   a. 3D treatment planning, non-coplanar beams
   b. ICRU concepts
   c. Virtual simulation, including beam's eye view (BEV) techniques
   d. Treatment planning systems
   e. Plan evaluation (dose volume histograms (DVH), normal tissue complication probability (NTCP), tumor control probability (TCP), etc.)
   f. Radiosurgery/stereotactic body radiotherapy (SBRT)
   g. Total body irradiation
3. IMRT, conformal arc, and volumetric modulated arc therapy (VMAT)
   a. IMRT delivery systems
   b. Dose prescriptions and inverse planning
   c. IMRT quality assurance

4. Assessment of patient set-up and verification
    a. Positioning and immobilization methods and devices
    b. Treatment verification
    c. Imaging for treatment delivery/image-guided radiation therapy (IGRT)
    d. Respiratory motion management
5. Brachytherapy
    a. Implant instrumentation and techniques for common disease sites

The aforementioned concepts are taught through clinical scenarios of treatment planning in the different disease sites stated in the core specialty topics.

Communicator

The resident will be able to:
1. Develop a professional rapport with other colleagues involved in treatment planning including the radiation oncologist, medical physicist, dosimetrist, and radiation therapist
2. Accurately convey relevant information and explanations to colleagues and coworkers
3. Convey effective oral and written information about the knowledge acquired during the course

Collaborator

The resident will be able to:
Share knowledge and information with other residents
Develop organizational structures that facilitate learning the course objective effectively
Understand the roles of the dosimetrist and medical physicist in the field of radiation oncology

Manager

The resident will be able to:
1. Develop time management skills allowing him/her to achieve the objectives stated within the specified time frame

Scholar

The resident will be able to:
1. Apply the knowledge acquired to clinical radiation oncology
2. Accept feedback received
3. Teach other residents

Professional

The resident will be able to:
1. Exhibit a professional approach with staff
2. Be punctual and dependable

Structure

A 4-week block of didactic lectures and practical teaching on treatment planning software during PGY-2

Evaluation

Written and oral formative assessment will be performed after completion of the course. All trainees must attain minimum competency in the summative assessment.

Basic Core Specialty Rotation: Radiation Treatment Planning II [Clinical Treatment Planning]

Radiation Oncology Objectives for Competency in Radiation Clinical Treatment Planning

Medical Expert

The resident will develop a good understanding of clinical treatment planning for different disease sub-sites.

The resident should develop adequate knowledge to explain the following concepts in all disease sites stated in the core specialty topics:

a. Treatment principles
   - Knowledge of standard dose/fractionation schedules
   - Early and late side effects

b. Treatment planning
   - Immobilization methods and the importance of patient comfort and set-up reproducibility
   - Identification of surgical scars, drain sites, and swellings
   - Determination of gross tumor volume (GTV), clinical target volume (CTV), and planning target volume (PTV)
   - Dose-volume constraints for neoplastic and normal tissues relevant to the fractionation schedule proposed for the plan
   - Tissue inhomogeneity corrections
   - Compensation for anatomical variations/organ motion in the irradiated volume
   - Dosimetric planning including use of bolus, choice of photon and/or electron energies, beam weighting, and use of wedges
   - Planning using more advanced techniques such as tomotherapy and IMRT
   - The ICRU recommendations for dose prescriptions for external beam therapy and brachytherapy
   - Verification of treatment delivery, including patient set-up and imaging

Communicator

The resident will be able to:

1. Develop a professional rapport with other colleagues involved in treatment planning including the radiation oncologist, medical physicist, dosimetrist, and radiation therapist
2. Accurately convey relevant information and explanations to colleagues and coworkers
3. Convey effective oral and written information about the knowledge acquired during the course

Collaborator

The resident will be able to:
1. Share knowledge and information with other residents
2. Develop organizational structures that facilitate learning the course objective effectively
3. Understand the roles of the dosimetrist and medical physicist in the field of radiation oncology

Manager

The resident will be able to:
1. Develop time management skills allowing him/her to achieve the objectives stated within the specified time frame

Scholar

The resident will be able to:
1. Apply the knowledge acquired to clinical radiation oncology
2. Accept feedback received
3. Teach other residents

Professional

The resident will be able to:
1. Exhibit a professional approach with staff
2. Be punctual and dependable

Structure

A 4-week block of case-based discussion and hands-on treatment planning software during the PGY-3 with the involvement of both clinicians and dosimetrists.

Evaluation

Case-based objective-structured clinical examination (OSCE) assessment; all trainees must attain minimum competency in the summative assessment.

CLINICAL CORE SPECIALTY ROTATIONS:

Competencies for the CanMEDS role as a Medical Expert will be described below specifically for each rotation. Competencies in other CanMEDS roles of core specialty topics are summarized as follows.

*Adapted from the University of Alberta and University of Ottawa curricula

Communicator

The training should provide the residents with exposure and opportunity to develop the communication skills essential for obtaining and conveying information to the patient and their families, as well as establishing therapeutic plans between the medical team and the patient. These abilities are critical in eliciting patients' beliefs, concerns, and expectations about their illness. The resident should be able to assess key factors impacting patients' beliefs to ensure that patients are able to make informed decisions and retain their right to autonomy.

The resident should be able to effectively communicate a management plan including treatment options and the relevant side effects to the patients, their families, and all members of the multidisciplinary team. This will include: presenting the patients problems clearly, concisely, and correctly as a written medical record and verbal presentation, demonstrating care, empathy, and respect, supporting and counseling patients and their families with situations related to end-of-life issues, and demonstrating an open mind and knowledge of alternative and complementary healthcare practices.

The written and/or dictated communications should be submitted and corrected promptly.

Collaborator

The resident should be able to interact and consult effectively with all health professionals by recognizing and acknowledging their roles and expertise. This interaction should include general surgeons, medical oncologists, radiologists, pathologists, nurses, radiation therapists, medical physicists, physiotherapists, and social workers.

The resident should recognize tasks that can be delegated to the team members taking care of the patients and be able to transfer duties to the appropriate person in order to assure a continuity of care during his or her absence.

The resident should learn to seek help from the other members of the treatment team and effectively work with other health professionals to prevent, negotiate, and resolve inter-professional conflict.

Manager

The resident should be able to understand and use current information technology efficiently to obtain the pertinent information for patients' care.

The resident should be able to use the health care resources in a cost-effective manner, understanding the scope and the limitations of each test, and be able to select the appropriate investigations as well as any treatment modality maintaining an adequate treatment benefit to cost ratio.

The resident should complete the consultation and follow-up notes within a reasonable time from the visit. In addition, treatment volumes need to be completed in a timely manner.

Health Advocate

The resident should function as an advocate for their patient to obtain adequate care corresponding to the priority of their condition. The resident should recognize advocacy as an essential and fundamental component of health promotion in the community. The resident should help the patient to promote good health habits and inform the community on screening and preventive programs for various cancers.

Scholar

The resident should display responsibility for self-directed learning as well as the development and implementation of a personal continuing education strategy.

The resident should be able to critically review the oncology literature, initiate the discussion about landmark articles, and recognize and describe areas where there are deficiencies in evidence-based care in oncology.

The teaching of oncology to other residents and medical students should be an integral component of the resident's activities.

Professional

The resident should demonstrate trustworthiness, honesty, and integrity in the interactions with patients and their families. The resident should show sensitivity and respect to the spiritual values and cultural differences of patients.

The resident should understand the ethical principles of autonomy, beneficence, non-maleficence, and justice by establishing priorities and goals with the patient and carers; discussing treatment options with the patient and jointly formulating care plans; fulfilling the patient's need for information about any treatments; respecting a patient's wish to decline treatment; and assessing the risks/burdens versus the benefits of each treatment.

The resident should be aware of the confidentiality of the patient's medical record at all times.

The resident should understand the principle of self-discipline and respect for different activity schedules as well as being punctual to attend meetings and clinics.

The resident should recognize in self and others the danger of trivializing and denying personal needs, recognize and respond to emotional stress in self and others on the team and identify where support is available.

The resident should demonstrate awareness of own limitations, seeking advice when necessary.

The resident should demonstrate respect when providing feedback and also be accepting of feedback from colleagues and peers.

Clinical Core Specialty Rotation: Breast Cancer

*Adapted from the University of Alberta and University of Ottawa curricula

Radiation treatment plays an important role in the curative, adjuvant, and palliative treatment of patients with breast cancer. The breast oncology rotation will enable the radiation oncology resident to obtain the knowledge and skills necessary to diagnose and manage patients with breast cancer in a multidisciplinary team environment.

At the completion of training, the trainee will have demonstrated the necessary knowledge and skills to function effectively as a consultant on the breast cancer service, integrating all the CanMEDS competencies in order to provide optimal, ethical, and patient-centered medical care.

Medical Expert

The trainee will possess a body of knowledge and technical skills relevant to breast oncology. This will enable the trainee to collect and to interpret data, and to carry out diagnostic and therapeutic procedures within the limits of their expertise.

The resident will be familiar with the following:

1. **Epidemiology**
   a. Risk factors for breast cancer such as family history, genetic abnormalities (BRCA1 and BRCA2), benign breast disease, parity, age of menarche and menopause, use of hormone replacement therapy, and prior radiation exposure
   b. The incidence of the common types of benign and malignant breast tumors
2. **Anatomy**
   a. Surface anatomy, draining lymphatics, blood supply and nerve supply of the breast and regional lymph nodes
   b. Age and pregnancy-related physiologic changes in the breast
   c. Radiological anatomy of the breast and regional nodes using mammography, ultrasound, CT scan and magnetic resonance imaging (MRI)
3. **Pathology**
   a. Benign and neoplastic lesions of the breast
   b. Normal histology of the breast
   c. The process of carcinogenesis
   d. The classification of neoplastic disease arising in the breast, including epithelial and mesenchymal malignancies using the WHO classification system
   e. The importance of pathological prognostic factors, including histological differentiation, resection margins, the presence of lymphovascular invasion and extent of lymph node involvement on the pathological report.

f. The process of special stains and studies as well as prognostic implications of hormone receptors and molecular pathology
g. The use of genomic assays (e.g., OncotypeDx, Mammaprint) prognostic and predictive tools in breast cancer

4. **Prevention:**
   a. Indications of screening and identification of risk groups
   b. Screening methods: mammogram, breast MRI
   c. Risks and benefits of screening and impact on mortality and other health parameters
   d. Other risk reduction methods such as bilateral mastectomy +/- oophorectomy in BRCA-1/2, hormonal therapy
5. **Diagnostic Imaging**
   a. Indications for mammography, breast ultrasound, and MRI of the breast in screening (both in a normal population and in a high-risk population) and follow-up
   b. Sensitivity and specificity of these imaging modalities
   c. Interventional radiology techniques such as stereotactic biopsy and wire localization for diagnosis of non-palpable lesions
6. **Clinical Presentation**
   a. Natural history of breast cancer and the clinical presentation of local, regional, and metastatic disease
   b. The risk of nodal disease in relation to the size and grade of the primary tumor
   c. The risk of residual axillary disease in the setting of micrometastasis in a sentinel node
7. **Clinical Skills**
   a. A **complete history and physical examination** of the breast and regional nodal areas, recognizing and describing abnormal findings
   b. Identification and management of treatment-related side effects of radiation as well as hormonal therapy, including skin reactions and menopausal symptoms
8. **Staging**
   a. TNM categories for breast cancer using the UICC system (7th edition)
   b. The principle of clinical and pathological staging following neoadjuvant systemic therapy
   c. The principle of clinical and pathological staging, as well as the restaging of recurrent disease
9. **Radiobiology**
   a. The effect of x-rays on the normal and neoplastic tissues in the irradiated volumes
   b. The principle of acute, early delayed, and delayed radiation reactions
   c. The concept of fractionation and its impact on both tumor control and normal tissue-induced toxicity; such fractionation schedules include concomitant boost and hypofractionation.
10. **Radiation Pathology**
    a. Radiation therapy-induced clinical and pathological changes in normal tissue, both at the histopathological and physiological levels
    b. The impact of other factors such as co-morbidities and/or systemic chemotherapy on the incidence and severity of the radiation-induced pathological changes in the irradiated organs
11. **Radiation Physics**
    a. Properties of photons and electrons
    b. Principles of radiation safety relevant to linear accelerators and brachytherapy
    c. Principles of intensity-modulated radiotherapy including QA

12. **Clinical Trials**
    a. The literature pertaining to breast oncology especially with meta-analyses (Oxford overviews) and randomized clinical trials (NSABP, OCOG, EORTC, NCIC) that have impacted our current management in breast oncology
    b. Relevant clinical trials in the center
13. **Medical Oncology**
    a. Chemotherapeutic, hormonal, and molecular agents used in the treatment of breast cancer, as well as the side effect profile of the various agents and the risks or benefits of concurrent radiotherapy treatment
    b. The indications for use of these agents in the neoadjuvant, adjuvant, and metastatic setting
    c. The indications for use of hormonal therapies in breast cancer prevention
14. **Surgical Oncology**
    a. The methods of obtaining histological diagnosis such as fine needle aspiration (FNA), core biopsy, excisional biopsy, and sentinel lymph node biopsy
    b. The principles of surgical management in breast cancer including breast conserving surgery, modified radical mastectomy, sentinel node biopsy, axillary node dissection, and also reconstructive techniques such as TRAM flap and implants
15. **Radiotherapy:**
    a. Treatment principles
        - Knowledge of standard dose/fractionation schedules
        - Early and late side effects
    b. Treatment planning
        - Immobilization methods and the importance of patient comfort and set-up reproducibility
        - Identification of surgical scars, drain sites, and swellings
        - Determination of GTV, CTV, and PTV
        - Dose-volume constraints for neoplastic and normal tissues relevant to the fractionation schedule proposed for the plan
        - Techniques used to reduce heart dose such as prone position and deep inspiration breath hold (DIBH)
        - Tissue inhomogeneity corrections
        - Compensation for anatomical variations in the irradiated volume
        - Dosimetric planning including use of bolus, choice of photon and/or electron energies, beam weighting, and use of wedges
        - Planning using more advance techniques such as tomotherapy and IMRT
        - The ICRU recommendations for dose prescriptions for external beam therapy and brachytherapy
        - Verification of treatment delivery, including patient set-up and imaging

Graded Responsibility

Junior residents: *Focus on assessment and reporting of basic principles (patient factors, tumor factors, and treatment factors) in a patient presenting with breast cancer.*

- Learn the epidemiology, anatomy, pathology, diagnostic imaging, clinical presentation, and staging of breast cancer.
- Gain expertise in obtaining a focused history and performing a reliable breast and regional nodal examination. Be able to present findings of the history and exam and outline required staging tests.

- Be able to outline treatment options and a treatment recommendation, discuss the role and benefits of the radiation, obtain informed consent and work with radiotherapy planning and treatment delivery staff for adjuvant radiation treatment of DCIS and early invasive breast cancer.

Senior residents: *Focus on interpreting and synthesizing basic principles based on thorough understanding of published literature as well as accumulated clinical experience.*

- Build on the knowledge and skills acquired as a junior resident.
- Be able to outline treatment options and a treatment recommendation, discuss the role and benefits of the radiation, obtain informed consent, and work with radiotherapy planning and treatment delivery staff for adjuvant radiation treatment of node-positive, locally advanced, or inflammatory breast cancer, and recurrent breast cancer.
- Be able to manage acute and late effects of adjuvant breast radiation.
- Have detailed knowledge of literature relevant to breast cancer treatment.
- Be able to discuss current recommendations and controversies regarding breast cancer screening.

Clinical Core Specialty Rotation: Neuro-Oncology

*Adapted from the University of Alberta and University of Ottawa curricula

Radiation treatment plays an important role in the curative, adjuvant, and palliative treatment of patients with primary or secondary brain tumors. The neuro-oncology rotation will enable the radiation oncology resident to obtain the knowledge and skills necessary to treat brain tumor patients in a multidisciplinary team environment.

At the completion of training, the trainee will have demonstrated the necessary knowledge and skills to function effectively as a consultant on the neuro-oncology service integrating all the CanMEDS competencies in order to provide optimal, ethical, and patient-centered medical care.

Medical Expert

The trainee will possess a body of knowledge and technical skills relevant to neuro-oncology. This will enable the trainee to collect and to interpret data, and to carry out diagnostic and therapeutic procedures within the limits of their expertise.

The resident will be familiar with:

1. **Epidemiology**
   a. The influence of sex, age, occupation, known etiologic agents and association between genetic syndromes and primary brain tumors (e.g., neurofibromatosis, Von Hippel-Lindau)
   a. The relative incidence of the common types of benign and malignant brain tumors (both intra-axial and extra-axial lesions)
   c. The primary histologies commonly associated with brain metastases and spinal cord compression due to epidural metastatic disease
2. **Anatomy**
   a. The anatomy (both structural and functional anatomy) of the brain, skull base, and spinal cord.

3. **Pathology**
   a. The WHO grading for gliomas and meningiomas
   b. The clinical biomarkers for specific tumor types such as MGMT methylation status, IDH mutation for malignant glioma and cytogenic abnormalities (e.g., 1p/19q codeletion) for oligodendroglial tumors
   c. CSF evaluation in selected CNS tumors
4. **Diagnostic Imaging**
   a. The normal radiological anatomy of the brain, skull base, and spine
   b. The typical radiological appearance of the common types of benign and malignant brain tumors (both intra-axial and extra-axial lesions) on CT, MRI, and PET scan
   c. The use of different MRI sequences such as T1, T2, and Flair, as well as gadolinium enhancement in the interpretation of CNS lesions
5. **Clinical Presentation**
   a. The natural history of the common types of brain and spinal cord tumors
   b. The clinical presentation according to the site of local involvement, and the probability of craniospinal axis and distant metastatic disease
6. **Clinical Skills**
   a. A complete history and physical examination including complete neurological examination, recognizing and describing abnormal findings
   b. Identification and management of common tumor or treatment-related side effects such as seizures, increased intracranial pressure, DVT, and steroid-induced side effects
   c. Distinguish focal brain injury (necrosis) and more diffuse brain injury (neurocognitive side effects and their histopathologic correlates)
   d. Identification of the signs and symptoms of intracranial metastatic disease and spinal cord compression
   e. Management of seizures and increased intracranial pressure
7. **Staging**
   a. Neuropathological as well as neuroimaging staging
   b. The importance of other prognostic variables such as age and Karnofsky Performance Status
8. **Radiobiology**
   a. The effect of x-rays on the normal neurologic tissue and the neoplastic tissues in the irradiated volumes
   b. The principle of acute, early delayed, and delayed neurological toxicity secondary to irradiation
   c. The concept of radiation dose, fraction size, and treated volume in contributing to these side effects
   d. The rationale of altered fractionation schemes such as hyperfractionation, accelerated fractionation, hypofractionation, stereotactic radiosurgery, and their potential impact on both tumor control and normal nervous tissue toxicity
   e. The principle of radiation-induced secondary malignancies in the central nervous system
9. **Radiation Pathology**
   a. Radiation therapy-induced clinical and pathological changes in the normal neurologic tissue, both at the histopathological and physiological level
   b. The impact of other factors, such as co-morbidities and/or systemic chemotherapy, on the incidence and severity of the radiation-induced pathological changes in the central nervous system

10. **Radiation Physics**
    a. Properties of photons and electrons
    b. Properties of protons and other heavy charged particles
    c. Principles of radiation safety relevant to linear accelerators
    d. Principles of intensity-modulated radiotherapy including QA
11. **Medical Oncology**
    a. Chemotherapeutic and targeted therapies in neuro-oncology, as well as the side effect profile of the various agents and the risks or benefits of concurrent radiotherapy treatment
    b. The indications for use of these agents in the concomitant, neo-adjuvant, and adjuvant setting
12. **Surgical Oncology**
    a. The methods of obtaining histological diagnosis such as stereotactic biopsy
    b. The principles of neurosurgical management of brain and spinal cord tumors such as craniotomy, transsphenoidal pituitary adenectomy, skull base resection, and decompressive laminectomy
    c. Role of surgery: impact of extent of resection, the role of surgery in solitary brain metastasis, indications of surgical intervention in spinal cord compression
13. **Radiotherapy Planning**
    a. Treatment principles
        i. Knowledge of standard dose/fractionation schedules
        ii. The appropriate indications for using stereotactic radiosurgery and stereotactic radiotherapy techniques
    b. Treatment planning
        i. Immobilization methods and the importance of patient comfort and set-up reproducibility
        ii. Identification of surgical scars, drain sites, and swellings
        iii. Clinical mark-up for palliative whole brain treatment, identify the position of lens, orbit, cribriform plate, and optic nerve on lateral skull x-ray
        iv. Stereotactic localization systems
        v. Determination of GTV, CTV, and PTV, use of image-fusion to minimize contouring uncertainties
        vi. Dose-volume constraints for neoplastic and normal tissues relevant to the fractionation schedule proposed for the plan
        vii. Tissue inhomogeneity corrections
        viii. Compensation for anatomical variations in the irradiated volume
        ix. Dosimetric planning including choice of photon energies, beam arrangement and weighting, use of wedges or other beam modifiers; use of non-coplanar beams in SRS
        x. The ICRU recommendations for dose prescriptions for external beam therapy using photons or protons
        xi. Verification of treatment delivery, including patient set-up and imaging

Graded Responsibility

Junior residents: *Focus on assessment and reporting of basic principles (patient factors, tumor factors and treatment factors) in a patient presenting with CNS cancer.*

- Gain expertise in obtaining a focused history and performing a reliable neurologic examination. Be able to present findings of the history and exam.

- Learn the epidemiology, anatomy, pathology, diagnostic imaging, clinical presentation, and staging of CNS cancers.
- Be able to outline treatment options and a treatment recommendation, obtain informed consent, and work with radiotherapy planning and treatment delivery staff for adjuvant, radical, and palliative radiation treatment of CNS cancer.

Senior residents: *Focus on interpreting and synthesizing basic principles based on thorough understanding of published literature as well as accumulated clinical experience.*

- Build on the knowledge and skills acquired as a junior resident.
- Be able to outline treatment options and a treatment recommendation, obtain informed consent, and work with radiotherapy planning and treatment delivery staff on complex cases, particularly patients presenting with recurrent CNS cancer.
- Be able to manage acute and late effects of CNS radiation.
- Have detailed knowledge of literature relevant to CNS cancer treatment.

Clinical Core Specialty Rotation: Gastrointestinal Oncology

*Adapted from the University of Alberta and University of Ottawa curricula

Radiation treatment plays an important role in the curative, adjuvant, and palliative treatment of patients with gastrointestinal (GI) cancer. The GI oncology rotation will enable the radiation oncology resident to obtain the knowledge and skills necessary to diagnose and manage patients with GI cancer in a multidisciplinary team environment.

At the completion of training, the trainee will have demonstrated the necessary knowledge and skills to function effectively as a consultant on the GI cancer service, integrating all the CanMEDS competencies in order to provide optimal, ethical, and patient-centered medical care.

Medical Expert

The trainee will possess a body of knowledge and technical skills relevant to GI oncology, with particular emphasis on esophageal, gastric, rectal, and anal cancers. This will enable the trainee to collect and to interpret data and to carry out diagnostic and therapeutic procedures within the limits of their expertise.

The resident will be familiar with:

1. **Epidemiology**
   a. Risk factors for GI cancer such as smoking, diet, family history, viral (HPV) and immune deficiency, hereditary syndromes predisposing the patient to colon cancer
   b. The incidence of GI tumors, by sub-site
2. **Anatomy**
   a. Anatomy, draining lymphatics, blood supply, and nerve supply of the GI sub-sites
   b. The radiological anatomy of the chest, abdomen, and pelvis using plain x-ray, CT scan, MRI, and PET scan

3. **Pathology**
   a. Benign and neoplastic lesions of the GI sub-sites
   b. The normal histology found in the gastrointestinal organs
   c. The process of carcinogenesis, molecular pathways leading to colorectal tumorigenesis (e.g., chromosomal instability, mismatch repair pathway, hypermethylation phenotype)
   d. The classification of neoplastic disease arising from different anatomical GI sub-sites including epithelial and mesenchymal malignancies
   e. The importance of pathological prognostic factors, including histological differentiation, resection margins, the presence of perineural, lymphovascular invasion, and nodal involvement on the pathological report
   f. The principle of molecular pathology including important growth factors receptors and different tumor markers
4. **Prevention**
   a. Indications of screening and identification of risk groups
   b. Screening methods: fecal occult blood, sigmoidoscopy, colonoscopy in colorectal cancer
   c. Risks and benefits of screening and impact on mortality
5. **Diagnostic Imaging**
   a. The use of different radiological modalities, particularly endorectal and esophageal US, CT scan, MRI, and PET scan needed for accurate staging of a patient with GI cancer
6. **Clinical Presentation**
   a. The natural history of each disease site
   b. The clinical presentation of local, regional, and metastatic disease; patterns of spread (local, lymphatic, hematogenous, peritoneal)
   c. The risk of nodal disease in relation to the anatomical site and stage of the disease
7. **Clinical Skills**
   a. A complete history and physical examination pertinent to a patient with GI cancer, particularly DRE in the assessment of rectal and anal canal cancer and assessment of nutritional status in a patient with esophageal cancer
   b. Identification and management of treatment-related side effects of therapy, including skin reactions, weight loss, nausea and vomiting, diarrhea, and metabolic abnormalities
   c. Recognize and manage disease complications such as fistulas, bowel incontinence, rectal bleeding, and obstruction of GI tract
8. **Staging**
   a. TNM categories and stage sub-grouping for GI cancer using the UICC system (7th edition)
   b. The principle of clinical and pathological staging, as well as the restaging of recurrent disease
9. **Radiobiology**
   a. The effect of x-rays on the normal and neoplastic tissues in the irradiated volumes
   b. The principle of acute, early delayed, and delayed radiation reactions
   c. The concept of fractionation and its impact on both tumor control and the normal tissue-induced toxicity for external beam therapy
   d. The normal and malignant tissue effects related to dose rate in brachytherapy
   e. The principle of radiation-induced malignancies
10. **Radiation Pathology**
   a. Radiation therapy-induced clinical and pathological changes in normal tissue, both at the histopathological and physiological levels
   b. The impact of other factors, such as co-morbidities and/or systemic chemotherapy, on the incidence and severity of the radiation-induced pathological changes in the irradiated organs

11. **Radiation Physics**
    a. Properties of photons and electrons
    b. Principles of radiation safety relevant to linear accelerators and brachytherapy
    c. Principles of intensity-modulated radiotherapy including QA
12. **Clinical Trials**
    a. The literature pertaining to GI oncology, especially with randomized clinical trials (RTOG, EORTC, NCIC) that have impacted our current management in GI oncology
    b. Relevant clinical trials in the center
13. **Medical Oncology**
    a. Systemic chemotherapy and targeted therapy in the context of GI oncology, especially 5FU, cisplatin, mitomycin C
    b. The array of chemotherapeutic and molecular agents used in the treatment of GI cancers, as well as the side effect profile of the various agents and the risks or benefits of concurrent radiotherapy treatment
    c. The indications for use of these agents in the neoadjuvant, adjuvant, and metastatic setting
14. **Surgical Oncology**
    a. The methods of obtaining histological diagnosis including core biopsy, excisional biopsy, and lymph node biopsy
    b. Surgical procedures including endoscopy, colonoscopy, esophagectomy including differences in surgical approach and its impact on radiotherapy, gastrectomy (subtotal/total) including options for anastomosis and reconstruction, endoscopic retrograde cholangiopancreatography (ERCP), meso-rectal excision (MRE), defunctioning colostomy/ileostomy, abdominoperineal resection (APR), low anterior resection (LAR), and inguinal lymph node resection
15. **Radiotherapy Planning**

    Treatment principles
    a. Knowledge of standard dose/fractionation schedules
    b. Early and late side effects

    Treatment planning
    a. Immobilization methods and the importance of patient comfort and set-up reproducibility
    b. Use of contrast agents for radiation planning
    c. Identification of surgical scars, drain sites, and swellings, specifically identifying site of colostomy and anastomosis radiologically
    d. Determination of GTV, CTV, and PTV
    e. Dose-volume constraints for neoplastic and normal tissues relevant to the fractionation schedule proposed for the plan
    f. Tissue inhomogeneity corrections
    g. Compensation for anatomical variations in the irradiated volume
    h. Dosimetric planning including use of bolus, choice of photon and/or electron energies, beam weighting, and use of wedges
    i. The ICRU recommendations for dose prescriptions for external beam therapy and brachytherapy
    j. Verification of treatment delivery, including patient set-up and imaging

Graded Responsibility

Junior residents: *Focus on assessment and reporting of basic principles (patient factors, tumor factors and treatment factors) in a patient presenting with genitourinary cancer.*

- Gain expertise in obtaining a focused history and performing a reliable GI examination, particularly DRE. Be able to present findings of the history and exam.
- Learn the epidemiology, anatomy, pathology, diagnostic imaging, clinical presentation, and staging of GI cancers.
- Be able to outline treatment options and a treatment recommendation, discuss the role and benefits of the radiation, obtain informed consent, and work with radiotherapy planning and treatment delivery staff for palliative, adjuvant, and radical radiation treatment of GI cancer.

Senior residents: *Focus on interpreting and synthesizing basic principles based on thorough understanding of published literature as well as accumulated clinical experience.*

- Build on the knowledge and skills acquired as a junior resident.
- Be able to outline treatment options and a treatment recommendation, discuss the role and benefits of the radiation, obtain informed consent, and work with radiotherapy planning and treatment delivery staff on complex cases.
- Be able to manage acute and late effects of GI radiotherapy.
- Have detailed knowledge of literature relevant to GI cancer treatment.

Clinical Core Specialty Rotation: Genitourinary Oncology

*Adapted from the University of Alberta and University of Ottawa curricula

Radiation treatment plays an important role in the curative, adjuvant, and palliative treatment of patients with genitourinary (GU) cancer. The GU oncology rotation will enable the radiation oncology resident to obtain the knowledge and skills necessary to diagnose and manage patients with GU cancer in a multidisciplinary team environment.

At the completion of training, the trainee will have demonstrated the necessary knowledge and skills to function effectively as a consultant on the GU cancer service, integrating all the CanMEDS competencies in order to provide optimal, ethical, and patient-centered medical care.

Medical Expert

The trainee will possess a body of knowledge and technical skills relevant to GU oncology, with particular emphasis on prostate, bladder, testicular, and penile cancer. This will enable the trainee to collect and to interpret data, and to carry out diagnostic and therapeutic procedures within the limits of their expertise.

The resident will be familiar with:

1. **Epidemiology**
   a. Risk factors for GU cancer such as smoking, ethnic background, family history, age, and cryptorchidism
   b. The incidence of GU tumors by sub-site

2. **Anatomy**
   a. Surface anatomy, draining lymphatics, blood supply, and nerve supply of the GU sub-sites
   b. The radiological anatomy of the pelvis using plain x-ray, CT scan, MRI, and PET scan
3. **Pathology**
   a. Benign and neoplastic lesions of the GU sub-sites
   b. The normal histology found in the genitourinary organs
   c. The process of carcinogenesis
   d. The classification of neoplastic disease arising from different anatomical GU sub-sites including epithelial and mesenchymal malignancies
   e. The importance of pathological prognostic factors, including histological differentiation, resection margins, the presence of perineural and lymphovascular invasion, the extent of disease burden in prostate cancer, and nodal involvement on the pathological report
   f. The principle of molecular pathology, including important growth factors receptors and different tumor markers
4. **Prevention**
   a. Indications of screening and identification of risk groups
   b. Screening methods: PSA or PSA derivatives, DRE in prostate cancer
   c. Risks and benefits of screening and impact on mortality
5. **Diagnostic Imaging**
   a. The use of different radiological modalities, particularly prostate US, CT scan, MRI, and PET scan with its different more specific radioisotopes needed for accurate staging of a patient with GU cancer
6. **Clinical Presentation**
   a. The natural history of each disease site
   b. The clinical presentation of local, regional, and metastatic disease
   c. The risk of nodal disease in relation to the anatomical site and stage of the disease
7. **Clinical Skills**
   a. A complete history and physical examination pertinent to a patient with GU cancer, particularly DRE in the assessment of prostate cancer, characterization, and quantification of urinary symptoms in prostate cancer
   b. Identification and management of treatment-related side effects of therapy, including skin reactions, weight loss, GI toxicities, rectal bleeding, sexual dysfunction, and hormonal toxicities
   c. Recognize and manage disease complications such as hematuria, obstructive uropathy, hypercalcemia, and marrow failure, as well as paraneoplastic conditions associated with renal and prostate cancer
8. **Staging**
   a. TNM categories and stage sub-grouping for GU cancer using the UICC system (7th edition)
   b. Risk stratification in prostate cancer
   c. The principle of clinical, radiological, and pathological staging, as well as the restaging of recurrent disease
9. **Radiobiology**
   a. The effect of x-rays on the normal and neoplastic tissues in the irradiated volumes
   b. The principle of acute, early delayed, and delayed radiation reactions
   c. The concept of fractionation and its impact on both tumor control, and the normal tissue-induced toxicity for external beam therapy
   d. The normal and malignant tissue effects related to dose rate in brachytherapy
   e. The principle of radiation-induced malignancies

10. **Radiation Pathology**
    a. Radiation therapy-induced clinical and pathological changes in normal tissue, both at the histopathological and physiological levels
    b. The impact of other factors such as co-morbidities and/or systemic chemotherapy on the incidence and severity of the radiation-induced pathological changes in the irradiated organs
11. **Radiation Physics**
    a. Properties of photons and electrons
    b. Principles of radiation safety relevant to linear accelerators and brachytherapy
    c. Principles of intensity-modulated radiotherapy including QA
    d. The physical properties of isotopes used in prostate brachytherapy, including radiation protection advantages and disadvantages of each
12. **Clinical Trials**
    a. The literature pertaining to GU oncology especially with randomized clinical trials (RTOG, EORTC, NCIC) that have impacted our current management in GU oncology
    b. Relevant clinical trials in their center
    a. Investigational procedures such as cryotherapy and HIFU
13. **Medical Oncology**
    a. Systemic chemotherapy and targeted therapy in the context of GU oncology
    b. The array of chemotherapeutic, hormonal, and molecular agents used in the treatment of GU cancers, as well as the side effect profile of the various agents and the risks or benefits of concurrent radiotherapy treatment
    c. The indications for use of these agents in the neoadjuvant, adjuvant, and metastatic setting
14. **Surgical Oncology**
    a. The methods of obtaining histological diagnosis including cytology, core biopsy, excisional biopsy, lymph node biopsy, particularly principles of systematic biopsy of the prostate
    b. Surgical procedures including cystoscopy, TURP, radical prostatectomy, cystectomy with ileal conduit, nephrectomy, and orchiectomy
15. **Radiotherapy Planning**

    Treatment principles
    a. Knowledge of standard dose/fractionation schedules
    b. Early and late side effects

    Treatment planning
    a. Immobilization methods and the importance of patient comfort and set-up reproducibility
    b. Identification of surgical scars, drain sites, and swellings
    c. Determination of GTV, CTV, and PTV
    d. Dose-volume constraints for neoplastic and normal tissues relevant to the fractionation schedule proposed for the plan
    e. Tissue inhomogeneity corrections
    f. Compensation for anatomical variations in the irradiated volume
    g. Dosimetric planning including use of bolus, choice of photon and/or electron energies, beam weighting, and use of wedges
    h. The ICRU recommendations for dose prescriptions for external beam therapy and brachytherapy
    i. Verification of treatment delivery, including patient set-up and imaging

Graded Responsibility

Junior residents: *Focus on assessment and reporting of basic principles (patient factors, tumor factors and treatment factors) in a patient presenting with genitourinary cancer.*

- Gain expertise in obtaining a focused history and performing a reliable GU examination, particularly DRE. Be able to present findings of the history and exam.
- Learn the epidemiology, anatomy, pathology, diagnostic imaging, clinical presentation, and staging of GU cancers.
- Be able to outline treatment options and a treatment recommendation, describe the role and benefits of radiation therapy, obtain informed consent, and work with radiotherapy planning and treatment delivery staff for palliative, adjuvant, and radical radiation treatment of GU cancer.

Senior residents: *Focus on interpreting and synthesizing basic principles based on thorough understanding of published literature as well as accumulated clinical experience.*

- Build on the knowledge and skills acquired as a junior resident.
- Be able to outline treatment options and a treatment recommendation, describe the role and benefits of radiation therapy, obtain informed consent, and work with radiotherapy planning and treatment delivery staff on complex cases.
- Be able to manage acute and late effects of GU radiotherapy.
- Have detailed knowledge of literature relevant to GU cancer treatment.

Clinical Core Specialty Rotation: Gynecology Oncology

*Adapted from the University of Alberta and University of Ottawa curricula

Radiation treatment plays an important role in the curative, adjuvant, and palliative treatment of patients with gynecologic cancer. The gynecology oncology rotation will enable the radiation oncology resident to obtain the knowledge and skills necessary to diagnose and manage patients with gynecologic cancer in a multidisciplinary team environment.

At the completion of training, the trainee will have demonstrated the necessary knowledge and skills to function effectively as a consultant on the gynecology cancer service, integrating all the CanMEDS competencies in order to provide optimal, ethical, and patient-centered medical care.

Medical Expert

The trainee will possess a body of knowledge and technical skills relevant to gynecologic oncology. This will enable the trainee to collect and to interpret data, and to carry out diagnostic and therapeutic procedures within the limits of their expertise.

The resident will be familiar with:

1. **Epidemiology**
   a. Risk factors for gynecologic cancers such as HPV, obesity, diabetes, lifetime estrogen exposure and genetic factors (BRCA1, BRCA2)
   b. The incidence of gynecologic tumors, by sub-site

2. **Anatomy**
   a. Surface anatomy, draining lymphatics, blood supply, and nerve supply of all gynecologic sub-sites
   b. Age and pregnancy-related physiologic changes in the gynecologic tract
   c. Radiological anatomy of the gynecologic sites using plain x-ray, CT scan, MRI, and PET scan
3. **Pathology**
   a. Benign and neoplastic lesions of the gynecologic sub-sites
   b. Normal histology found in the gynecologic organs
   c. The process of carcinogenesis in all sub-sites, the molecular pathway to carcinogenesis in cervical cancer as a prototype for viral-induced cancers
   d. The classification of neoplastic disease arising from different anatomical sites in the gynecologic tract including epithelial and mesenchymal malignancies
   e. The importance of pathological prognostic factors, including histological differentiation, resection margins, depth of invasion, the presence of lymphovascular invasion and nodal involvement on the pathological report
   f. The principle of molecular pathology including important growth factors receptors and different tumor markers
4. **Prevention**
   a. Indications and frequency of cervical cytology
   b. Identification of risk groups
   c. Screening methods: PSA or PSA derivatives, DRE in prostate cancer
   d. Risks and benefits of screening and impact on mortality
   e. Other preventive methods: HPV vaccination
5. **Diagnostic Imaging**
   a. The use of different radiological modalities, particularly CT scan, MRI, and PET scan needed for accurate staging of a patient with gynecologic cancer
6. **Clinical Presentation**
   a. The natural history of each disease site and the clinical presentation of local, regional, and metastatic disease
   b. The risk of nodal disease in relation to the anatomical site and stage of the disease
7. **Clinical Skills**
   a. A complete history and physical examination including examination under anesthesia (EUA), pertinent to a patient with gynecologic cancer, recognizing and describing abnormal findings
   b. Identification and management of treatment-related side effects of therapy, including skin reactions, weight loss, GI toxicities, and menopausal symptoms
   c. Management of disease complications such as hemorrhage, ureteric obstruction, and ascites
   d. Insertion of brachytherapy applicator for cervical cancer and endometrial cancer
8. **Staging**
   a. Particularly FIGO but also TNM categories and stage sub-grouping for gynecologic cancers using the UICC system (7th edition)
   b. The principle of clinical, radiological, and pathological staging, as well as the restaging of recurrent disease
9. **Radiobiology**
   a. The effect of x-rays on the normal and neoplastic tissues in the irradiated volumes
   b. The principle of acute, early delayed, and delayed radiation reactions

c. The concept of fractionation and its impact on both tumor control and normal tissue-induced toxicity; such fractionation schedules include hyperfractionation, accelerated fractionation, concomitant boost, and hypofractionation
d. The normal and malignant tissue effects related to dose rate in brachytherapy

10. Radiation Pathology

a. Radiation therapy-induced clinical and pathological changes in normal tissue, both at the histopathological and physiological levels
b. The impact of other factors such as co-morbidities and/or systemic chemotherapy on the incidence and severity of the radiation-induced pathological changes in the irradiated organs

11. Radiation Physics

a. Properties of photons and electrons
b. Principles of radiation safety relevant to linear accelerators and brachytherapy
c. Principles of intensity-modulated radiotherapy including QA
d. The physical properties of isotopes used in gynecologic brachytherapy, including radiation protection advantages and the disadvantages of each

12. Clinical Trials

a. The literature pertaining to gynecologic oncology especially with randomized clinical trials (GOG, EORTC, NCIC) that have impacted our current management in gynecology oncology
b. Relevant clinical trials in their center

13. Medical Oncology

a. Systemic chemotherapy and targeted therapy in the context of gynecologic oncology
b. The principles of concomitant, induction, and adjuvant chemotherapy sequences with radiotherapy

14. Surgical Oncology

a. The methods of obtaining histological diagnosis such as Pap smear, punch biopsy, cone biopsy, pipelle sampling, and fractional D & C
b. The principles of surgical management in gynecologic cancer including radical hysterectomy, total abdominal hysterectomy and bilateral salpingo-oopherectomy (TAH & BSO), radical vulvectomy, pelvic lymph node and also inguinal node dissection, and ovarian surgery including debulking

15. Radiotherapy Planning

Treatment principles

a. Knowledge of standard dose/fractionation schedules
b. Early and late side effects

Treatment planning

a. Immobilization methods and the importance of patient comfort and set-up reproducibility
b. Identification of surgical scars, drain sites, and swellings
c. Determination of GTV, CTV, and PTV
d. Dose-volume constraints for neoplastic and normal tissues relevant to the fractionation schedule proposed for the plan
e. Tissue inhomogeneity corrections
f. Compensation for anatomical variations in the irradiated volume
g. Dosimetric planning, including use of bolus, choice of photon and/or electron energies, beam weighting, and use of wedges
h. The ICRU recommendations for dose prescriptions for external beam therapy and brachytherapy
i. Verification of treatment delivery, including patient set-up and imaging

Graded Responsibility

Junior residents: *Focus on assessment and reporting of basic principles (patient factors, tumor factors, and treatment factors) in a patient presenting with gynecologic cancer.*

- Gain expertise in obtaining a focused history and performing a reliable gynecologic examination. Be able to perform a Pap smear. Be able to present findings of the history and exam.
- Learn the epidemiology, anatomy, pathology, diagnostic imaging, clinical presentation, and staging of all gynecologic cancer sub-sites.
- Be able to outline treatment options and a treatment recommendation, describe the role and benefits of radiation therapy, obtain informed consent, and work with radiotherapy planning and treatment delivery staff for palliative, adjuvant, and radical radiation treatment of gynecologic cancer.

Senior residents: *Focus on interpreting and synthesizing basic principles based on thorough understanding of published literature as well as accumulated clinical experience.*

- Build on the knowledge and skills acquired as a junior resident.
- Be able to outline treatment options and a treatment recommendation, describe the role and benefits of radiation therapy, obtain informed consent, and work with radiotherapy planning and treatment delivery staff on complex cases.
- Be able to manage acute and late effects of pelvic radiation.
- Have detailed knowledge of literature relevant to gynecologic cancer treatment.
- Be able to discuss current recommendations regarding screening and vaccination for cervical cancer.

Clinical Core Specialty Rotation: Head and Neck Oncology

*Adapted from the University of Alberta and University of Ottawa curricula

Radiation treatment plays an important role in the curative, adjuvant, and palliative treatment of patients with head and neck cancer. The head and neck oncology rotation will enable the radiation oncology resident to obtain the knowledge and skills necessary to diagnose and manage patients with head and neck cancer in a multidisciplinary team environment.

At the completion of training, the trainee will have demonstrated the necessary knowledge and skills to function effectively as a consultant on the head and neck cancer service, integrating all the CanMEDS competencies in order to provide optimal, ethical, and patient-centered medical care.

Medical Expert

The trainee will possess a body of knowledge and technical skills relevant to head and neck oncology. This will enable the trainee to collect and to interpret data, and to carry out diagnostic and therapeutic procedures within the limits of their expertise.

The resident will be familiar with:

1. **Epidemiology**
   a. Risk factors for head and neck cancer such as smoking, alcohol, viral (EBV and HPV), and immune deficiency
   b. The relative incidence of the common types of benign and malignant head and neck tumors
2. **Anatomy**
   a. Surface anatomy, draining lymphatics, blood supply, and nerve supply of all head and neck anatomical sites
   b. The radiological anatomy of the head and neck and base of skull using plain x-ray, ultrasound, CT scan, MRI, and PET scan
3. **Pathology**
   a. Benign and neoplastic lesions of the head and neck
   b. The normal histology found in the different head and neck organs
   c. The process of carcinogenesis
   d. The classification of neoplastic disease arising from different anatomical sites in the head and neck, including epithelial and mesenchymal malignancies
   e. The importance of pathological prognostic factors, including histological differentiation, resection margins, the presence of perineural and lymphovascular invasion, and extracapsular extension on the pathological report
   f. The methods used for tissue diagnosis such as FNA, core biopsy, excision biopsy, and lymph node biopsy
   g. The principle of molecular pathology, including important growth factors receptors and different tumor markers, especially in thyroid malignancy
4. **Diagnostic Imaging**
   a. The radiological anatomy of the head and neck using different radiological modalities, particularly CT scan, MRI, and PET scan
5. **Clinical Presentation**
   a. The natural history of each disease site
   b. The clinical presentation of local, regional, and metastatic disease
   c. The risk of nodal disease in relation to the anatomical site and stage of the disease
6. **Clinical Skills**
   a. A complete history and physical examination including flexible endoscopy and CNS examination
   b. Identification and management of treatment-related side effects of therapy, including mucositis, skin reactions, xerostomia, loss of taste, weight loss, febrile neutropenia, thrombocytopenia, electrolytes and water balance, as well as the different paraneoplastic syndromes associated with head and neck cancer
7. **Staging**
   a. TNM categories and stage sub-grouping for head and neck cancer using the UICC system (7th edition)
   b. The principle of clinical, radiological and pathological staging, as well as the restaging of recurrent disease
8. **Radiobiology**
   a. The effect of x-rays on the normal and neoplastic tissues in the irradiated volumes
   b. The principle of acute, early delayed, and delayed radiation reactions
   c. The concept of fractionation and its impact on both tumor control, as well as the normal tissue-induced toxicity; such fractionation schedules include hyperfractionation, accelerated fractionation, concomitant boost, and hypofractionation
   d. The principle of radiation-induced malignancies

9. **Radiation Pathology**
   a. Radiation-induced clinical and pathological changes in normal tissue, both at the histopathological and physiological levels
   b. The impact of other factors such as co-morbidities and systemic chemotherapy on the incidence and severity of the radiation-induced pathological changes in the irradiated organs
10. **Radiation Physics**
   a. Properties of photons and electrons
   b. Principles of radiation safety relevant to linear accelerators and brachytherapy
   c. Principles of intensity-modulated radiotherapy including QA
   d. Physical properties of other modalities such as proton, neutrons, and heavy ions as appropriate for the treatment of head and neck and base of skull tumors
   e. The principles of stereotactic radiosurgery, and TomoTherapy and Cyberknife techniques appropriate to each anatomical site and stage of disease
11. **Clinical Trials**
   a. The literature pertaining to head and neck oncology especially with randomized clinical trials (RTOG, DAHANCA, EORTC, NCIC) that have impacted our current management in head and neck oncology
   b. Relevant clinical trials in their center
12. **Medical Oncology**
   a. Systemic chemotherapy and targeted therapy in the context of head and neck oncology
   b. The principles of concomitant, induction, and adjuvant chemotherapy sequences with radiotherapy
13. **Surgical Oncology**
   a. The principles of surgical management in head and neck cancer
   b. Surgical procedures include total laryngectomy, thyroidectomy, lymph node neck dissection, laser excision and reconstructive procedures, including myocutaneous and vascularized graft
14. **Radiotherapy Planning**

   Treatment principles
   a. Knowledge of standard dose/fractionation schedules
   b. Early and late side effects

   Treatment planning
   a. Immobilization methods and the importance of patient comfort and set-up reproducibility
   b. Identification of surgical scars, drain sites, and swellings
   c. Determination of GTV, CTV, and PTV
   d. Dose-volume constraints for neoplastic and normal tissues relevant to the fractionation schedule proposed for the plan
   e. Tissue inhomogeneity corrections
   f. Compensation for anatomical variations in the irradiated volume
   g. Dosimetric planning, including use of bolus, choice of photon and/or electron energies, beam weighting, and use of wedges
   h. The ICRU recommendations for dose prescriptions for external beam therapy and brachytherapy
   i. Verification of treatment delivery, including patient set-up and imaging

Graded Responsibility:

Junior residents: *Focus on assessment and reporting of basic principles (patient factors, tumor factors and treatment factors) in a patient presenting with head and neck cancer.*

- Gain expertise in obtaining a focused history and performing a reliable head and neck examination, including flexible endoscopy. Be able to present findings of the history and exam.
- Learn the epidemiology, anatomy, pathology, diagnostic imaging, clinical presentation, and staging of head and neck cancers.
- Be able to outline treatment options and a treatment recommendation, discuss the role and benefits of radiation therapy, obtain informed consent, and work with radiotherapy planning and treatment delivery staff for adjuvant and radical radiation treatment of head and neck cancer.

Senior residents: *Focus on interpreting and synthesizing basic principles based on thorough understanding of published literature as well as accumulated clinical experience.*

- Build on knowledge and skills acquired as a junior resident.
- Be able to outline treatment options and a treatment recommendation, discuss the role and benefits of radiation therapy, obtain informed consent, and work with radiotherapy planning and treatment delivery staff on complex cases, particularly patients presenting with recurrent head and neck cancer.
- Be able to manage acute and late effects of head and neck radiation.
- Have detailed knowledge of literature relevant to head and neck cancer treatment.

Clinical Core Specialty Rotation: Lung Oncology

*Adapted from the University of Alberta and University of Ottawa curricula

Radiation treatment plays an important role in the curative, adjuvant, and palliative treatment of patients with lung cancer. The lung oncology rotation will enable the radiation oncology resident to obtain the knowledge and skills necessary to diagnose and manage patients with lung cancer in a multidisciplinary team environment.

At the completion of training, the trainee will have demonstrated the necessary knowledge and skills to function effectively as a consultant on the lung cancer service, integrating all the CanMEDS competencies in order to provide optimal, ethical, and patient-centered medical care.

Medical Expert

The trainee will possess a body of knowledge and technical skills relevant to lung oncology. This will enable the trainee to collect and to interpret data, and to carry out diagnostic and therapeutic procedures within the limits of their expertise.

The resident will be familiar with:

1. **Epidemiology**
   a. Risk factors for lung cancer such as smoking, and occupational and environmental exposures
   b. The incidence of the various lung cancer sub-types

2. **Anatomy**
   a. Surface anatomy, draining lymphatics, blood supply, and nerve supply of the lungs
   b. Functional anatomy of the lung as described by pulmonary function tests
3. **Pathology**
   a. Benign and neoplastic lesions of the lungs
   b. Normal histology of the lungs
   c. The process of carcinogenesis
   d. The classification of neoplastic disease arising from different anatomical sites in the lungs and pleura including epithelial and mesenchymal malignancies
   e. The importance of pathological prognostic factors, including histological differentiation, resection margins, the presence of perineural and lymphovascular invasion and nodal involvement on the pathological report
   f. The principle of molecular pathology including important growth factors receptors and different tumor markers
4. **Diagnostic Imaging**
   a. The use of different radiological modalities, particularly endoscopic US, CT scan, MRI, and PET scans needed for the accurate staging of a patient with lung cancer
5. **Clinical Presentation**
   a. The natural history of each disease site
   b. The clinical presentation of local, regional, and metastatic disease
   c. The risk of nodal disease in relation to the anatomical site and stage of the disease
6. **Clinical Skills**
   a. A complete history and physical examination pertinent to a patient with lung cancer
   b. The indications for use of a Pleurex catheter for symptom management
   c. Identification and management of treatment-related side effects of therapy, including skin reactions, weight loss, dysphagia, dyspnea and cough, febrile neutropenia, thrombocytopenia, electrolytes and water balance, as well as the different paraneoplastic syndromes associated with lung cancer
7. **Staging**
   a. TNM categories and stage sub-grouping for lung cancer using the UICC system (7th edition)
   b. The principle of clinical, radiological, and pathological staging, as well as the restaging of recurrent disease
8. **Radiobiology**
   a. The effect of x-rays on the normal and neoplastic tissues in the irradiated volumes
   b. The principle of acute, early delayed, and delayed radiation reactions
   c. The concept of fractionation and its impact on both tumor control, as well as the normal tissue-induced toxicity; such fractionation schedules include hyperfractionation, accelerated fractionation, concomitant boost, and hypofractionation
   d. The principle of radiation-induced malignancies
9. **Radiation Pathology**
   a. Radiation-induced, clinical, and pathological changes in normal tissue, both at the histopathological and physiological levels
   b. The impact of other factors such as co-morbidities and systemic chemotherapy on the incidence and severity of the radiation-induced pathological changes in the irradiated organs
10. **Radiation Physics**
    a. Properties of photons and electrons
    b. Principles of radiation safety relevant to linear accelerators and brachytherapy

c. Principles of intensity-modulated radiotherapy, including QA
d. The principles of extracranial stereotactic radiosurgery and TomoTherapy

11. Clinical Trials
a. The literature pertaining to lung oncology especially with randomized clinical trials (RTOG, EORTC, NCIC) that have impacted our current management in lung oncology
b. Relevant clinical trials in their center

12. Medical Oncology
a. Systemic chemotherapy and targeted therapy in the context of lung oncology
b. The principles of concomitant, induction, and adjuvant chemotherapy sequences with radiotherapy

13. Surgical Oncology
a. The methods used for tissue diagnosis such as sputum cytology, FNA, core biopsy, excisional biopsy, and lymph node biopsy
b. The methods of obtaining histological diagnosis, including thoracentesis, bronchoscopy, and mediastinoscopy
c. The principles of surgical procedures including lobectomy, intraoperative lymph node biopsy, and pneumonectomy

14. Radiotherapy Planning
Treatment principles
i. Knowledge of standard dose/fractionation schedules
ii. Early and late side effects
Treatment planning
i. Immobilization methods and the importance of patient comfort and set-up reproducibility
ii. Use of 4D-CT and respiratory gating
iii. Identification of surgical scars, drain sites, and swellings
iv. Determination of GTV, CTV, and PTV
v. Dose-volume constraints for neoplastic and normal tissues relevant to the fractionation schedule proposed for the plan
vi. Tissue inhomogeneity corrections
vii. Compensation for anatomical variations in the irradiated volume
viii. Dosimetric planning, including use of bolus, choice of photon and/or electron energies, beam weighting, and use of wedges
ix. The ICRU recommendations for dose prescriptions for external beam therapy and brachytherapy
x. Verification of treatment delivery, including patient set-up and imaging

Graded Responsibility

Junior residents: *Focus on assessment and reporting of basic principles (patient factors, tumor factors and treatment factors) in a patient presenting with lung cancer.*

- Gain expertise in obtaining a focused history and performing a reliable chest examination. Be able to present findings of the history and exam.
- Learn the epidemiology, anatomy, pathology, diagnostic imaging, clinical presentation, and staging of lung cancers.
- Be able to outline treatment options and a treatment recommendation, discuss the role and benefits of radiation therapy, obtain informed consent, and work with radiotherapy planning and treatment delivery staff for palliative, adjuvant, and radical radiation treatment of lung cancer.

Senior residents: *Focus on interpreting and synthesizing basic principles based on thorough understanding of published literature as well as accumulated clinical experience.*

- Build on the knowledge and skills acquired as a junior resident.
- Be able to outline treatment options and a treatment recommendation, discuss the role and benefits of radiation therapy, obtain informed consent, and work with radiotherapy planning and treatment delivery staff on complex cases.
- Be able to manage acute and late effects of chest radiation.
- Have detailed knowledge of literature relevant to lung cancer treatment.

Clinical Core Specialty Rotation: Hematology Oncology

*Adapted from the University of Alberta and University of Ottawa curricula

Radiation treatment plays an important role in the curative, adjuvant, and palliative treatment of patients with hematologic cancer. The hematology oncology rotation will enable the radiation oncology resident to obtain the knowledge and skills necessary to diagnose and manage patients with hematologic cancer in a multidisciplinary team environment.

At the completion of training, the trainee will have demonstrated the necessary knowledge and skills to function effectively as a consultant on the hematology cancer service, integrating all the CanMEDS competencies in order to provide optimal, ethical, and patient-centered medical care.

Medical Expert

The trainee will possess a body of knowledge and technical skills relevant to hematology oncology. This will enable the trainee to collect and to interpret data, and to carry out diagnostic and therapeutic procedures within the limits of their expertise.

The resident will be familiar with:

1. **Epidemiology**
   a. Risk factors for hematologic cancer such as family history, genetic abnormalities, infectious agents (HIV, EBV, Helicobacter pylori) and prior radiation exposure
   b. The principle of malignant transformation in hematologic malignancy
   c. The incidence of the common hematologic malignancies
2. **Anatomy**
   a. Of the lymphoreticular system, including bone marrow and spleen
   b. The microarchitecture as well as the functional anatomy of the lymphoreticular system
3. **Pathology**
   a. Benign and neoplastic diseases of the lymphoreticular system
   b. Normal hematopoiesis
   c. The process of carcinogenesis
   d. The classification of neoplastic disease arising in the lymphoreticular system using the WHO classification system
   e. The importance of pathological prognostic factors, in particular, molecular and genetic factors
   f. The special methods of a lymphoma protocol used for tissue diagnosis including immunohistochemical stains, flow cytometry, and PCR
   g. Evaluation of bone marrow biopsy and aspirate

4. **Diagnostic Imaging**
   a. Indications for and interpretation of CT and PET in staging, restaging, and follow-up
   b. The sensitivity and specificity of these imaging modalities
5. **Clinical Presentation**
   a. The natural history of hematologic malignancies, in particular, lymphoma and plasma cell disorders
   b. The presentation of nodal (both Hodgkin and non-Hodgkin) lymphoma as well as extra-nodal lymphomas such as CNS, GI tract, testis, and skin
6. **Clinical Skills**
   a. A complete history and physical examination relevant to the lymphoreticular system, including assessment of all nodal areas as well as spleen and skin, recognizing and describing abnormal findings
   b. Recognize and manage treatment-related toxicities, in particular, febrile neutropenia
7. **Staging**
   a. Ann Arbor staging with Cotswold modifications
   b. Risk stratification systems: international prognostic index (IPI) and follicular lymphoma interntional prognostic Index (FLIPI)
   c. The principle of clinical, radiologic, and pathological staging, as well as the restaging of recurrent disease
8. **Radiobiology**
   a. The effect of x-rays on the normal and neoplastic tissues in the irradiated volumes
   b. The principle of acute, early delayed, and delayed radiation reactions
   c. The concept of fractionation and its impact on both tumor control, as well as the normal tissue-induced toxicity
   d. The principle of radiation-induced malignancies
9. **Radiation Pathology**
   a. Radiation therapy-induced clinical and pathological changes in normal lymphoreticular tissue, both at the histopathological and physiological levels
   b. The impact of other factors such as co-morbidities and/or systemic chemotherapy on the incidence and severity of radiation-induced pathological changes in the irradiated tissues
10. **Radiation Physics**
    a. Properties of photons and electrons
    b. Principles of radiation safety relevant to linear accelerators and brachytherapy
    c. Principles of intensity-modulated radiotherapy, including QA
    d. Principles of total body irradiation and total skin irradiation
    e. Principles of brachytherapy using unsealed sources as well as related radiation safety issues
11. **Clinical Trials**
    a. The literature pertaining to hematologic oncology especially randomized clinical trials (NCI, CALGB, GELA, German Hodgkin Study Group) that have impacted our current management in hematologic oncology
    b. Relevant clinical trials in their center
12. **Medical Oncology**
    a. The array of chemotherapeutic and molecular agents used in the treatment of hematologic cancer, as well as the side effect profile of the various agents and the risks or benefits of concurrent radiotherapy treatment
    b. The indications for use of these agents in the neoadjuvant, adjuvant, and metastatic setting
    c. The indications for bone marrow or stem cell transplant and understand when allo- vs. auto-transplant is indicated

13. **Radiotherapy Planning**
    a. Treatment principles
        i. Knowledge of standard dose/fractionation schedules
        ii. Early and late side effects
    b. Treatment planning
        i. Immobilization methods and the importance of patient comfort and set-up reproducibility
        ii. Identification of surgical scars, drain sites, and swellings
        iii. Determination of GTV, CTV, and PTV
        iv. Dose-volume constraints for neoplastic and normal tissues relevant to the fractionation schedule proposed for the plan
        v. Tissue inhomogeneity corrections
        vi. Compensation for anatomical variations in the irradiated volume
        vii. Dosimetric planning including use of bolus, choice of photon and/or electron energies, beam weighting, and use of wedges
        viii. The ICRU recommendations for dose prescriptions for external beam therapy and brachytherapy of unsealed sources
        ix. Verification of treatment delivery, including patient set-up and imaging

Graded Responsibility

Junior residents: *Focus on assessment and reporting of basic principles (patient factors, tumor factors and treatment factors) in a patient presenting with hematologic cancer.*

- Gain expertise in obtaining a focused history and performing a reliable examination of the lymphoreticular system. Be able to present findings of the history and exam.
- Learn the epidemiology, anatomy, pathology, diagnostic imaging, clinical presentation, and staging of hematologic cancer.
- Be able to outline treatment options and a treatment recommendation, obtain informed consent, and work with radiotherapy planning and treatment delivery staff for treatment of hematologic malignancy.

Senior residents: *Focus on interpreting and synthesizing basic principles based on a thorough understanding of published literature as well as accumulated clinical experience.*

- Build on the knowledge and skills acquired as a junior resident.
- Be able to outline treatment options and a treatment recommendation, obtain informed consent, and work with radiotherapy planning and treatment delivery staff on complex cases, particularly involving re-irradiation.
- Be able to manage acute and late effects of radiation for hematologic cancer.
- Have detailed knowledge of literature relevant to hematology oncology treatment.

Clinical Core Specialty Rotation: Medical Oncology

*Adapted from the University of Alberta and University of Ottawa curricula

Systemic treatment plays an important role in the curative, adjuvant, and palliative treatment of patients with cancer. The medical oncology rotation will enable the radiation oncology resident to obtain the knowledge and skills necessary to understand and utilize systemic therapy in the management of cancer patients in a multidisciplinary team environment.

Medical Expert

The resident will possess a body of knowledge and management skills relevant to medical oncology. This will enable the resident to collect and to interpret data, and to carry out diagnostic and therapeutic procedures within the limits of their expertise.

The resident will be able to:

- Elicit a focused and accurate history and physical exam relevant to a particular tumor site (breast, lung, GU, GI, hematologic, CNS, H & N, skin, and musculoskeletal), recognizing and describing abnormal findings.
- Order appropriate staging investigations for a new or relapsed malignancy, and be able to interpret the results.
- Know the classification of chemotherapeutic agents, targeted/molecular agents, hormonal agents, and bisphophonates; which drugs are commonly used for specific cancers, usual frequency of administration, typical doses and adverse effects, the principles of titration, the routes of administration, the effects of renal and liver dysfunction on chemotherapeutic drugs.
- Recognize and manage common complications of cancers and their treatment in the curative and palliative settings, such as venous thrombosis, pneumonia, nausea and vomiting, pan-mucositis, febrile neutropenia, pericardial tamponade, SVC obstruction, cord compression, hypercalcemia, and hyponatremia.
- Recognize and manage common complications of treatment with chemotherapy, particularly febrile neutropenia, GI toxicities, and allergic drug reactions.
- Understand the principles of medical oncology treatment decision-making, including consideration of benefits and risks of different drugs for cancer management and evaluation of response.
- Understand the process of director's privileges and special access for non-formulary agents.
- Learn to perform the following procedures:
  a. Paracentesis
  b. Lumbar puncture
  c. Thoracentesis

Graded Responsibility

Junior residents: *Focus on assessment and reporting of basic principles (patient factors, tumor factors and treatment factors) in a patient presenting to the medical oncology service.*

- Gain expertise in obtaining a focused history and performing a reliable physical examination. Be able to present findings of the history and exam.
- Learn about standard regimens for adjuvant systemic therapy in breast, lung, GI, H & N, and CNS cancers. Be able to outline treatment options and a treatment recommendation for these tumor sites.
- Be able to manage common chemotherapy toxicities (febrile neutropenia, GI toxicities, and allergic reactions).

Senior residents: *Focus on interpreting and synthesizing basic principles based on critical appraisal of published literature as well as accumulated clinical experience.*

- Build on the knowledge and skills acquired as a junior resident.
- Learn about systemic therapy regimens used in the curative and metastatic setting for hematologic malignancies.
- Learn about systemic therapy regimens used in the metastatic setting of breast, lung, GI, GU, H & N, and skin cancers.

Clinical Core Specialty Rotation: Bone and Soft Tissue Tumors

*Adapted from the University of Alberta and University of Ottawa curricula

Radiation treatment plays an important role in the adjuvant, and palliative treatment of patients with sarcoma. The sarcoma oncology rotation will enable the radiation oncology resident to obtain the knowledge and skills necessary to diagnose and manage patients with mesenchymal tumors in a multidisciplinary team environment.

At the completion of training, the trainee will have demonstrated the necessary knowledge and skills to function effectively as a consultant on the sarcoma service, integrating all the CanMEDS competencies in order to provide optimal, ethical, and patient-centered medical care.

Medical Expert

The trainee will possess a body of knowledge and technical skills relevant to mesenchymal tumors, with particular emphasis on soft tissue sarcoma and retroperitoneal sarcomas. This will enable the trainee to collect and to interpret data, and to carry out diagnostic and therapeutic procedures within the limits of their expertise.

The resident will be familiar with:

1. **Epidemiology**
   a. Risk factors for soft tissue sarcoma such as radiation exposure, and hereditary conditions
   b. The incidence of soft tissue sarcomas
2. **Anatomy**
   a. Surface anatomy, draining lymphatics, blood supply, and nerve supply of extremities
   b. The radiological anatomy of the extremities using plain x-ray, CT scan, MRI, and PET scan
3. **Pathology**
   a. The WHO classification of neoplastic disease of mesenchymal malignancies
   b. The importance of pathological prognostic factors, including histological differentiation, resection margins, the presence of perineural and lymphovascular invasion, and nodal involvement on the pathological report
   c. The principle of molecular pathology including important growth factors receptors and different tumor markers
4. **Diagnostic Imaging**
   a. The use of different radiological modalities, particularly, CT scan, and MRI needed for accurate staging of a patient with extremity sarcomas
5. **Clinical Presentation**
   a. The natural history
   b. The clinical presentation of local, regional, and metastatic disease
   c. The risk of nodal disease in relation to the histology, anatomical site, and stage of the disease

6. **Clinical Skills**
   a. A complete history and physical examination pertinent to a patient with sarcoma
   b. Identification and management of treatment-related side effects of therapy, including skin reactions, sexual, functional impairment
   c. Recognize and manage disease complications such as neurovascular involvement
7. **Staging**
   a. TNM categories and stage grouping for sarcomas (7th edition)
   b. The principle of clinical, radiological, and pathological staging, as well as the restaging of recurrent disease
8. **Radiobiology**
   a. The effect of x-rays on the normal and neoplastic tissues in the irradiated volumes
   b. The principle of acute, early delayed, and delayed radiation reactions
9. **Radiation Pathology**
   a. Radiation therapy-induced clinical and pathological changes in normal tissue, both at the histopathological and physiological levels
   b. The impact of other factors such as co-morbidities and/or systemic chemotherapy on the incidence and severity of the radiation-induced pathological changes in the irradiated organs
10. **Radiation Physics**
    a. Properties of photons and electrons
    b. Principles of radiation safety relevant to linear accelerators and brachytherapy
    c. Principles of intensity-modulated radiotherapy, including QA
    d. The physical properties of isotopes used in prostate brachytherapy, including the radiation protection advantages and disadvantages of each
11. **Clinical Trials**
    a. The literature pertaining to soft tissue sarcomas especially with randomized clinical trials (RTOG, NCI) that have impacted our current management in soft tissue sarcomas
    b. Relevant clinical trials in their center
12. **Medical Oncology**
    a. Systemic chemotherapy and targeted therapy in the context of soft tissue sarcomas
    b. The array of chemotherapeutic and molecular agents used in the treatment of sarcomas, as well as the side effect profile of the various agents and the risks or benefits of concurrent radiotherapy treatment
    c. The indications for use of these agents in the adjuvant and metastatic setting
13. **Surgical Oncology**
    a. The methods of obtaining histological diagnosis including core biopsy, incisional biopsy
    b. Surgical procedures, including amputation vs. limb-sparing, wide local excision, radical excision
14. **Radiotherapy Planning**

    Treatment principles
    a. Knowledge of standard dose/fractionation schedules
    b. Early and late side effects

    Treatment planning
    a. Immobilization methods and the importance of patient comfort and set-up reproducibility
    b. Identification of surgical scars, drain sites, and swellings
    c. Determination of GTV, CTV, and PTV
    d. Dose-volume constraints for neoplastic and normal tissues relevant to the fractionation schedule proposed for the plan
    e. Tissue inhomogeneity corrections
    f. Compensation for anatomical variations in the irradiated volume

g. Dosimetric planning including use of bolus, choice of photon and/or electron energies, beam weighting, and use of wedges
h. The ICRU recommendations for dose prescriptions for external beam therapy and brachytherapy
i. Verification of treatment delivery, including patient set-up and imaging

Graded Responsibility

Junior residents: *Focus on assessment and reporting of basic principles (patient factors, tumor factors and treatment factors) in a patient presenting with genitourinary cancer.*

- Gain expertise in obtaining a focused history and performing a reliable examination.
- Learn the epidemiology, anatomy, pathology, diagnostic imaging, clinical presentation, and staging of extremity sarcomas.
- Be able to outline treatment options and a treatment recommendation, describe the role and benefits of radiation therapy, obtain informed consent, and work with radiotherapy planning and treatment delivery staff for palliative, adjuvant, and radical radiation treatment of extremity sarcomas.

Senior residents: *Focus on interpreting and synthesizing basic principles based on thorough understanding of published literature as well as accumulated clinical experience.*

- Build on the knowledge and skills acquired as a junior resident.
- Be able to outline treatment options and a treatment recommendation, describe the role and benefits of radiation therapy, obtain informed consent, and work with radiotherapy planning and treatment delivery staff on complex cases.
- Be able to manage acute and late effects of extremity sarcomas.
- Have detailed knowledge of literature relevant to extremity sarcoma treatment.

Clinical Core Specialty Rotation: Palliative Medicine

*Adapted from the University of Alberta and University of Ottawa curricula

The objectives for the palliative medicine rotation are based on principles common to palliative care and oncology. The palliative medicine rotation will enable the radiation oncology resident to obtain the knowledge and skills necessary to diagnose and manage patients with advanced cancer in a multidisciplinary team environment.

At the completion of training, the resident will have demonstrated the necessary knowledge and skills to provide palliative care as part of a radiation oncology consultant practice, integrating all the CanMEDS competencies in order to provide optimal, ethical, and patient-centered medical care.

Medical Expert

The resident will possess a body of knowledge and management skills relevant to palliative care. This will enable the resident to collect and to interpret data, and to carry out diagnostic and therapeutic procedures within the limits of their expertise.

Basic and Clinical Knowledge

1. **Physical Aspects**
   a. Disease process: The resident should know the meaning of "terminal illness" and of "palliative medicine''; understand the concept of clinical re-evaluation as the disease progresses; be able to anticipate potential problems caused either by the disease or by treatments; have skills in diagnosis and management of common concurrent conditions; know the natural history, markers of progression, and range of treatments available at each stage of malignant diseases.
   b. Symptom control: The resident should know that symptoms may be caused by the disease itself, caused by treatment, related to disease or associated disability, or caused by a pre-existing or concurrent disorder. The resident should be able to direct management of each symptom appropriately. This includes candidiasis, anorexia, nausea and vomiting, constipation, diarrhea, intestinal obstruction, dysphagia, pruritis, jaundice, dyspnea, cough, hiccups, anxiety and fear and their role in intensifying symptoms, depression (situational vs. clinical), delirium, fatigue, sexual dysfunction, incontinence, bladder and rectal spasms, and lymphedema.
   c. Pain: The resident should be able to take a pain history, including the use of assessment tools such as Edmonton Symptom Assessment Score (ESAS), Brief Pain Inventory, and EORTC QLQ C30. Be able to differentiate between nociceptive and neuropathic pain. Elicit factors influencing pain (physical, psychological, social, and spiritual). Assess opioid responsiveness and appropriate use of co-analgesics. Recognize when appropriate referral to radiation oncology or anesthesia is indicated. Be aware of non-drug treatments and complementary/alternative therapies.
   d. Management of emergencies: The resident should be able to identify and direct management of common emergencies such as hypercalcemia, spinal cord compression, superior vena cava obstruction, hemorrhage, and seizures.
   e. Management of sub-acute issues: The resident should be able to direct management of fungating lesions and wound care, pressure area care, raised intracranial pressure, fistulae, and malignant effusions.
2. **Pharmacology**
   The resident should know the classification of analgesics (as defined by the World Health Organization) and their use; which drugs are commonly used for the control of symptoms, usual frequency of administration, typical doses and adverse effects, and the principles of titration; the pharmacological management of difficult pain syndromes such as incident pain, and neuropathic pain; the various routes available for drug administration and when each is appropriate; the effects of renal and liver failure on drugs commonly used in palliative medicine; how to weigh up benefits and risks of different drugs for symptom control, being aware that these may change as a patient condition deteriorates; the rationale for, and clinical practice of opioid switching.
3. **Psychosocial Aspects**
   The resident should be able to assess the differing perceptions and expectations of disease and treatment among the various family members; understand the importance of meetings with the family; be aware of the psychodynamics of interpersonal relationships and the changes which can occur in illness; assess the need for bereavement support and know how to refer to other disciplines for assistance in supporting a bereaved person.
4. **Organizational Aspects**
   The resident should know about statutory regulation such as certification of death and controlled drugs regulations.

OFF-SERVICE (NON-CORE) ROTATIONS

Competencies for the CanMEDS role as a Medical Expert will be described below specifically for each rotation. Competencies in other CanMEDS roles of universal topics are summarized as follows:

Communicator

The resident will:
1. Provide a verbal and written summary of the patient's medical problems, and keep legible and accurate records of in-patient as well as outpatient care
2. Effectively relay patient problems and work out possible solutions with other members of the health care team
3. Clearly, consistently, and accurately communicate the patient diagnosis, management plan, risks and benefits of any treatment, and prognosis with the patient, relevant family members, and decision makers
4. Obtain informed consent for procedures as required

Collaborator

The resident will:
1. Describe their role and function within a multidisciplinary team approach to healthcare
2. Understand the role of other specialties in the multidisciplinary approach to patient management
3. Have a straightforward approach with staff and peers
4. Assist others as required
5. Take on an appropriate share of team assignments
6. Consult effectively with other healthcare professionals
7. Contribute effectively to interdisciplinary team activities

Manager

The resident will:
1. Allocate health care resources wisely and order medical tests with a view toward maximizing utility while minimizing cost
2. Make effective use of information technology to optimize patient care
3. Demonstrate effective time management and organizational skills

Health Advocate

The resident will:
1. Function as an advocate for their patient to obtain adequate care corresponding to the priority of their conditions
2. Provide information on prevention programs for various cancers and intervention programs for smoking cessation or other addictions issues

Scholar

The resident will:
1. Accept the responsibility for self-directed learning as a lifelong goal
2. Formulate educational questions resulting from their patient-related responsibilities

3. Complete a literature search based on specific educational questions
4. Explain the principles of critical appraisal and its relevance to clinical decision-making
5. Attend and contribute to rounds, seminars, and other learning events
6. Accept and act on constructive feedback
7. Record personal learning objectives during the rotation and take responsibility for self-managing their own learning objectives documented at the beginning of the rotation

Professional

The resident will:
1. Recognize limitations and seek advice and consultation when needed
2. Exercise initiative within limits of knowledge and training
3. Discharge duties and assignments dependably and in a timely and ethical manner
4. Report facts accurately, including own errors
5. Maintain appropriate boundaries in work and learning situations
6. Respects the diversity of race, age, gender, disability, intelligence, and socio-economic status
7. Demonstrate an understanding of the basic principles of medical ethics, including patient autonomy, beneficence, confidentiality, conflict of interest, and advance directives
8. Recognize own limitations and seek advice when necessary
9 Provide feedback respectfully and accept feedback from colleagues and peers

Off-service (Non-core) Rotation: Internal Medicine

*Adapted from the University of Alberta and University of Ottawa curricula

Objectives for Radiation Oncology Resident for Competency in CanMEDS Roles in General Internal Medicine

Medical Expert

The trainee will possess a body of knowledge and technical skills in internal medicine relevant to a primary clinician. This will enable the trainee to collect and to interpret data, and to carry out diagnostic and therapeutic procedures within the limits of their expertise.

The resident will be able to **diagnose and manage** common problems experienced by the general medical patient, these include, but not exclusive to, the following:
1. Common undifferentiated presentations of illness
    a. Shortness of breath and hypoxemia
    b. Delirium and decreased level of consciousness
    c. Chest pain and abdominal pain
    d. Anemia
    e. Joint pains
    f. Weakness and fatigue
    g. Hypotension and shock
    h. Multi-organ failure
    i. Sepsis and occult infections
    j. Failure to cope

2. Infectious diseases
   a. Community and hospital-acquired lung infections
   b. Urinary tract infections
   c. Fever of unknown origin
3. Nephrology
   a. Acute and chronic renal failure
   b. Electrolyte disorders (sodium, potassium)
   c. Calcium and magnesium disorders
   d. Indications for dialysis
4. Respirology
   a. COPD and asthma
   b. Interstitial lung diseases
   c. The role of endoscopy
5. Gastroenterology
   a. Upper GI bleeding and its causes including peptic ulcer disease
   b. Inflammatory bowel disease
   c. Acute hepatitis and liver failure
   d. Complications of liver failure
6. Endocrinology
   a. Diabetes and diabetic ketoacidosis
   b. Hyper and hypothyroidism
7. Hematology
   a. Anemia
   b. Thrombocytopenia
   c. Thrombo-embolic disease
8. Cardiology
   a. Congestive heart failure
   b. Ischemic heart disease
   c. Common valvular disorders (aortic stenosis, regurgitation, and mitral valve regurgitation)
   d. Hypertension
   e. Hypercholesterolemia
   f. Peripheral vascular disease
9. Neurology
   a. Stroke
   b. Seizure disorders
10. Rheumatology
    a. Workup of inflammatory arthritis and vasculitis
11. Geriatrics and palliative care
    a. Pain management at the end of life
    b. Control of nausea
    c. Management of constipation/diarrhea and incontinence
    d. Management of polypharmacy
    e. Strategies to reduce fall risk and delirium

The resident will display effective **clinical skills** in the following:
1. Perform a focused history pertinent to the patient's presenting illness
2. Perform a physical examination relevant to the patient's presenting illness
3. Learn how to present a case in a clear, concise, integrated, and problem-based manner

4. Record in the medical record accurate, problem-oriented, progress notes, and brief and informative discharge summaries
5. Order pertinent laboratory and other investigations, justify their use, interpret, and integrate the information appropriately
6. Demonstrate a systematic approach to clinical problem-solving and implement a management plan with clear, comprehensive, and correct orders

The resident will display effective **technical skills** in the following:
1. ECG interpretation
2. Venipuncture
3. NG tube insertion
4. Blood gases
5. Bladder catheterization
6. ECG interpretation
7. Lumbar puncture
8. Bone marrow aspirate
9. Paracentesis
10. Thoracentesis

Off-service (Non-core) Rotation: Malignant Hematology

*Adapted from the University of Alberta and University of Ottawa curricula

Objectives for Radiation Oncology Resident for Competency in CanMEDS Roles in Hematology

Medical Expert

The trainee will possess a body of knowledge and technical skills in hematology relevant to a primary clinician and to oncology. This will enable the trainee to collect and to interpret data, and to carry out diagnostic and therapeutic procedures within the limits of their expertise.

The resident will be able to:
1. Demonstrate a basic understanding of the WHO classification of malignant tumors of the hematologic system and the IPI scoring scheme of non-Hodgkin lymphoma.
2. Choose appropriate staging investigations for a new diagnosis or relapsed hematologic malignancy.
3. Demonstrate a basic understanding of the indications for bone marrow or stem cell transplant and understand when allo- vs. auto-transplant is indicated.
4. Describe the technique of bone marrow aspirate and biopsy as well as the type of information obtained from each of the two samples.
5. Understand the pharmacology of agents used in the treatment of hematologic cancers.

The resident will be able to **diagnose and manage** common problems experienced by the general medical patient and in a patient with a hematologic malignancy; these include, but are not exclusive to the following:
1. Common complications of hematologic cancers such as:
   a. Pain
   b. Febrile neutropenia

   c. Pericardial tamponade
   d. Superior vena cava obstruction
   e. Cord compression
2. Common benign hematologic disorders such as:
   a. Immune thrombocytopenic purpura Thrombotic thrombocytopenic purpura Disseminated intravascular coagulation

The resident will display effective **clinical skills** in the following:
1. Elicit a focused and accurate history relevant to the hematologic system. This includes symptoms of hematologic pathology and should include a review of performance status, history of fever and/or sweats, medications, travel history, occupational exposures, family history, and social history (specifically HIV risk).
2. Accurately perform a physical exam relevant to the hematologic system. This includes assessment of regional nodes, liver and spleen, and skin.
3. Learn how to present a case in a clear, concise, integrated, and problem-based manner.
4. Record in the medical record accurate, problem-oriented progress notes, and brief and informative discharge summaries.
5. Order pertinent laboratory and other investigations, justifies their use, interpret and integrate the information appropriately.
6. Demonstrate a systematic approach to clinical problem-solving and implement a management plan with clear, comprehensive, and correct orders.

The resident will display an understanding of **technical skills** in the following:
1. Bone marrow aspirate and biopsy

Off-service (Non-core) Rotation: Pathology

*Adapted from the University of Alberta and University of Ottawa curricula

Objectives for Radiation Oncology Resident for Competency in CanMEDS Roles in Hematology

Medical Expert

The trainee will possess a body of knowledge and technical skills in pathology relevant to a radiation oncology resident.

The resident will be able to:
1. Describe what is involved in the following procedures.
   a. Gross examination of surgical specimens
   b. Cytological Examination of needle aspirates
   c. Fixation and paraffin embedding of slides
   d. Frozen Section
   e. Cytology of pleural fluid
2. Describe the indications, applications and limitations of fine needle aspiration and needle biopsy
3. Identify the gross features of common cancers
4. Identify the general pathological features of hyperplasia, metaplasia, dysplasia, neoplasms, in situ carcinoma, and frank carcinoma

5. Demonstrate knowledge of the common histological features of cancers of the colon and rectum, lung, breast, skin, thyroid, esophagus, stomach, ovary, anus, urinary bladder, and prostate
6. Be able to provide a classification for tumors of the skin, lung, head and neck, thyroid, breast, kidneys, esophagus, stomach, colon and rectum, testicle, anus, urinary bladder, ovary, and lymphatic system
7. Be able to describe the histological features of radiation change in normal tissues

Off-service (Non-core) Rotation: Radiology and Nuclear Medicine

*Adapted from the University of Alberta and University of Ottawa curricula

Objectives for Radiation Oncology Resident for Competency in CanMEDS Roles in Hematology

Medical Expert

As a clinical specialist devoted to management of cancer patients, the radiation oncologist uses all aspects of imaging and, especially, tumor imaging. In addition, he/she will use specialized techniques of tumor imaging in the precise planning of radiation treatment. The general objectives of this rotation in DIAGNOSTIC RADIOLOGY are to give to the radiation oncology resident the necessary body of knowledge in diagnostic radiology that will allow him or her to fulfill the role adequately.

1. CT scanning:
   a. The trainee will be able to briefly describe the physical principles of CT Scanning. He or she will be able to describe the rationale behind the use of contrast agents and to discuss the main indications for their use in tumor imaging.
   b. The trainee will be able to recognize on CT scans, the gross normal anatomy of the brain, the chest and mediastinum, and the abdomen and pelvis. He or she will be able to recognize and describe the modification of normal anatomy related to tumors in these different sites.
2. Magnetic resonance imaging (MRI):
   a. The trainee will be able to describe briefly the physical principles of MR imaging and to describe the different parameters that can be varied in the production of MR scans as well as the general effect of these variations. He or she will be able to name the principal contrast agents used and to recognize and describe the changes caused by these contrast materials.
   b. The trainee will be able to recognize on MRI scans the normal anatomy of the brain, the head and neck region, the cord, the thorax, the abdomen and pelvis, and will be able to recognize and describe the main MRI changes caused in these organs by tumors.
   c. The trainee will be able to compare the relative advantages of MRI over other imaging modalities and, especially, CT Scanning for the main tumors.
3. Nuclear medicine objectives:
   a. The trainee will become familiar with scientific principles, technology, and clinical applications of nuclear medicine studies as they pertain to the practice of oncology.
   b. The trainee will obtain an understanding of the physical and biological properties of radiopharmaceuticals used in the diagnosis and treatment of cancer.

c. The trainee will develop knowledge of radiation safety procedures.
d. The trainee will become familiar with the clinical indications and usefulness of the different nuclear medicine examinations.
e. The trainee will develop knowledge of the advantages and disadvantages of the different examinations in relationship to other radiologic imaging modalities.
f. The trainee will become familiar with the following techniques:
   - Bone scanning, three phase studies, spot views, whole body imaging, quantitative assessment, and SPECT
   - PET (positron emission tomography in oncology)
   - Thyroid uptake determination and imaging with 99mTc, 123I, and/or 131I
   - 131I body scanning

Off-service (Non-core) Rotation: Emergency Medicine

*Adapted from the University of Alberta and University of Ottawa curricula

Objectives for Radiation Oncology Resident for Competency in CanMEDS Roles in Emergency Medicine

Medical Expert

The trainee will possess a body of knowledge and technical skills in cardiology relevant to a primary clinician. This will enable the trainee to collect and to interpret data, and to carry out diagnostic and therapeutic procedures within the limits of their expertise.

The resident will be able to **diagnose and manage** common problems experienced by the general medical patient; these include, but are not exclusive to, the following:

1. Stabilizing the patient in life-threatening situations, such as:
   a. Major trauma
   b. Coma
   c. Cardiac arrest
   d. Respiratory failure
   e. Poisoning/overdoses
   f. Asphyxia
2. Common acute problems, such as:
   a. Cardiovascular system
      i. MI
      ii. Stroke
      iiii. PE
      iv. Hypertension
   b. Respiratory system
      i. COPD
      ii. Asthma
      iii. Pneumonia
      iv. Stridor
   c. GI/GU system
      i. GI bleed
      ii. Renal colic

d. Central nervous system
    i. Stroke
    ii. Seizure
    iii. Headache
    iv. Altered consciousness
e. Metabolic disorders
    i. Acid-base and electrolyte disturbances
    ii. Diabetic ketoacidosis
    iii. Poisoning
f. Infections
    i. Sepsis
    ii. Febrile neutropenia
g. Fractures
    i. Dislocations
    ii. Sprains
h. ENT
    i. Epistaxsis
    ii. Red eye
    iii. Foreign body
    iv. Neck trauma
i. OBGYN
    i. Bleeding
    ii. Ectopic pregnancy
    iii. Toxemia
    iv. Pelvic pain
    v. Pelvic inflammatory disease
j. Skin
    i. Burns
    ii. Infections
    ii. Wounds
k. Psychiatric
    i. Acute psychosis
    ii. Suicidal patient
    iii. Substance abuse

The resident will display effective **clinical skills** in the following:
1. Perform a focused history pertinent to the patient's presenting illness
2. Perform a physical examination relevant to the patient's presenting illness
3. Learn how to present a case in a clear, concise, integrated, and problem-based manner
4. Record in the medical record an accurate, problem-oriented notes
5. Order pertinent laboratory and other investigations, justify their use, interpret, and integrate the information appropriately
6. Demonstrate a systematic approach to clinical problem-solving and implement a management plan with clear, comprehensive, and correct orders

The resident will display effective **technical skills** in the following:
1. Care of fractures/dislocations
2. Wound care (local anesthesia, suturing, dressings), airway control (intubation)
3. Needle thoracentesis
4. Paracentesis

5. Lumbar puncture
6. Eye patching
7. Nasal packing
8. NG tube insertion
9. Blood gases
10. Bladder catheter insertion

Off-service (Non-core) Rotation: Head and Neck Surgery

*Adapted from the University of Alberta and University of Ottawa curricula

The ENT surgery elective rotation will enable the radiation oncology resident to obtain the knowledge and skills necessary to understand the surgical management of ENT problems within a multidisciplinary team environment.

The resident will possess a body of knowledge and management skills relevant to ENT surgery. This will enable the resident to collect and to interpret data, and to carry out diagnostic and therapeutic procedures within the limits of their expertise.

Objectives for Radiation Oncology Resident for Competency in CanMEDS Roles in ENT Surgery

Medical Expert

The resident will be able to:

1. Demonstrate a basic understanding of the WHO classification of H and N tumors.
2. Be able to describe lymph node levels in the neck.
3. Describe the methods of obtaining histological diagnosis including FNA, core biopsy, excisional biopsy, and lymph node biopsy. Describe indications and contraindications for each of these procedures.
4. Describe the principles of surgical procedures including total laryngectomy, thyroidectomy, lymph node neck dissection, laser excision, and reconstructive procedures, including myocutaneous and vascularized graft. Describe indications and contraindications for each of these procedures.
5. Manage problems experienced by the head and neck surgical patient:
   a. Airway obstruction
   b. Palliation of advanced head and neck tumors
   c. Dysphagia, odynophagia
   d. Approach to enlarged neck node
6. Manage common in-patient problems in the post-operative period, such as:
   a. Pain
   b. Hemostasis and transfusion
   c. Head and Neck Sepsis
   d. Thrombosis and pulmonary embolus
   e. Fluid and electrolyte support
   f. Nutritional support

The resident will display effective **clinical skills** in the following:
1. Elicit a focused and accurate history relevant to the ear, nose, and throat. This includes symptoms of ENT pathology and should include a review of performance status, medications, occupational exposures, family history, and social history.
2. Accurately perform a physical exam relevant to the ENT system. This includes assessment of regional nodes. Describe abnormal findings. Be able to perform indirect laryngoscopy. Describe normal anatomy seen on indirect laryngoscopy and direct endoscopy.
3. Order appropriate investigations and be able to interpret the results, especially CT of the head and neck, and PET scan.

The resident will display effective **technical skills** in the following:
1. NG/Feeding tube insertion
2. Fiberoptic nasopharyngoscopy, indirect laryngoscopy
3. Wound care (local anesthesia, suturing, dressings)
4. Assist at neck dissection
5. Assist at examination under anesthesia
6. Assist at tracheostomy

Off-service (Non-core) Rotation: Colorectal Surgery

*Adapted from the University of Alberta and University of Ottawa curricula

The colorectal surgery rotation will enable the radiation oncology resident to obtain the knowledge and skills necessary to understand the surgical management of a variety of patient problems within a multidisciplinary team environment.

The resident will possess a body of knowledge and management skills relevant to colorectal surgery. This will enable the resident to collect and to interpret data, and to carry out diagnostic and therapeutic procedures within the limits of their expertise.

Objectives for Radiation Oncology Resident for Competency in CanMEDS Roles in General Surgery

Medical Expert

The resident will be able to:
1. Demonstrate a basic understanding of the WHO classification of GI tumors. Be able to describe regional lymph nodes in the pelvis and staging of GI cancers (gastric, rectal, and anal canal).
2. Describe the methods of obtaining histological diagnosis including core biopsy, excisional biopsy, and lymph node biopsy. Describe indications and contraindications for each of these procedures.
3. Describe surgical procedures including endoscopy, colonoscopy, esophagectomy, gastrectomy (subtotal/total), ERCP, meso-rectal excision (MRE), non-functioning colostomy/ileostomy, abdominoperineal resection (APR), low anterior resection (LAR), and inguinal lymph node dissection. Describe indications and contraindications for each of these procedures.
4. Manage common problems experienced by the general surgical patient:
   a. Acute abdomen
   b. Bowel obstruction

   c. Pancreatic and biliary disease
   d. GI bleeding
   e. Lumps (breast, thyroid)
5. Determine whether a patient is fit for surgery based on an understanding of the determinants of operative risk
6. Identify and manage the causes of circulatory collapse and shock in the surgical patient
7. Manage common in-patient problems in the post-operative period such as:
   a. Pain
   b. Bowel obstruction
   c. Hemostasis and transfusion
   d. Sepsis
   e. Thrombosis and pulmonary embolus
   f. Fluid and electrolyte support
   g. Nutritional support

The resident will display effective **clinical skills** in the following:
1. Elicit a focused and accurate history with particular focus on the abdomen. This includes symptoms related to hepatic, biliary, and bowel pathology, and should include a review of performance status, medications, family history, and social history.
2. Accurately perform a physical exam relevant to the abdomen and pelvis. Describe abnormal findings.
3. Order appropriate investigations and be able to interpret the results, especially liver panel, ultrasound, and CT abdomen and pelvis.

The resident will display effective **technical skills** in the following:
1. Venipuncture
2. NG tube
3. Blood gases
4. Bladder catheters
5. Abscess incision and drainage
6. Wound care (local anesthesia, suturing, dressings)
7. Aseptic technique
8. Assist at meso-rectal excision (MRE), defunctioning colostomy/ileostomy, colonoscopy

Off-service (Non-core) Rotation: Breast Surgery

*Adapted from the University of Alberta and University of Ottawa curricula

The breast surgery rotation will enable the radiation oncology resident to obtain the knowledge and skills necessary to understand the surgical management of a variety of patient problems within a multidisciplinary team environment.

The resident will possess a body of knowledge and management skills relevant to breast surgery. This will enable the resident to collect and to interpret data, and to carry out diagnostic and therapeutic procedures within the limits of their expertise.

Objectives for Radiation Oncology Resident for Competency in CanMEDS Roles in Breast Surgery

Medical Expert

The resident will be able to:

1. Demonstrate a basic understanding of the WHO classification of breast tumors. Be able to describe regional lymph nodes and staging of breast cancers.
2. Describe the methods of obtaining histological diagnosis, including stereotactic biopsy, U.S.-guided-biopsy, wire localization, image-guided marking (clipping) of breast lesions, vacuum-assisted biopsy, fine needle aspiration, core biopsy, excisional biopsy, skin punch biopsy, and lymph node biopsy. Describe indications and contraindications for each of these procedures.
3. Describe surgical procedures including breast conservative surgery, total mastectomy, skin-sparing mastectomy, skin- and nipple-sparing mastectomy, oncoplastic surgery, mastopexy, breast reconstruction using prosthesis or autologous tissue flaps, axillary lymph node dissection, and sentinel lymph node biopsy. Describe indications and contraindications for each of these procedures.
4. Manage common problems:
   a. Breast lumps (breast, thyroid)
   b. Mastitis, breast abscess
5. Determine whether a patient is fit for surgery based on an understanding of the determinants of operative risk
6. Manage common in-patient problems in the post-operative period such as:
   a. Pain
   b. Seroma
   c. Wound infection

The resident will display effective **clinical skills** in the following:

1. Elicit a focused and accurate history with particular focus on the abdomen. This includes symptoms related to hepatic, biliary, and bowel pathology, and should include a review of performance status, medications, family history, and social history.
2. Accurately perform a physical exam relevant to the abdomen and pelvis. Describe abnormal findings.
3. Order appropriate investigations and be able to interpret the results, especially liver panel, ultrasound, and CT abdomen and pelvis.

The resident will display effective **technical skills** in the following:

1. Core needle biopsy
2. Skin punch biopsy
3. Seroma aspiration
4. Abscess incision and drainage
5. Wound care (local anesthesia, suturing, dressings)
6. Aseptic technique
7. Assist at lumpectomy, mastectomy, axillary sentinel lymph node biopsy, axillary lymph node dissection

Off-service (Non-core) Rotation: Gynecologic-Oncology Surgery

*Adapted from the University of Alberta and University of Ottawa curricula

The gynecology oncology elective rotation will enable the radiation oncology resident to obtain the knowledge and skills necessary to understand the surgical management of patients with gynecologic cancer in a multidisciplinary team environment.

The resident will possess a body of knowledge and management skills relevant to gynecologic oncology. This will enable the resident to collect and to interpret data, and to carry out diagnostic and therapeutic procedures within the limits of their expertise.

Objectives for Radiation Oncology Resident for Competency in CanMEDS Roles in Gynecologic-Oncology Surgery

Medical Expert

The resident will be able to:

1. Demonstrate a basic understanding of the FIGO and TNM classification of malignant tumors of the gynecologic system
2. Describe the methods of obtaining histological diagnosis such as punch biopsy, cone biopsy, pipelle sampling, and fractional D & C
3. Describe the principles of surgical management in gynecologic cancer including radical hysterectomy, TAH & BSO, radical vulvectomy, pelvic lymph node and also inguinal node dissection, and ovarian surgery, including debulking.
4. Describe principles of management of disease complications such as:
   a. Hemorrhage
   b. Ureteric obstruction
   c. Ascites
5. Manage common problems:
   a. Breast lumps (breast, thyroid)
   b. Mastitis, breast abscess
6. Determine whether a patient is fit for surgery based on an understanding of the determinants of operative risk
7. Manage common in-patient problems in the post-operative period such as:
   a. Pain
   b. Malignant bowel obstruction
   c. Hemostasis and transfusion
   d. Sepsis
   e. Thrombosis and pulmonary embolus
   f. Fluid and electrolyte support
   g. Nutritional support
   h. Bladder function impairment
   i. Ureteric obstruction

The resident will display effective **clinical skills** in the following:
1. Elicit a focused and accurate history relevant to the gynecologic system. This includes symptoms of pathology and should include a review of performance status, fertility and pregnancy history, family history and social history (specifically HPV risk).
2. Accurately perform a physical exam relevant to the gynecologic system and be able to perform a Pap smear.
3. Order appropriate diagnostic and staging investigations and be able to interpret the results.

The resident will display effective **technical skills** in the following:
1. Speculum examination
2. PAP smear
3. Uterine sounding
4. Cervical dilatation and curettage
5. Vaginal packing
6. Bimanual examination
7. Wound care (local anesthesia, suturing, dressings)
8. Common procedures such as IV, NG tube, blood gases, bladder catheters
9. Paracentesis.
10. Cervical biopsy

Off-service (Non-core) Rotation: Urology

*Adapted from the University of Alberta and University of Ottawa curricula

The urology elective rotation will enable the radiation oncology resident to obtain the knowledge and skills necessary to understand the surgical management of patients with genitourinary malignancies in a multidisciplinary team environment.

The resident will possess a body of knowledge and management skills relevant to genitourinary oncology. This will enable the resident to collect and to interpret data, and to carry out diagnostic and therapeutic procedures within the limits of their expertise.

Objectives for Radiation Oncology Resident for Competency in CanMEDS Roles in Genitourinary-oncology Surgery

Medical Expert

The resident will be able to:
1. Demonstrate a basic understanding of the TNM classification of malignant tumors of the genitourinary system.
2. The methods of obtaining histological diagnosis including cytology, core biopsy, excisional biopsy, lymph node biopsy, particularly principles of systematic biopsy of the prostate.
3. Describe the principles of surgical management in genitourinary cancer including cystoscopy, TURP, radical prostatectomy, cystectomy with ileal conduit, nephrectomy, and orchiectomy.
4. Describe principles of management of disease complications such as:
   a. Urinary outlet obstruction
   b. Gross hematuria
   c. Ureteric obstruction

5. Manage common problems:
   a. Benign prostatic hypertrophy
   b. Diagnosis and management of hematuria
6. Determine whether a patient is fit for surgery based on an understanding of the determinants of operative risk.
7. Manage common in-patient problems in the post-operative period such as:
   a. Pain
   b. Hemostasis and transfusion
   c. Sepsis
   d. Thrombosis and pulmonary embolus
   e. Fluid and electrolyte support
   f. Nutritional support
   g. Bladder function impairment
   h. Ureteric obstruction

The resident will display effective **clinical skills** in the following:
1. Elicit a focused and accurate history relevant to the GU cancer including characterization and quantification of urinary symptoms in prostate cancer.
2. Accurately perform a physical exam relevant to the GU system particularly DRE in the assessment of prostate cancer.
3. Order appropriate diagnostic and staging investigations and be able to interpret the results.

The resident will display effective **technical skills** in the following:
1. DRE examination
2. Catheter placement
3. Bladder irrigation
4. Wound care (local anesthesia, suturing, dressings)
5. Common procedures such as IV, NG tube, blood gases
6. Assist at TURP, radical prostatectomy, orchidectomy, cystectomy

Off-service (Non-core) Rotation: Thoracic Surgery

*Adapted from the University of Alberta and University of Ottawa curricula

The thoracic surgery elective rotation will enable the radiation oncology resident to obtain the knowledge and skills necessary to understand the surgical management of patients with thoracic malignancies in a multidisciplinary team environment.

The resident will possess a body of knowledge and management skills relevant to thoracic oncology. This will enable the resident to collect and to interpret data, and to carry out diagnostic and therapeutic procedures within the limits of their expertise.

Objectives for Radiation Oncology Resident for Competency in CanMEDS Roles in Thoracic-oncology Surgery

Medical Expert

The resident will be able to:

1. Demonstrate a basic understanding of the TNM classification of malignant tumors of the thoracic malignancies.
2. The methods of obtaining histological diagnosis including sputum cytology, transbronchial needle biopsy, transcutaneous find needle biopsy, and open lung biopsy and the procedures used to obtain histological sampling, including endobronchial ultrasound (EBUS), bronchoscopy, mediastinoscopy, and mediastinotomy.
3. Describe the principles of surgical management in thoracic malignancies including wedge resection, sleeve resection, lobectomy, pneumonectomy, mediastinal lymph node dissection, and laser therapy.
4. Describe principles of management of disease complications such as:
   a. Airway obstruction
   b. Superior vena cava syndrome
   c. Hemoptysis
   d. Brachial plexopathy
   e. Malignant pleural effusion including indications for use of a Pleurex catheter
   f. Hypercalcemia
   g. Syndrome of inappropriate antidiuretic hormone secretion (SIADH)
5. Manage common problems:
   a. Pleural effusion
6. Determine whether a patient is fit for surgery based on an understanding of the determinants of operative risk, including pulmonary function tests and estimated post-operative pulmonary function
7. Manage common in-patient problems in the post-operative period such as:
   a. Pain
   b. Hemostasis and transfusion
   c. Sepsis
   d. Thrombosis and pulmonary embolus
   e. Fluid and electrolyte support
   f. Nutritional support

The resident will display effective **clinical skills** in the following:

1. Elicit a focused and accurate history relevant to thoracic malignancies, including assessment of exercise tolerance, functional status, nutritional status, and symptoms of paraneoplastic syndromes.
2. Accurately perform a physical exam relevant to the respiratory system.
3. Order appropriate diagnostic and staging investigations and be able to interpret the results.

The resident will display effective **technical skills** in the following:

1. Pulmonary function test interpretation
2. Wound care (local anesthesia, suturing, dressings)
3. Common procedures such as IV, NG tube, blood gases
4. Thoracocentesis
5. Assist at bronchoscopy, mediastinoscopy, and mediastinotomy, wedge resection, sleeve resection, lobectomy, pneumonectomy, mediastinal lymph node dissection

Off-service (Non-core) Rotation: Neurosurgery

*Adapted from the University of Alberta and University of Ottawa curricula

The neurosurgery elective rotation will enable the radiation oncology resident to obtain the knowledge and skills necessary to understand the surgical management of patients with neurological malignancies in a multidisciplinary team environment.

The resident will possess a body of knowledge and management skills relevant to neuro-oncology. This will enable the resident to collect and to interpret data, and to carry out diagnostic and therapeutic procedures within the limits of their expertise.

Objectives for Radiation Oncology Resident for Competency in CanMEDS Roles in Neuro-Oncology Surgery

Medical Expert

The resident will be able to:

1. Demonstrate a basic understanding of the WHO classification of malignant CNS tumors.
2. The methods of obtaining histological diagnosis, including CSF cytology and stereotactic biopsy
3. Describe the principles of surgical management in CNS malignancies including craniotomy, transsphenoidal pituitary adenectomy, skull base resection, and decompressive laminectomy.
4. Describe principles of management of disease complications such as:
   a. Increased intracranial pressure
   b. Obstructive hydrocephalus
   c. Spinal cord compression
   d. SIADH
   e. Seizures
5. Manage common problems:
   a. Diagnosis and management of intracranial mass
   b. Diagnosis and management of spinal cord compression
6. Determine whether a patient is fit for surgery based on an understanding of the determinants of operative risk
7. Manage common in-patient problems in the post-operative period such as:
   a. Pain
   b. Hemostasis and transfusion
   c. Sepsis
   d. Thrombosis and pulmonary embolus
   e. Fluid and electrolyte support
   f. Nutritional support
   g. Rehabilitation for neurological impairment
   h. Posterior fossa syndrome in children

The resident will display effective **clinical skills** in the following:

1. Elicit a focused and accurate history relevant to the CNS tumor
2. Accurately perform a neurological physical exam
3. Order appropriate diagnostic and staging investigations and be able to interpret the results

The resident will display effective **technical skills** in the following:

1. Lumbar puncture
2. Wound care (local anesthesia, suturing, dressings)
3. Common procedures such as IV, NG tube, blood gases.
4. Assist at craniotomy and de-compressive laminectomy

TEACHING AND LEARNING

The radiation oncology program will be structured to facilitate learning through the following teaching-essential components.

Core Specialty Topics

Basic Science Topics

These are developed with consideration to the Royal College of Physicians and Surgeons of Canada's Specialty Training Requirements in Radiation Oncology (v. 2012) and the American Board of Radiology Certification Requirements. The following topics of basic sciences will be covered:

- Cancer biology: to understand the process of malignant transformation, the hallmarks of cancer and its molecular biology, including opportunities for therapeutic targeting
- Radiobiology: to understand the molecular and cellular damage induced by radiation, cellular responses to radiation damage, early and late effects of radiation on normal tissue, including carcinogenesis, hereditary effects, and effects on the embryo
- Radiation Therapy Physics: to understand basic radiation physics, dosimetry, their application to treatment planning of both external beam radiation and brachytherapy, radiation safety, and protection
- Epidemiology: to understand the burden of the full range of malignant diseases
- Biostatistics: to be competent in interpreting the literature and understand the principle of conducting clinical trials
- Anatomy of normal and malignant tissue: to particularly understand the appearance of normal organs, tumors, and their spread with various imaging modalities
- Pathology as it applies to malignant diseases and irradiated tissues
- For further details, refer to Basic Core Specialty Rotations in the earlier section

Clinical Core Specialty Topics

Using the CanMEDS framework, a radiation oncologist should be competent in the therapeutic use of radiotherapy in a range of malignant diseases as well as some benign conditions (Appendix 1).

Additionally, a radiation oncologist should develop a good understanding of the principles of allied clinical disciplines such as surgical oncology, medical oncology, hematology, and palliative care. This is to be complemented with internal medicine and general surgery required for the practice of any clinician. For further details, refer to clinical core specialty rotations in the earlier section.

Trainee-selected Topics

In addition to the aforementioned topics, residents have the option to select additional topics catering to the need of the trainee, his/her current practice or anticipated practice. Trainees are advised to refer to the top conditions in the specialty (Appendix 2).

Universal Topics

The intent of these topics is to develop a well-rounded radiation oncology clinician with skills and confidence in managing primary general clinical conditions commonly encountered in the cancer patient. The resident will develop such knowledge through off-service general medical and surgical rotations in addition to online teaching modules of which ten with relevance to the specialty of radiation oncology have been selected.

Seminars

At least **4–6 hours of formal teaching time,** with an assigned tutor, time slot, and venue will be dedicated each week. The resident will be free of clinical duties. Different format of teaching is advised. This includes lectures, seminars (such as morbidity and mortality rounds, weekly oncology grand rounds), journal clubs, and case-based discussion. Lectures will include radiation oncologists, other radiation therapy experts (medical physicists, radiobiologist, research scientists) and from other oncology disciplines (e.g., medical oncology, radiology, surgical oncology specialties).

FORMAT	RECOMMENDED FREQUENCY	OBJECTIVES
ONCOLOGY GRAND ROUNDS	Once or twice a month	**THESE WILL BE PRESENTED BY EXPERIENCED SENIOR STAFF OR INVITED SPEAKERS FROM DIFFERENT DISCIPLINES.** **THE FOCUS OF THE TOPICS IS TO:** • **REVIEW UP-TO-DATE MANAGEMENT STRATEGIES FOR VARIOUS CANCER TYPES** • **HIGHLIGHT NEW OR ONGOING CLINICAL TRIALS** • **DESCRIBE THE LATEST ADVANCES IN ONCOLOGY** • **PROVIDE MULTIDISCIPLINARY PANELS TO DISCUSS AREAS OF CONTROVERSY IN ONCOLOGY**
MORBIDITY AND MORTALITY ROUNDS	Once a month or every other month	• **SENIOR RESIDENTS ARE ENCOURAGED TO PARTICIPATE UNDER THE SUPERVISION OF THE MORBIDITY AND MORTALITY PANEL, AND THE PROGRAM DIRECTOR.** • **THE OBJECTIVES OF MORTALITY AND MORBIDITY CONFERENCE ARE THE FOLLOWING:** • **THE PRIMARY GOAL IS THE IMPROVEMENT OF PATIENT CARE BY IDENTIFYING THE SOURCE OF SUCH EVENTS WHETHER MEDICAL ERRORS OR ANTICIPATED TREATMENT COMPLICATIONS**

		• **SYSTEMATIC ANALYSIS OF ROOT CAUSES LEADING TO A MEDICAL ERROR (E.G., COMMUNICATION PROBLEMS, HUMAN ERRORS, TECHNICAL FAILURES, INADEQUATE POLICIES)** • **PREVENTION OF MEDICAL ERRORS BY IDENTIFYING AREAS OF IMPROVEMENT (E.G., CLINICIAN KNOWLEDGE/SKILLS), LAYING OUT POLICIES AND PROCEDURES THAT MINIMIZE THE CHANCES OF ERRORS LEADING TO COMPLICATIONS**
JOURNAL CLUBS, CRITICAL APPRAISAL AND EVIDENCE-BASED MEDICINE	Once a month or every other month	• **UP-TO-DATE CLINICAL ARTICLES ARE DISCUSSED IN THE CONTEXT OF THE PREVIOUS LITERATURE AND ARE SELECTED BY AN EXPERT IN THE FIELD.** • **THE OBJECTIVES OF THE JOURNAL CLUB ARE THE FOLLOWING:** • **PROMOTING CONTINUING PROFESSIONAL DEVELOPMENT** • **STAYING UP-TO-DATE WITH THE LITERATURE AND MODIFYING CLINICAL PRACTICE WHEN APPLICABLE** • **ENSURING THAT PROFESSIONAL PRACTICE IS EVIDENCE-BASED** • **LEARNING AND PRACTICING CRITICAL APPRAISAL SKILLS**
ACADEMIC HALF-DAY ACTIVITIES	Once a week Half a day a week	**THREE TO FOUR HOURS OF PROTECTED LEARNING TIME SHOULD BE SECURED. A SERIES OF PRE-SPECIFIED ONCOLOGICAL TOPICS ARE TO BE PRESENTED DURING THIS ALLOTTED TIME. SELECTION OF THE TOPICS IS DETERMINED BY THE PROGRAM DIRECTOR WITH THE INVOLVEMENT OF THE CHIEF RESIDENT. THE AIM IS TO ACCOMPLISH THE OBJECTIVES OF THE CORE SPECIALTY TOPICS DETAILED BELOW. TEACHING FORMAT INCLUDES STAFF-LED REVIEW LECTURES, CASE-BASED DISCUSSIONS (E.G., HOT SEAT), RESIDENT-LED LECTURES (E.G., FLIPPED CLASSROOM SESSIONS)**

RADIATION PLANS REVIEW (SIMULATION MEETING)	Once a week	**SENIOR RESIDENTS MUST PRESENT THE CASES WHERE THEY HAVE BEEN INVOLVED. THE FOCUS OF SUCH MEETINGS IS TO:** • **PRESENT CASES AND REVIEW ITS CLINICAL DATA, INCLUDING PATIENT- AND DISEASE-RELATED FACTORS, AND DISCUSS THE TREATMENT INTENT AND THE RATIONALE LEADING TO THE PROPOSED MANAGEMENT PLAN** • **PROVIDE PEER REVIEW OF RADIATION TREATMENT PLANS WHERE IMPROVEMENT OF TREATMENT PLANS CAN BE DISCUSSED**
JOINT MULTIDISCIPLINARY MEETINGS (TUMOR BOARD)	**AS PER THE TREATMENT SITE OF THE INVOLVED ROTATION**	**RESIDENTS MUST REGULARLY ATTEND TUMOR BOARDS DURING THE INVOLVED ROTATION AND ARE ENCOURAGED TO ACTIVELY PARTICIPATE IN DISCUSSIONS AND TO PRESENT CASES WHEN NEEDED. THE OBJECTIVE IS TO:** • **LEARN TO REVIEW AND TO INTERPRET DATA RELEVANT IN DEVISING A MANAGEMENT PLAN** • **LEARN THE ROLE AND LIMITATION OF VARIOUS ONCOLOGICAL TREATMENTS** • **LEARN TO HAVE A PROFESSIONAL PATIENT-FOCUSED DIALOG WITH OTHER PHYSICIANS** • **LEARN STANDARD TREATMENT RECOMMENDATIONS** • **LEARN HOW TO RATIONALIZE TREATMENT INTERVENTIONS FOR RARE CASES**

Research

The Radiation Oncology Residency Training Program strongly supports research during residency training via a flexible and pragmatic approach to residents' research. Research projects may take many forms, and the time required will vary significantly. Residents and their research supervisors may designate up to six Hybrid Clinical Research Blocks (4 weeks each) for approved projects, which can be scattered throughout the training program to cover various phases of the research project. The Hybrid Clinical Research Blocks (3 days Clinical and 2 days Research) are designated according to a clear proposal of the planned research activities during these blocks and need to be supported by the program director and the

research supervisor and approved by the Training Program Committee. A detailed written report of the research activity is to be submitted on the last day of each Hybrid Clinical Research Block. A minimum of one peer-reviewed publication is required of each resident during the 5-year residency training.

UNIVERSAL TOPICS

Online Teaching Modules

These ten high-value topics have been selected given their relevance to the practice of radiation oncology. The topics are taught centrally through an e-learning platform and are to be completed throughout the residency program. At the end of the learning module, there will be an online formative assessment. After completion of all topics, there will be a combined summative assessment in the form of context-rich multiple choice questions (MCQs). All trainees must attain minimum competency in the summative assessment.

The objectives of the selected universal topics are as follows.

PGY-1

1. **Occupation Hazards of Health Care Workers (HCW).** At the end of the Learning Unit, you should be able to:
   a. Recognize common sources and risk factors of occupational hazards among the HCW
   b. Describe common occupational hazards in the workplace
   c. Develop familiarity with legal and regulatory frameworks governing occupational hazards among the HCW
   d. Develop a proactive attitude to promote workplace safety
   e. Protect yourself and colleagues against potential occupational hazards in the workplace
2. **Ethical issues including treatment refusal, patient autonomy.** At the end of the Learning Unit, you should be able to:
   a. Predict situations where a patient or family is likely to decline prescribed treatment
   b. Describe the concept of "rational adult" in the context of patient autonomy and treatment refusal
   c. Analyze key ethical, moral, and regulatory dilemmas in treatment refusal
   d. Recognize the importance of patient autonomy in the decision-making process
   e. Counsel patients and families declining medical treatment in light of the patients' best interests
3. **Sepsis, systemic inflammatory response syndrome (SIRS),**
4. **Disseminated intravascular coagulation (DIC).** At the end of the Learning Unit, you should be able to:
   a. Explain the pathogenesis of sepsis, SIRS, and DIVC
   b. Identify patient-related and non-patient-related predisposing factors of sepsis, SIRS, and DIVC
   c. Recognize a patient at risk of developing sepsis, SIRS, and DIVC
   d. Describe the complications of sepsis, SIRS, and DIVC
   e. Apply the principles of management of patients with sepsis, SIRS, and DIVC
   f. Describe the prognosis of sepsis, SIRS, and DIVC

PGY-2

5. **Blood Transfusion.** At the end of the Learning Unit, you should be able to:
   a. Review the different components of blood products available for transfusion
   b. Recognize the indications and contraindications of blood product transfusion
   c. Discuss the benefits, risks, and alternative to transfusion
   d. Undertake consent for specific blood product transfusion
   e. Perform steps necessary for safe transfusion

f. Develop an understanding of special precautions and procedures necessary during massive transfusions
g. Recognize transfusion-associated reactions and provide immediate management

6. **Management of Acute Chest Pain.** At the end of the Learning Unit, you should be able to:
   a. Triage and categorize patients
   b. Identify patients who need prompt medical and surgical attention
   c. Generate preliminary diagnosis-based history and physical examination
   d. Order and interpret urgent investigations
   e. Provide appropriate immediate management to patients
   f. Refer the patients to the next level of care, if needed
7. **Management of Upper GI Bleeding.** At the end of the Learning Unit, you should be able to:
   a. Triage and categorize patients
   b. Identify patients who need prompt medical and surgical attention
   c. Generate preliminary diagnosis-based history and physical examination
   d. Order and interpret urgent investigations
   e. Provide appropriate immediate management to patients
   f. Refer the patients to the next level of care, if needed
8. **Management of Acute Breathlessness.** At the end of the Learning Unit, you should be able to:
   a. Triage and categorize patients
   b. Identify patients who need prompt medical and surgical attention
   c. Generate preliminary diagnoses based on history and physical examination
   d. Order and interpret urgent investigations
   e. Provide appropriate immediate management to patients
   f. Refer the patients to the next level of care, if needed

PGY-3

9. **Management of Fluid in Hospitalized Patients.** At the end of the Learning Unit, you should be able to:
   a. Review physiological basis of water balance in the body
   b. Assess a patient for his/her hydration status
   c. Recognize a patient with over and under hydration
   d. Order fluid therapy (oral as well as intravenous) for a hospitalized patient
   e. Monitor fluid status and response to therapy through history, physical examination, and selected laboratory investigations
10. **Prescribing Drugs in the Elderly.** At the end of the Learning Unit, you should be able to:
   a. Discuss the principles of prescribing in the elderly
   b. Recognize polypharmacy, prescribing cascade, inappropriate dosages, inappropriate drugs, and deliberate drug exclusion as major causes of morbidity in the elderly
   c. Describe the physiological and functional declines in the elderly that contribute to increased drug-related adverse events
   d. Discuss drug-drug interactions and drug-disease interactions among the elderly
   e. Be familiar with Beers criteria
   f. Develop rational prescribing habit for the elderly
   g. Counsel elderly patient and family on safe medication usage

PGY-4

11. **Evidence-Based Approach to Smoking Cessation.** At the end of the Learning Unit, you should be able to:
    a. Describe the epidemiology of smoking and tobacco usage in Saudi Arabia
    b. Review the effects of smoking on the smoker and family members
    c. Effectively use pharmacologic and non-pharmacologic measures to treat tobacco usage and dependence
    d. Effectively use pharmacologic and non-pharmacologic measures to treat tobacco usage and dependence among special population groups such as pregnant women, adolescents, and patients with psychiatric disorders
12. **Patient Advocacy**. At the end of the Learning Unit, you should be able to:
    a. Define patient advocacy
    b. Recognize patient advocacy as a core value governing medical practice
    c. Describe the role of patient advocates in the care of patients
    d. Develop a positive attitude toward patient advocacy
    e. Be a patient advocate in conflicting situations
    f. Be familiar with local and national patient advocacy groups

ASSESSMENT

Purpose of Assessment

- Enhance learning by providing formative assessments, enabling trainees to receive immediate feedback, measure their own performance, and identify areas for development.
- Drive learning and enhance the training process by clarifying what is required of trainees and motivating them to ensure they receive suitable training and experience.
- Provide robust, summative evidence that trainees are meeting the curriculum standards during the training program.
- Ensure trainees are acquiring competencies within the domains of good medical practice.
- Ensure that trainees possess the essential underlying knowledge, skills, and attitudes required for their specialty.
- Identify trainees who should be advised to consider a career change.

Assessment Methods

To fulfill the CanMEDS competencies, the resident's performance will be evaluated jointly by relevant staff for the following competencies:

Competency	Tool	Frequency
Medical Expert		
▪ Knowledge relevant to the discipline	ITER (DO-C) Mini-CEX (DO-C) STACER (DO-NC) CBD	Every rotation 6 encounters per year 6 encounters per year 6 encounters per year
▪ Clinical and/or technical skills	ITER (DO-C) STACER	Every rotation 6 encounters per year
Communicator		
▪ Therapeutic relationships with patients and families, including patient-centered approach and shared care planning	ITER (DO-C) Mini-CEX	Every rotation 6 encounters per year
▪ Oral communication, including difficult communication scenarios, including but not limited to disagreements and emotionally charged conversations	ITER (DO-C) Mini-CEX (DO-C)	Every rotation 6 encounters per year
▪ Written and electronic communication and information	STACER (DO-NC) Mini-CEX (DO-C)	6 encounters per year 6 encounters per year
▪ Disclosure of harmful patient safety incidents	ITER (DO-C)	Every rotation

Collaborator		
▪ Conflict resolution	ITER (DO-C)	Every rotation
▪ Relationships with health care professionals	ITER (DO-C) Mini-CEX (DO-C)	Every rotation 6 encounters per year
Leader		
▪ Leadership and health care improvement	ITER (DO-C)	Every rotation
▪ Stewardship of health care resources	ITER (DO-C)	Every rotation
Health Advocate		
▪ Advocacy for individual patients and/or communities or populations	ITER (DO-C) Mini-CEX (DO-C)	Every rotation 6 encounters per year
Scholar		
▪ Self-assessment and self-directed lifelong learning	ITER (DO-C)	Every rotation
▪ Critical appraisal and integration into practice	Research	One complete project per residency
▪ Teaching abilities		Complete the Research Methods course
▪ Contributions to scholarship and/or research, including research ethics		
Professional		
▪ Professional conduct and ethical behaviors, including technology-enabled communication	ITER (DO-C) Mini-CEX (DO-C)	Every 2–rotation 6 encounters per year

ITER	*In-training evaluation report*
DO-C	*Direct observation-clinical (considering graded responsibility for clinical encounters)*
Mini-CEX	*Mini-clinical evaluation exercise*
STACER	*Standardized assessment of a clinical encounter report*
DOPS	*Direct observation of procedural skills*
DO-NC	*Direct observation-nonclinical*
WE	*Written examination*
MO	*Mock oral examination*
EW	*Evaluation of written communication (clinical encounter notes)*
EP	*Evaluation of a presentation given by resident*

A. Annual Assessment

1. Continuous appraisal

This assessment is conducted toward the end of each training rotation throughout the academic year and at the end of each academic year as continuous assessment in the form of formative and summative evaluation.

1.1 Formative Continuous Evaluation

The following tools will be used for evaluation.

- In-training evaluation report (ITER)
  The assessment is conducted at the end of each rotation relying on direct observation of clinical performance (Appendix 4). This can consider other formative assessment tools described below. It must be completed within two weeks following the end of each rotation (preferably in an electronic format) and signed by at least two consultants. The program director will discuss the evaluation with the resident, as necessary. The evaluation form will be submitted to the Regional Training Supervisory Committee of the SCFHS within four weeks following the end of the rotation.
- Mini-clinical evaluation exercise (Mini-CEX)
  Performance in a 10–20-minute direct observation assessment of trainee-patient interactions. (Appendix 5). Preceptors are encouraged to perform at least two assessment per clinical rotation, preferably mid-rotation and then near the end of the rotation. Preceptors should provide timely and specific feedback to the trainee after each assessment of a trainee-patient encounter.
- Standardized assessment of a clinical encounter report (STACER)
  Treatment planning performance assessment is conducted twice in each rotation (every 2–3 months) where a resident's skills carrying out a treatment plan, including the contouring, dose prescription, and plan evaluation are objectively evaluated (Appendix 6). A list of case-specific radiation treatment plans is stated in Appendix 7. Residents are encouraged to undergo STACER twice a rotation (once as a junior and once as a senior) for the stated clinical scenarios.
- Direct observation of procedural skills (DOPS)
  This provides an objective assessment of the performance of diagnostic and therapeutic procedural skills by the trainee. Timely and specific feedback for the trainee after each procedure is mandatory (Appendix 8). Examples of relevant procedures are listed in the appendix.
- Mock oral examination (MO)
  Case-based discussion (approximately 20–30 minutes) will involve a comprehensive review of a clinical case between a trainee and an evaluator. The trainee is given feedback from an

evaluator across a range of areas relating to clinical knowledge, clinical decision-making, and patient management. A short MO is conducted multiple times a year in a "hot seat" platform with other residents during academic activities. More formal MOs are conducted once yearly. Timely and specific feedback for the trainee is mandatory (Appendix 9).

- Evaluation of presentation given by resident
  Formal evaluation of a presentation given by the resident is encouraged (Appendix 10).

1.2 Summative Continuous Evaluation

A summative continuous evaluation report prepared for each resident at the end of each academic year using the aforementioned assessment tools is encouraged. This should be discussed one-to-one with the program director to allow identification of strengths and weaknesses. A trainee promotion to the next training level will be made based on this performance evaluation.

2. Written examinations

Written examinations at the end of the Radiobiology and the Radiation Therapy Physics Course will be conducted as detailed above.

B. Final In-training Evaluation Report (FITER)/Comprehensive Competency Report (CCR)

In addition to the approval of completion of the clinical requirements (resident's logbook) by the local supervising committee, the FITER is also prepared by the program's directors for each resident at the end of his/her final year in residency (PGY-4). This might also involve clinical, oral exams, and completion of other academic assignments (Appendix 8).

C. Final Radiation Oncology Board Examination (Saudi Board Examination)

The final Saudi Board Examination comprises two parts:

1. Written examination

This examination assesses the theoretical knowledge base (including recent advances) and problem-solving capabilities of candidates in the specialty of radiation oncology, which is held at least once a year. The number of exam items, eligibility, and passing score will be in accordance with the Commission's training and examination rules and regulations. Examination details and blueprint are to be developed by an exam committee.

2. Clinical examination

This examination assesses a broad range of high-level clinical skills, including data gathering, patient management, communication, and counseling skills. The examination is held at least once a year, preferably in an objective-structured clinical examination (OSCE) format in the form of patient management problems (PMPs). The exam eligibility and passing score will be in accordance with the Commission's training and examination rules and regulations. Examination details and blueprint are to be developed by an exam committee.

D. Certification

"Certificate of training completion" will only be issued upon the resident's successful completion of all program requirements. Candidates passing all components of the final specialty examination (written and clinical examination) are awarded the "Saudi Board of Radiation Oncology" Certificate.

TRAINEE SUPPORT

Mentorship Program

Mentoring during residency has a positive impact on the professional development of residents. This involves pairing the resident with a mentor to provide guidance and support throughout the residency program. The aim is to facilitate achieving the objectives of the residency program, maintain the well-being of the resident, and provide advice with career development.

This involves two types of mentorship:

- Resident-staff program
  A staff member is paired with each resident with the intention that this pairing continues over the five years of resident training. Mentees and their mentors will meet personally twice a year (or more if needed) to discuss research projects, career planning, or other professional issues.
- Resident-resident program
  A junior resident is paired with a senior resident. The aim is to facilitate a smooth transition into the different roles and familiarize him/her with existing resources, policies, and procedures.

Resident Safety and Security

Any resident who is a victim of intimidation, harassment, or abuse during his/her training is strongly encouraged to promptly discuss this problem with the program director.

Radiation Safety

All training sites must have a radiation safety certification by the Saudi FDA to ensure that occupational and public exposure to ionizing radiation is minimized to the fullest possible extent, in accordance with ALARA (As Low as Reasonably Achievable, social and economic factors being taken into account).

Radiation safety training
A formal radiation safety introductory course, structured and delivered by the training hospital, is to be delivered to the resident during the first year of residency (during the radiation oncology first block).

Personal radiation monitoring devices (dosimeters)
Dosimeters must be issued to each resident at the teaching site. It is expected that dosimetry reports will be available to the resident.

Emergency procedure for a brachytherapy source emergency
A formal teaching session with regard to the procedures of handling a stuck radioactive source.

Declaration of pregnancy
Given the effects of radiation on the fetus, a radiation dose to the fetus that results from occupational exposure of the mother should not exceed 4mSV during the period of gestation.

Residents who become pregnant must declare their pregnancy immediately to the radiation safety officer or to the program director.

The resident then has to be reassigned throughout her pregnancy in order to not increase the risk of exposure (avoid rotations where brachytherapy is used); a special fetus monitor will be provided.

Reading and Reference Materials

The following reference books are recommended:

- DeVita, Hellman, and Rosenberg's Cancer: Principles and Practice of Oncology (Cancer: Principles & Practice (DeVita) Ninth, North American Edition by Vincent T. DeVita Jr. MD, Theodore S. Lawrence MD PhD, Steven A. Rosenberg MD PhD. Lippincott Williams & Wilkins, 2011
- Perez & Brady's Principles and Practice of Radiation Oncology by Dr. Edward C. Halperin MD, Dr. David E. Wazer MD, Dr. Carlos A. Perez MD and Dr. Luther W. Brady MD. Wolters Kluwer, 2019
- Clinical Radiation Oncology by Leonard L. Gunderson MD MS FASTRO, Joel E. Tepper MD. ELSEVIER 2015
- Radiobiology for the Radiologist by Eric J. Hall, Amato J. Giaccia. Lippincott Williams & Wilkins, 2012
- The Physics of Radiation Therapy by Faiz M. Khan, John P. Gibbons. Lippincott Williams & Wilkins, 2014
- Basic Science of Oncology by Ian F. Tannock, Richard P. Hill, Robert G. Bristow, Lea Harrington Fifth Edition. McGraw-Hill International Editions 2013

Journals:

- Radiotherapy & Oncology
- International Journal of Radiation Oncology, Biology & Physics
- British Journal of Radiology Cancer
- Lancet Oncology
- New England Journal of Medicine
- Journal of Clinical Oncology
- Journal of the National Cancer Institute

Other textbooks include:

Suggested books PGY1

- Tortora JT & Grabowski SR, Principles of Anatomy and Physiology, (10th Edition), Harper Collins.
- Guyton AC, Human Physiology and Mechanisms of Disease, W.B. Saunders.
- Robbins A: Handbook of Pathology.
- Snell, R.S. Gross Anatomy, Little, Brown & Co.
- Weir, J. & Abrahams, P. Imaging Atlas of Human Anatomy.
- Graham, D. Principles of Radiological Physics Churchill Livingstone.
- Hendee, W.R, & Ibbott, J.S. Radiation Therapy Physics. (3rd Edition) Mosby.
- Williams, J.R., & Thwaites, D.I. Radiotherapy Physics. Oxford Medical Publications.
- Bomford, C. & Kunkler, I. Walter and Miller's Textbook of Radiotherapy, Radiation Physics, Therapy & Oncolog Churchill Livingstone.
- Ball, J.L, & Moore, A.D. Essential Physics for Blackwell Science.

- Martin, A.M., & Harbison, S.A. An Introduction to Radiation Protection. Chapman & Hall Medical.
- International Commision on radiological Protection Radiation Protection-ICRP 60. Oxford Pergamon Press.
- Health & Safety Executive (HSE). The Ionising Radiation Regulations. HMSO.
- McKenzie, A.L., Shaw, J.E., Stephenson, S.K., & Turner, P.C.R. Radiation Protection in Radiotherapy, Report No. 46. The Institute of Physical Sciences in Medicine.
- Nias A, An Introduction to Radiobiology, John Wiley and Sons.

Suggested Books PGY2

- Griffiths S & Short C, Radiotherapy: Principles to Practice. A Manual for Quality in Treatment Delivery, Churchill Livingstone.
- Dobbs J, Barrett A, & Ash D, Practical Radiotherapy Planning, Edward Arnold.
- Bentel GC, Radiotherapy Planning, McGraw-Hill Inc.
- Taylor J, Imaging in Radiotherapy, Croom Helm.
- Bomford C & Kunkler I, Walter & Miller's Textbook of Radiotherapy, Radiation Physics, Therapy & Oncology, Churchill Livingstone.
- Southamie R & Tobias J, Cancer and Its Management, Blackwell.
- Bouma GD, Statistics and the Research Process, Oxford University Press.
- Polgar S & Thomas SA, Introduction to Research in the Health Sciences, Churchill Livingstone.

Suggested Books PGY3-5

- Ellis H, Logan BM, & Dixon A, Human Cross-Sectional Anatomy: Pocket Atlas of Body sections and CT and MRI Images, Butterworth-Heinemann.
- Han, MC & Kim CW, Atlas of Sectional Human Anatomy Correlated with CT and MRI, Igakuu-Shoin.
- Sutton D & Young JWR, A Short Textbook of Clinical Imaging, Springer-Vertag.
- Burnard P. Effective Communication Skills for Health Professionals, Stanley Thomas.
- Souhamie & Tobias JS, Cancer and Its Management, Blackwell.
- Faulkner A & Maguire P, Talking to Cancer Patients and Their Relatives, Oxford University Press.
- Aitkin V & Jellicoe H, Behavioural Science for Health Professionals, WB Saunders.
- Kantor JE, Medical Ethics for Physicians in Training, Planum Publishing.

Useful Links

Canadian Association of Radiation Oncologist suggested education resources:
http://www.caro-acro.ca/meetings-education/education-links/

Contouring and Cross-sectional anatomy:
https://www.rtog.org/CoreLab/ContouringAtlases.aspx
https://www.imaios.com/en/e-Anatomy

POLICIES AND PROCEDURES

General Policies and Procedures

- Applicants should fulfill all admission requirements set by the Saudi Commission rules and regulations for admission into Saudi Board programs.
- Trainees shall abide by all regulations and obligations as set by the Saudi Commission for Health Specialties (https://www.scfhs.org.sa/en/MESPS/Pages/Regulations--.aspx).
- Training is a full-time commitment. Residents shall be enrolled in full-time, continuous training for the entire program period.
- Training is to be conducted in institutions accredited for training by the Saudi Commission for radiation oncology residency training.
- Trainees shall be actively involved in patient care with a gradual progression of responsibility under direct and/or indirect supervision of a fully privileged and credentialed consultant physician.

Specialty Policies

Teaching Faculty

A minimum of eight board-certified consultants (FRCPC, ABR, COSTB, or other equivalent board certification recognized by the SCFHS) covering the aforementioned core specialties should be available for a single training program.

Professional Responsibility

Graded Responsibility

- One-to-one preceptor-based rotations are recommended. This is to facilitate the graded responsibility necessary for a resident to achieve the experience required to reach the role of consultant.
- Shorter rotations (1–2 months) are recommended during junior years while longer rotations (2–3 months) are recommended for senior residents. The longer rotations in the senior years provide more opportunities to longitudinally care for patients through consultation, radiation planning, a course of treatment, and follow-up.

Signing Authority

- It is recommended that senior residents (during PGY-5 year) be given the authority to independently prescribe a portion of the radiation therapy treatment (e.g., no more than 20% of the number of fractions) before co-signature of the preceptor. This allows a smooth transition into the consultant role.

On-Call Duties

Radiation oncology residents are expected to attain proficiency in the recognition and management of emergent, urgent, and elective problems in radiation oncology. As part of this training, the residents participate in on-call duties. The calls should be home-based, where the resident is expected to attend to the hospital to manage patient issues as needed. The

maximum number of on-calls and post on-calls are to be adhered to as per the SCFHS rules and regulations. The resident is expected to be supervised during the on-call by a consultant who will provide support, advice, and education.

Vacation and Conference Leave

Residents are granted four weeks per year, as per SCFHS rules and regulations. Requests for vacation time must be approved by the program director. Vacation blocks will be distributed at the discretion of the program director. Requests for vacation time must be given at least four weeks in advance. In addition, residents are granted seven working days for educational leave per year. This must be approved by the program director, and adhere to the SCFHS rules and regulations.

Appendix – 1: Core Specialty Problem List and Representative Diseases

Adapted from American Board of Radiology Radiation Oncology Study Guide

Head and Neck Cancer
- Oral cavity
- Oropharynx
- Nasopharynx
- Hypopharynx
- Larynx
- Nasal cavity and paranasal sinuses
- Eye and orbit
- Salivary glands
- Thyroid gland
- Others (e.g., cervical lymph node metastases, melanoma)

Gastrointestinal (GI) Tract
- Esophagus
- Stomach
- Liver and biliary tract
- Pancreas
- Colon/rectum
- Anus

Thorax
- Non-small cell lung cancer
- Small cell lung cancer
- Thymomas and/or mediastinal tumors
- Mesothelioma

Bone and Soft Tissue
- Skin cancer, including malignant melanoma and non-melanoma tumors
- Soft tissue sarcoma
- Ewing sarcoma
- Desmoid tumor
- Osteosarcoma and/or chondrosarcoma

Breast Cancer
- Early stage
- Locally advanced
- Inflammatory
- Carcinoma in situ
- Locally recurrent
- Metastatic carcinoma

Gynecology
- Cervix
- Endometrium
- Ovaries and fallopian tubes
- Vagina
- Vulva

Genitourinary (GU) Tract
- Prostate
- Bladder
- Testes/seminoma
- Testes/non-seminoma
- Kidneys
- Penis

Lymphoma and Leukemia
- Hodgkin disease
- Non-Hodgkin lymphoma
- Leukemia, chronic and acute
- Multiple myeloma/plasmacytoma
- NK/T-cell lymphoma
- Cutaneous lymphomas

Central Nervous System (Adult and Pediatric)
- Astrocytoma, low-grade
- Astrocytoma, high-grade
- Medulloblastoma
- Brainstem glioma
- Ependymoma and ependymoblastoma
- Pineal
- Lymphoma
- Optic tract glioma
- Oligodendroglioma
- Meningioma (benign and malignant)
- Pituitary
- Spinal cord
- Craniopharyngioma
- Arteriovenous malformation (AVM)
- Acoustic neuroma

Cancer of Unknown Primary
Radiotherapy for Palliation
- Skeletal metastases
- Brain metastases
- Spinal cord compression
- Superior vena cava syndrome

- Obstructive syndromes
- Bleeding syndromes

Re-irradiation
Pediatric Tumors
- Wilms tumor
- Neuroblastoma
- Rhabdomyosarcoma
- Ewing sarcoma and other bone and cartilage tumors
- Pediatric solid tumors
- Hodgkin lymphoma

Benign Disease
Problem List Detailed Topics
For each of the disease sites listed above, the following is to be covered:
- Epidemiology and pathology
- Normal and pathologic anatomy
- Elements of cancer diagnosis, staging, treatment (including the utilization of modalities other than radiation), and follow-up
- Tumor markers for diagnosis and follow-up
- Natural history and routes of local, regional, and distant spread
- Selection of treatment modality (specific details of multimodality therapies including sequencing, interactions, and specific agents)
- Management of both local and metastatic disease
- Optimum radiation simulation, field design, and radiation techniques (including external beam, radiosurgery, brachytherapy, and unsealed radioactive agents) for various clinical situations
- Tumor localization and respiratory management
- Radiation target and organs at risk dose distribution
- Selection of optimum radiation volume, dose, and fractionation
- Radiation dose constraints
- Interpreting a dose-volume histogram
- Understanding of how radiation affects normal tissues
- Side effects of radiation and other modalities, and how to manage them
- Evidence-based treatment results (e.g., with surgery, radiation therapy, chemotherapy, biological therapy, or other emerging interventions)
- Patterns of failure
- Palliative care

Appendix – 2: Top Conditions in the Specialty

The Ten Most Common Cancers among Saudi Nationals, 2015

Sites	No.	%	Male	5454	%	Female	6584	%
Breast	2016	16.7	**Colorectal**	810	14.9	**Breast**	1979	30.1
Colorectal	1465	12.2	**NHL**	503	9.2	**Thyroid**	793	12.0
Thyroid	1020	8.5	**Leukemia**	408	7.5	**Colorectal**	655	9.9
NHL	829	6.9	**Prostate**	340	6.2	**Corpus uteri**	403	6.1
Leukemia	702	5.8	**Lung**	324	5.9	**NHL**	326	5.0
Hodgkin lymphoma	436	3.6	**Liver**	274	5.0	**Leukemia**	294	4.5
Lung	416	3.5	**Hodgkin lymphoma**	267	4.9	**Ovary**	220	3.3
Corpus uteri	403	3.3	**Thyroid**	227	4.2	**Hodgkin lymphoma**	169	2.6
Liver	376	3.1	**Kidney**	199	3.6	**Stomach**	131	2.0
Prostate	340	2.8	**Brain, CNS**	194	3.6	**Brain, CNS**	126	1.9

Source: Saudi Health Council, National Health Information Center, Saudi Cancer Registry 2015 Report

The Ten Most Common Cancers among Non-Saudis, 2015

Site	All	%	Male	1816	%	Female	1688	%
Breast	718	20.5	**Colorectal**	287	15.8	**Breast**	698	41.4
Colorectal	392	11.2	**Prostate**	154	8.5	**Thyroid**	151	8.9
Thyroid	223	6.4	**NHL**	131	7.2	**Colorectal**	105	6.2
NHL	192	5.5	**Lung**	109	6.0	**Corpus uteri**	81	4.8
Prostate	154	4.4	**Bladder**	94	5.2	**Ovary**	63	3.7
Lung	141	4.0	**Stomach**	88	4.8	**NHL**	61	3.6
Leukemia	118	3.4	**Leukemia**	74	4.1	**Cervix uteri**	47	2.8
Stomach	116	3.3	**Thyroid**	72	4.0	**Leukemia**	44	2.6
Bladder	103	2.9	**Kidney**	64	3.5	**Lung**	32	1.9
Kidney	94	2.7	**Hodgkin lymphoma**	52	2.9	**Kidney**	30	1.8

Source: Saudi Health Council, National Health Information Center, Saudi Cancer Registry 2015 Report

Appendix – 3: List of Radiation Therapy Techniques (Procedures)

General Techniques

1. Two-field parallel opposed
2. Wedged-pair fields
3. 3-field technique
4. 4-field box technique
5. Intensity-modulated radiation therapy (IMRT)
6. Rotational therapy: RapidArc, Tomotherapy
7. Stereotactic radiosurgery and radiotherapy
8. Brachytherapy

Disease-specific Techniques

It is recommended that at least five of each core-level radiation treatment plan (**CL: PGY1-3**) and one of some mastery level (**ML: PGY4-5**) radiation treatment plan be performed. For each of the radiation treatment plans, it is recommended that all of the following elements be covered:

a) Immobilization methods, and the importance of patient comfort and set-up reproducibility
b) Identification of surgical scars, drain sites, and swellings
c) Determination of GTV, CTV, and PTV
d) Planning aims: dose and fractionation of tumor target and dose-volume constraints for normal tissues relevant to the fractionation schedule proposed for the plan
e) Tissue inhomogeneity corrections
f) Compensation for anatomical variations in the irradiated volume (e.g., organ motion, tumor shrinkage)
g) Dosimetric planning including use of bolus, choice of photon, and/or electron energies, beam weighting and use of wedges, use of advanced treatment techniques (e.g., stereotactic radiotherapy, IMRT: static or rotational techniques)
h) The ICRU recommendations for dose prescriptions for external beam therapy and/or brachytherapy
i) Verification of treatment delivery, including patient set-up and imaging

A proposed list of treatment plans is shown below.

Head and Neck Cancer

- Oral cavity:
  1. Definitive radiation therapy (**CL**)
  2. Post-operative radiation therapy (**CL**)
  3. Brachytherapy (**ML**)
  4. Re-irradiation for local recurrence (**ML**)
  5. Palliative-intent radiation therapy (**CL**)
- Oropharynx:
  1. Parotid-sparing definitive radiation therapy (**CL**)
  2. Post-operative radiation therapy (**CL**)
  3. Re-irradiation for local recurrence (**ML**)
  4. Palliative-intent radiation therapy (**CL**)
- Nasopharynx:
  1. Parotid-sparing definitive radiation therapy (**CL**)
  2. Definitive radiation therapy with T4 disease (**ML**)

3. Re-irradiation for local recurrence (**ML**)
4. Palliative-intent radiation therapy (**CL**)

- Hypopharynx:
  1. Definitive radiation therapy (**ML**)
  2. Post-operative radiation therapy (**ML**)
  3. Palliative-intent radiation therapy (**CL**)
- Larynx:
  1. Definitive radiation therapy (early glottis, advanced glottis, supraglottis) (**CL**)
  2. Post-operative radiation therapy (**CL**)
  3. Re-irradiation for local recurrence (**ML**)
  4. Palliative-intent radiation therapy (**CL**)
- Nasal cavity and paranasal sinuses:
  1. Ocular-sparing post-operative radiation therapy (**ML**)
  2. Palliative-intent radiation therapy (**CL**)
- Salivary glands:
  1. Post-operative radiation therapy (**CL**)
  2. Post-operative radiation therapy with involvement of a named nerve (**ML**)
  3. Palliative-intent radiation therapy (**CL**)
- Thyroid gland:
  1. Radioactive iodine following total thyroidectomy (**CL**)
  2. Radioactive iodine fore residual, recurrent disease, cervical LN too small for resection or bone/pulmonary metastasis (**ML**)
  3. Post-operative radiation therapy (**ML**)
  4. Palliative-intent radiation therapy (**CL**)
- Eye and orbit:
  1. Post-operative radiation therapy for squamous cell carcinoma (**CL**)
  2. Orbital lymphoma (**CL**)
  3. Intraocular lymphoma (**ML**)
  4. Uveal melanoma: proton therapy, plaque brachytherapy, stereotactic radiosurgery (SRS)/stereotactic radiotherapy (SRT) (**ML**)
  5. Thyroid ophthalmopathy (**ML**)
- Cervical lymph node metastases with unknown primary:
  1. Definitive radiation therapy (**CL**)
  2. Palliative-intent radiation therapy (**CL**)

Gastrointestinal (GI) Tract

- Esophagus:
  1. Pre-operative radiation therapy (**CL**)
  2. Post-operative radiation therapy (**CL**)
  3. Definitive radiation therapy (**CL**)
  4. Brachytherapy boost (**ML**)
  5. Palliative-intent radiation therapy (**CL**)
- Stomach:
  1. Post-operative radiation therapy (**CL**)
  2. Palliative-intent radiation therapy (**CL**)
- Liver and biliary tract:
  1. Definitive radiation therapy (**ML**)
  2. Stereotactic radiotherapy (SRT) (**ML**)

- Pancreas:
  1. Post-operative radiation therapy (**ML**)
  2. Definitive radiation therapy (**ML**)
- Rectum:
  1. Pre-operative short-course radiation therapy (**CL**)
  2. Pre-operative long-course radiation therapy (**CL**)
  3. Post-operative radiation therapy (**CL**)
  4. Brachytherapy (**ML**)
  5. Palliative-intent radiation therapy (**CL**)
- Anus:
  1. Definitive radiation therapy (**CL**)
  2. Interstitial brachytherapy (**ML**)

Thorax

- Non-small cell lung cancer:
  1. Curative-intent radiation therapy (**CL**)
  2. Palliative-intent radiation therapy (**CL**)
  3. Post-operative radiation therapy (**ML**)
  4. Pre-operative radiation therapy (**ML**)
  5. SBRT (**ML**)
- Small cell lung cancer:
  1. Thoracic radiation therapy in limited presentation of SCLC (**CL**)
  2. Thoracic radiation therapy in extensive presentation of SCLC (**ML**)
  3. Prophylactic cranial irradiation (**CL**)
  4. Palliative-intent radiation therapy (**CL**)
- Thymomas and/or mediastinal tumors:
  1. Adjuvant setting, following surgical resection (**ML**)
  2. Palliative-intent radiation therapy (**CL**)
- Mesothelioma:
  1. Definitive management of mesothelioma (**ML**)
  2. Adjuvant setting, following extrapleural pneumonectomy (**ML**)
  3. Recurrence after thoracoscopy/thoracotomy (**ML**)
  4. Palliative-intent radiation therapy (**CL**)

Bone and Soft Tissue

- Soft tissue sarcoma:
  1. Pre-operative radiation therapy (**CL**)
  2. Post-operative radiation therapy (**CL**)
  3. Palliative radiation therapy (**CL**)
- Aggressive fibromatosis:
  1. Definitive radiation therapy (**ML**)
  2. Adjuvant radiation therapy (**ML**)
- Benign conditions:
  1. Heterotopic bone ossification (**ML**)
  2. Keloid scarring (**ML**)
  3. Pterygium (**ML**)

Breast Cancer

- Radiation therapy following breast conservation surgery (**CL**)
- Post-mastectomy radiotherapy (**CL**)
- Comprehensive nodal irradiation (**CL**)
- Selective nodal irradiation: axilla levels 1–3, supraclavicular, internal mammary (**CL**)
- Breast boost (**CL**)
- Partial breast radiation (**CL**)
- Loco-regional recurrence (**ML**)

Gynecology

- Uterine cancer
  1. Adjuvant pelvic radiation therapy (**CL**)
  2. Consolidative radiation therapy (**CL**)
  3. Adjuvant vaginal vault brachytherapy (**CL**)
  4. Definitive radiation therapy (**ML**)
  5. Vaginal vault brachytherapy (**CL**)
  6. Brachytherapy for definitive treatment of uterine cancer (**ML**)
  7. Brachytherapy for vaginal recurrence (**ML**)
  8. Radiation for loco-/regional recurrence (**ML**)
  9. Palliative-intent radiation therapy (**CL**)
- Cervical cancer:
  1. Definitive pelvic radiotherapy +/- extended field radiotherapy (**CL**)
  2. Brachytherapy boost for definitive treatment (**CL**)
  3. Adjuvant radiotherapy (**CL**)
- Vulvar cancer:
  1. Definitive radiation therapy (**CL**)
  2. Adjuvant radiation therapy (**CL**)
  3. Palliative-intent radiation therapy (**CL**)
- Ovarian cancer:
  1. Palliative-intent radiation therapy (**CL**)
- Vaginal cancer:
  1. Definitive radiation therapy (**ML**)
  2. Brachytherapy boost for definitive treatment (**ML**)
  3. Palliative-intent radiation therapy (**CL**)
- Gestational trophoblastic disease:
  1. Concomitant whole brain radiation (**ML**)

Genitourinary (GU) Tract

- Prostate cancer:
  1. Definitive radiation therapy for low-risk disease (**CL**)
  2. Definitive radiation therapy for intermediate-risk disease (**CL**)
  3. Definitive radiation therapy for high-risk disease (**CL**)
  4. Adjuvant pelvic radiation therapy (**CL**)
  5. Salvage radiation therapy (**CL**)
  6. Palliative-intent radiation therapy (**CL**)
  7. Interstitial brachytherapy (**ML**)
  8. Palliation using radiopharmaceuticals (e.g., strontium-89, samarium) (**ML**)

- Bladder cancer:
  1. Bladder conserving radiation therapy (**CL**)
  2. Palliative radiation therapy (**CL**)
- Renal cell carcinoma:
  1. Adjuvant radiation therapy to renal bed following nephrectomy (**ML**)
- Testicular seminoma:
  1. Adjuvant radiation therapy to lymph nodes (stage I) (**CL**)
  2. Definitive radiation treatment to lymph node groups (stages II) (**CL**)
  3. Radiation therapy in the situation of post chemotherapy residual nodal disease (**ML**)
- Non-seminomatous germ cell tumors of testis (NSGCT):
  1. Radiation therapy to metastatic sites (e.g., brain) in potentially curative disease (**ML**)
  2. Radiation therapy following chemotherapy (**ML**)
  3. Palliative radiation therapy (**CL**)
- Penile cancer:
  1. Post-operative prophylactic nodal irradiation (**ML**)
  2. Definitive radiation therapy (**ML**)
  3. Brachytherapy for definitive radiation therapy (**ML**)

Lymphoma and Leukemia

- Hodgkin Lymphoma:
  1. Involved field/involved nodal radiation (**CL**)
  2. Mantle field, subtotal nodal irradiation, total nodal irradiation (chemotherapy could not be used) (**ML**)
- Non-Hodgkin Lymphoma:
  1. Involved-field radiation (**CL**)
  2. Extra-nodal radiation therapy (e.g., salivary glands, thyroid, gastric, etc.) (**CL**)
  3. Consolidation radiation therapy (**CL**)
- Leukemia:
  1. Cranial or craniospinal radiation (**ML**)
  2. Total body irradiation (**ML**)
- Multiple myeloma/plasmacytoma:
  1. Palliative radiation therapy (**CL**)
  2. Solitary plasmacytoma (**CL**)
- NK/T-cell lymphoma:
  1. Nasal NK/T-cell lymphoma (**ML**)
  2. Total skin irradiation (**ML**)
- Palliative radiation therapy

Central Nervous System (Adult and Pediatric)

- Adult glioma:
  1. Radiation therapy for high-grade glioma (**CL**)
  2. Immediate radiation therapy for low-grade glioma (**CL**)
  3. Delayed radiation therapy for low-grade glioma (**CL**)
  4. Re-irradiation for recurrent glioma (**ML**)
- Meningioma:
  1. Definitive radiation for meningioma (**CL**)
  2. Adjuvant radiation for meningioma (**CL**)
  3. Re-irradiation for recurrent meningioma (**ML**)
  4. Stereotactic radiosurgery (SRS)/stereotactic radiotherapy (SRT) (**ML**)

- Pituitary adenoma:
  1. Radiation therapy for pituitary adenoma (**ML**)
  2. Radiation therapy for pituitary carcinoma (**ML**)
- Medulloblastoma and Primitive Neuroectodermal Tumors (PNET)
  1. Craniospinal irradiation (**CL**)
- Ependymoma:
  1. Craniospinal irradiation (**ML**)
  2. Involved-field radiation therapy (**ML**)
- Germ cell tumors:
  1. Craniospinal irradiation (**ML**)
  2. Whole ventricular radiation therapy (**ML**)
  3. Involved-field radiation therapy (**ML**)
- Pineal tumors:
  1. Craniospinal irradiation (**ML**)
  2. Involved-field radiation therapy (**ML**)
- Acoustic neuroma:
  1. Stereotactic radiosurgery (SRS)/stereotactic radiotherapy (SRT) (**ML**)
  2. Conventional radiation therapy (**ML**)
- Cerebral Arteriovenous Malformations (AVMs):
  1. Stereotactic radiosurgery (SRS)/stereotactic radiotherapy (SRT) (**ML**)

Radiotherapy for Palliation

- Cerebral metastasis:
  1. Whole brain radiotherapy (**CL**)
  2. Stereotactic radiosurgery (SRS)/stereotactic radiotherapy (SRT) (**CL**)
- Malignant spinal cord compression:
  1. Palliative radiation therapy (**CL**)
  2. Palliative post-operative radiation therapy (**CL**)
- Bone metastasis:
  1. Palliative radiation therapy (**CL**)
  2. Palliative radiation following surgical interventions (**CL**)
  3. Stereotactic radiosurgery (SRS)/stereotactic radiotherapy (SRT) (**CL**)
  4. Re-irradiation (**CL**)
- Superior vena cava syndrome:
  1. Palliative radiation therapy (**CL**)
- Palliative radiation therapy for other obstructive conditions (e.g., airway, GI)

Skin:

- Non-melanomatous skin tumors:
  1. Definitive radiation therapy (**CL**)
  2. Post-operative radiation therapy to local site (**CL**)
  3. Post-operative radiation therapy to nodal regions (**ML**)
- Melanoma:
  1. Post-operative radiation therapy to the primary site and nodal regions (**ML**)
  2. Radiation therapy for advanced disease/metastatic disease (**ML**)
- Kaposi's sarcoma:
  1. Radiation therapy for Kaposi's sarcoma (**ML**)
- Palliative radiation therapy (**CL**)

Pediatric Tumors

All are **ML**

- Developmental Malignancies:
  1. Retinoblastoma
  2. Neuroblastoma
  3. Wilms' tumor
- Hematological Malignancies:
  1. ALL
  2. Hodgkin lymphoma
- Musculoskeletal Malignancies:
  1. Rhabdomyosarcoma
  2. Ewing's Sarcoma
  3. Osteosarcoma
- CNS Malignancies:
  1. Medulloblastoma
  2. Ependymoma
  3. Brainstem glioma and other gliomas
  4. CNS germ cell tumors

Appendix – 4: In-Training Evaluation Report (ITER)

Center:
Name:
Rotation
Program director:

Level of trainee:
Registration number:
Period:

	Clear failure (1)	Border-line (2)	Clear pass (3)	Exceeds expectation (4)	Not applicable
A. Medical Expert					
Basic and Clinical Knowledge					
1. Understands the basic and clinical science and pathophysiology of common medical illnesses					
2. Understands the clinical presentation, natural history, and prognosis of common medical illnesses					
3. Demonstrates expertise in all aspects of the diagnosis and management of common medical illnesses					
4. Practices contemporary, evidence-based and cost-effective medicine					
5. Avoids unnecessary or harmful investigations or management					
6. Provides care to diverse communities					
7. Demonstrates the appropriate knowledge, skills, and attitudes relating to gender, culture, and ethnicity					
8. Complete an accurate history and physical examination					
9. Formulates appropriate differential diagnoses					
10. Develops an appropriate plan of investigation and interpret the results					

11.	Develops a therapeutic plan					
12.	Develops a plan of secondary prevention					
13.	Demonstrates appropriate clinical judgment					
14.	Demonstrates knowledge of the medications used; mechanisms of action; clinically relevant pharmacokinetics, indications, contraindications, and adverse effects					
	Procedural skills					
15.	Understands the indications, contraindications, and complications of specific procedure					
16.	Demonstrates mastery of specific procedure techniques					
B.	**Communicator**					
17.	Writes appropriate progress notes, and transfer and discharge summaries					
18.	Communicates appropriately with junior medical, nursing, and allied health staff					
19.	Communicates appropriately with patients					
20.	Appropriate communication with patients' families					
21.	Establishes therapeutic relationships with patients/families					
22.	Delivers understandable information to patients/families					
23.	Provides effective counseling to patients/families					
24.	Maintains professional relationships with other health care providers					
25.	Provides clear and complete records, reports, informed and written consent					

C.	**Collaborator**					
26.	Works effectively in a team environment					
27.	Able to work with allied health care staff					
28.	Able to work with nursing staff					
29.	Able to work with attending and junior medical staff					
30.	Consults effectively with other physicians and other health care providers					
D.	**Manager**					
31.	Participates in activities that contribute to the effectiveness of their healthcare organizations and systems					
32.	Manages their own practice and career effectively					
33.	Allocates finite healthcare resources appropriately					
34.	Serves in administration and leadership roles, as appropriate					
35.	Utilizes information technology to optimize patient care, lifelong learning, and other activities					
E.	**Health advocate**					
36.	Attentive to preventive measures					
37.	Demonstrates adequate patient education on compliance and role of medications					
38.	Attentive to issues of public policy for health					
39.	Recognizes important social, environmental, and biological determinants of health					
40.	Demonstrates concern that patients have access to appropriate supports, information, and services					
41.	Offers advocacy on behalf of patients at practice and general population levels					

F.	**Scholar**					
42.	Attends and contributes to rounds, seminars, and other learning events					
43.	Appropriately discusses and presents selected topics as requested					
44.	Demonstrates adequate ability to search literature					
45.	Demonstrates efforts to increase knowledge base					
46.	Accepts and acts on constructive feedback					
47.	Reads around patient cases and takes an evidence-based approach to management problems					
48.	Contributes to the education of patients, house staff/students, and other health professionals					
49.	Contributes to the development of new knowledge					
G.	**Professional**					
50.	Recognizes limitations and seeks advice and consultation when needed					
51.	Understands the professional, legal, and ethical obligations of physicians					
52.	Delivers evidence-based care with integrity, honesty, and compassion					
53.	Demonstrates appropriate insight into own strengths and weaknesses					
54.	Exercises initiative within limits of knowledge and training					
55.	Discharges duties and assignments responsibly and in a timely and ethical manner					
56.	Reports facts accurately, including own errors					

57.	Maintains appropriate boundaries in work and learning situations					
58.	Respects diversity of race, age, gender, disability, intelligence, and socio-economic status					
	Total Score	Total score = ---------- ---------- X 25 = 100% Number of evaluated items =				

Comments:

I certify that I have read all the parts of this evaluation report and I have discussed it with the evaluators

Resident's name:----------Signature:----------

Evaluator's name:----------Signature:----------

Evaluator's name:----------Signature:----------

Program director:----------Signature:----------

Appendix – 5: Mini-clinical Evaluation Exercise (Mini-CEX)

Center:
Name: **Registration number:** **Level of trainee:**
Rotation: **Date:**
Program director:
Brief summary of the case:

New: **Follow-up:**
Setting for assessment:
Ambulatory: **In-patient:**
Complexity: **Low:** **Moderate:** **High:**
Focus: **Data gathering:** **Diagnosis:** **Therapy:** **Counseling:**

Assessment:

SCORE FOR STAGE OF TRAINING									
Questions	**Unsatisfactory**			**Satisfactory**			**Superior**		
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**
History taking									
Physical examination skills									
Communication skills									
Critical Judgment									
Humanistic quality/Professionalism									
Organization and efficiency									
Overall clinical care									

Mini-CEX time: Observing: min Providing feedback: min
Evaluator satisfaction with Mini-CEX: Low 1 2 3 4 5 6 7 8 9 High
Trainee satisfaction with Mini-CEX: Low 1 2 3 4 5 6 7 8 9 High

Remarks

Question	Description
History taking	Facilitates patient telling their story; effectively uses appropriate questions to obtain accurate, adequate information; responds appropriately to verbal and non-verbal cues.
Physical examination skills	Follows efficient, logical sequence; examination appropriate to clinical problem; explains to patient; sensitive to patient's comfort and modesty.
Communication skills	Explores patient's perspective; jargon free; open and honest; empathic; agrees management plan/therapy with patient.
Critical judgment	Makes appropriate diagnosis and formulates a suitable management plan; selectively orders/performs appropriate diagnostic studies; considers risks and benefits.
Humanistic quality/ Professionalism	Shows respect, compassion, empathy, establishes trust; attends to patient's needs of comfort; respects confidentiality; behaves in an ethical manner; awareness of legal frameworks; aware of own limitations.
Organization and efficiency	Prioritizes; is timely and succinct; summarizes.
Overall clinical care	A global judgment based on the above question areas.

Comments:

I certify that I have read all the parts of this evaluation report and I have discussed it with the evaluators

Resident's name:---------- Signature:----------

Evaluator's name:---------- Signature:----------

Program director:---------- Signature:----------

Appendix – 6: Standardized Assessment of a Clinical Encounter Report (STACER)/ Radiation Treatment Planning Competency Evaluation

Center:
Name:
Rotation
Program director:

Level of trainee:
Registration number:
Period:

Scoring criteria for answers

Score	Description
1	Vague, unsure, lacking precision, failed to incorporate relevant clinical and/or imaging information; lacks understanding of dose constraints and/or dose/fractionation; unable to identify need for plan revision; assessor needed to make major revisions to contours and/or plan
2	Correct application clinical and/or imaging information; applies dose constraints and fractionation according to guidelines; able to identify need for plan revision; contours and/or plan largely acceptable but at least one major revision needed
3	Confident and thorough understanding of clinical and/or imaging information; thorough understanding of dose constraints and fractionation according to guidelines; able to recommend and describe purpose of plan revision; assessor needed to make minor or no corrections to contours or plan

Item	Score		
	1	**2**	**3**
Contouring – explains the rationale for the GTV			
Contouring – explains the rationale for the CTV			
Contouring – explains the rationale for the PTV			
Radiation prescription – states planning aims for target (dose and fractionation)			
Radiation prescription – states planning aims for organs at risk (dose constraints)			
Radiation prescription – specifies planning technique/energy			

Plan evaluation – evaluates target coverage			
Plan evaluation – evaluates normal tissue constraints/dose to organs at risk			
Plan evaluation – respects guidelines for dose specification (e.g., ICRU report)			
Plan evaluation – suggests plan modifications or approves plan			

Comments:

I certify that I have read all the parts of this evaluation report and I have discussed it with the evaluators

Resident's name:---------- Signature:----------

Evaluator's name:---------- Signature:----------

Program director:---------- Signature:----------

Appendix – 7: Logbook of STACER Cases

A list of different radiation therapy plans addressing a variety of volumes, techniques, and intent-of-treatment is shown below with the aim of identifying common clinical scenarios to attain competency in radiation therapy planning. The resident is encouraged to complete all or a minimum of 90% of the list

Disease-specific Techniques

Performing at least five of all core level (**CL: PGY1-3**) and one of some mastery level (**ML: PGY4-5**) radiation treatment plans is recommended. For each of the radiation treatment plans, it is recommended that all of the following elements are covered:

a) Immobilization methods and the importance of patient comfort and set-up reproducibility
b) Identification of surgical scars, drain sites, and swellings
c) Determination of GTV, CTV, and PTV
d) Planning aims: dose and fractionation for tumor target and dose-volume constraints for normal tissues relevant to the fractionation schedule proposed for the plan
e) Tissue inhomogeneity corrections
f) Compensation for anatomical variations in the irradiated volume (e.g., organ motion, tumor shrinkage)
g) Dosimetric planning, including use of bolus, choice of photon and/or electron energies, beam weighting and use of wedges, use of advanced treatment techniques (e.g., stereotactic radiotherapy, IMRT: static or rotational techniques)
h) The ICRU recommendations for dose prescriptions for external beam therapy and/ or brachytherapy
i) Verification of treatment delivery, including patient set-up and imaging
j) A proposed list of treatment plans is shown below.

Head and Neck Cancer

- Oral cavity:
  1. Definitive radiation therapy (**CL**)
  2. Post-operative radiation therapy (**CL**)
  3. Brachytherapy (**ML**)
  4. Re-irradiation for local recurrence (**ML**)
  5. Palliative-intent radiation therapy (**CL**)
- Oropharynx:
  1. Parotid-sparing definitive radiation therapy (**CL**)
  2. Post-operative radiation therapy (**CL**)
  3. Re-irradiation for local recurrence (**ML**)
  4. Palliative-intent radiation therapy (**CL**)

- Nasopharynx :
  1. Parotid-sparing definitive radiation therapy (**CL**)
  2. Definitive radiation therapy with T4 disease (**ML**)
  3. Re-irradiation for local recurrence (**ML**)
  4. Palliative-intent radiation therapy (**CL**)
- Hypopharynx:
  1. Definitive radiation therapy (**ML**)
  2. Post-operative radiation therapy (**ML**)
  3. Palliative-intent radiation therapy (**CL**)
- Larynx:
  1. Definitive radiation therapy (early glottis, advanced glottis, supraglottis) (**CL**)
  2. Post-operative radiation therapy (**CL**)
  3. Re-irradiation for local recurrence (**ML**)
  4. Palliative-intent radiation therapy (**CL**)
- Nasal cavity and paranasal sinuses:
  1. Ocular-sparing post-operative radiation therapy (**ML**)
  2. Palliative-intent radiation therapy (**CL**)
- Salivary glands:
  1. Post-operative radiation therapy (**CL**)
  2. Post-operative radiation therapy with involvement of a named nerve (**ML**)
  3. Palliative-intent radiation therapy (**CL**)
- Thyroid gland:
  1. Radioactive iodine following total thyroidectomy (**CL**)
  2. Radioactive iodine fore residual, recurrent disease, cervical LN too small for resection or bone/pulmonary metastasis (**ML**)
  3. Post-operative radiation therapy (**ML**)
  4. Palliative-intent radiation therapy (**CL**)
- Eye and orbit:
  1. Post-operative radiation therapy for squamous cell carcinoma (**CL**)
  2. Orbital lymphoma (**CL**)
  3. Intraocular lymphoma (**ML**)
  4. Uveal melanoma: proton therapy, plaque brachytherapy, stereotactic radiosurgery (SRS)/stereotactic radiotherapy (SRT) (**ML**)
  5. Thyroid ophthalmopathy (**ML**)

- Cervical lymph node metastases with unknown primary:
  1. Definitive radiation therapy (**CL**)
  2. Palliative-intent radiation therapy (**CL**)

Gastrointestinal (GI) Tract

- Esophagus:
  1. Pre-operative radiation therapy (**CL**)
  2. Post-operative radiation therapy (**CL**)
  3. Definitive radiation therapy (**CL**)
  4. Brachytherapy boost (**ML**)
  5. Palliative-intent radiation therapy (**CL**)
- Stomach:
  1. Post-operative radiation therapy (**CL**)
  2. Palliative-intent radiation therapy (**CL**)
- Liver and biliary tract:
  1. Definitive radiation therapy (**ML**)
  2. Stereotactic radiotherapy (SRT) (**ML**)
- Pancreas:
  1. Post-operative radiation therapy (**ML**)
  2. Definitive radiation therapy (**ML**)
- Rectum:
  1. Pre-operative short-course radiation therapy (**CL**)
  2. Pre-operative long-course radiation therapy (**CL**)
  3. Post-operative radiation therapy (**CL**)
  4. Brachytherapy (**ML**)
  5. Palliative-intent radiation therapy (**CL**)
- Anus:
  1. Definitive radiation therapy (**CL**)
  2. Interstitial brachytherapy (**ML**)

Thorax

- Non-small cell lung cancer:
  1. Curative-intent radiation therapy (**CL**)
  2. Palliative-intent radiation therapy (**CL**)

3. Post-operative radiation therapy (**ML**)
4. Pre-operative radiation therapy (**ML**)
5. SBRT (**ML**)

- Small cell lung cancer:
  1. Thoracic radiation therapy in limited presentation of SCLC (**CL**)
  2. Thoracic radiation therapy in extensive presentation of SCLC (**ML**)
  3. Prophylactic cranial irradiation (**CL**)
  4. Palliative-intent radiation therapy **(CL)**
- Thymomas and/or mediastinal tumors:
  1. Adjuvant setting, following surgical resection (**ML**)
  2. Palliative-intent radiation therapy (**CL**)
- Mesothelioma:
  1. Definitive management of mesothelioma (**ML**)
  2. Adjuvant setting, following extrapleural pneumonectomy (**ML**)
  3. Recurrence after thoracoscopy/thoracotomy (**ML**)
  4. Palliative-intent radiation therapy (**CL**)

Bone and Soft Tissue

- Soft tissue sarcoma:
  1. Pre-operative radiation therapy (**CL**)
  2. Post-operative radiation therapy (**CL**)
  3. Palliative radiation therapy (**CL**)
- Aggressive fibromatosis:
  1. Definitive radiation therapy (**ML**)
  2. Adjuvant radiation therapy (**ML**)
- Benign conditions:
  1. Heterotopic bone ossification (**ML**)
  2. Keloid scarring (**ML**)
  3. Pterygium (**ML**)

Breast Cancer

- Radiation therapy following breast conservation surgery (**CL**)
- Post-mastectomy radiotherapy (**CL**)

- Comprehensive nodal irradiation (**CL**)
- Selective nodal irradiation: axilla levels 1–3, supraclavicular, internal mammary (**CL**)
- Breast boost (**CL**)
- Partial breast radiation(**CL**)
- Loco-regional recurrence (**ML**)

Gynecology

- Uterine cancer:
  1. Adjuvant pelvic radiation therapy (**CL**)
  2. Consolidative radiation therapy (**CL**)
  3. Adjuvant vaginal vault brachytherapy (**CL**)
  4. Definitive radiation therapy (**ML**)
  5. Vaginal vault brachytherapy (**CL**)
  6. Brachytherapy for definitive treatment of uterine cancer (**ML**)
  7. Brachytherapy for vaginal recurrence (**ML**)
  8. Radiation for loco-/regional recurrence (**ML**)
  9. Palliative-intent radiation therapy (**CL**)
- Cervical cancer:
  1. Definitive pelvic radiotherapy +/- extended field radiotherapy (**CL**)
  2. Brachytherapy boost for definitive treatment (**CL**)
  3. Adjuvant radiotherapy (**CL**)
- Vulvar cancer:
  1. Definitive radiation therapy (**CL**)
  2. Adjuvant radiation therapy (**CL**)
  3. Palliative-intent radiation therapy (**CL**)
- Ovarian cancer:
  1. Palliative-intent radiation therapy (**CL**)
- Vaginal cancer:
  1. Definitive radiation therapy (**ML**)
  2. Brachytherapy boost for definitive treatment (**ML**)
  3. Palliative-intent radiation therapy (**CL**)
- Gestational trophoblastic disease:
  1. Concomitant whole brain radiation (**ML**)

Genitourinary (GU) Tract

- Prostate cancer
  1. Definitive radiation therapy for low-risk disease (**CL**)
  2. Definitive radiation therapy for intermediate-risk disease (**CL**)
  3. Definitive radiation therapy for high-risk disease (**CL**)
  4. Adjuvant pelvic radiation therapy (**CL**)
  5. Salvage radiation therapy (**CL**)
  6. Palliative-intent radiation therapy
  7. Interstitial brachytherapy (**ML**)
  8. Palliation using radiopharmaceuticals (e.g., strontium-89, samarium) (**ML**)
- Bladder cancer:
  1. Bladder conserving radiation therapy (**CL**)
  2. Palliative radiation therapy (**CL**)
- Renal cell carcinoma:
  1. Adjuvant radiation therapy to renal bed following nephrectomy (**ML**)
- Testicular seminoma:
  1. Adjuvant radiation therapy to lymph nodes (stage I) (**CL**)
  2. Definitive radiation treatment to lymph node groups (stages II) (**CL**)
  3. Radiation therapy in the situation of post chemotherapy residual nodal disease (**ML**)
- Non-seminomatous germ cell tumors of testis (NSGCT):
  1. Radiation therapy to metastatic sites (e.g. brain) in potentially curative disease (**ML**)
  2. Radiation therapy following chemotherapy (**ML**)
  3. Palliative radiation therapy (**CL**)
- Penile cancer:
  1. Post-operative prophylactic nodal irradiation (**ML**)
  2. Definitive radiation therapy (**ML**)
  3. Brachytherapy for definitive radiation therapy (**ML**)

Lymphoma and Leukemia

- Hodgkin lymphoma:
  1. Involved field/involved nodal radiation (**CL**)
  2. Mantle field, subtotal nodal irradiation, total nodal irradiation (chemotherapy could not be used) (**ML**)

- Non-Hodgkin lymphoma:
  1. Involved-field radiation (**CL**)
  2. Extra-nodal radiation therapy (e.g., salivary glands, thyroid, gastric, etc.) (**CL**)
  3. Consolidation radiation therapy (**CL**)
- Leukemia:
  1. Cranial or craniospinal radiation (**ML**)
  2. Total body irradiation (**ML**)
- Multiple myeloma/plasmacytoma:
  1. Palliative radiation therapy (**CL**)
  2. Solitary plasmacytoma (**CL**)
- NK/T-cell lymphoma:
  1. Nasal NK/T-cell lymphoma (**ML**)
  2. Total skin irradiation (**ML**)
- Palliative radiation therapy

Central Nervous System (Adult and Pediatric):

- Adult glioma:
  1. Radiation therapy for high-grade glioma (**CL**)
  2. Immediate radiation therapy for low-grade glioma (**CL**)
  3. Delayed radiation therapy for low-grade glioma (**CL**)
  4. Re-irradiation for recurrent glioma (**ML**)
- Meningioma:
  1. Definitive radiation for meningioma (**CL**)
  2. Adjuvant radiation for meningioma (**CL**)
  3. Re-irradiation for recurrent meningioma (**ML**)
  4. Stereotactic radiosurgery (SRS)/stereotactic radiotherapy (SRT) (**ML**)
- Pituitary adenoma:
  1. Radiation therapy for pituitary adenoma (**ML**)
  2. Radiation therapy for pituitary carcinoma (**ML**)
- Medulloblastoma and primitive neuroectodermal tumors (PNET)
  1. Craniospinal irradiation (**CL**)
- Ependymoma:
  1. Craniospinal irradiation (**ML**)
  2. Involved-field radiation therapy (**ML**)

- Germ cell tumors
  1. Craniospinal irradiation (**ML**)
  2. Whole ventricular radiation therapy (**ML**)
  3. Involved-field radiation therapy (**ML**)
- Pineal tumors:
  1. Craniospinal irradiation (**ML**)
  2. Involved-field radiation therapy (**ML**)
- Acoustic neuroma:
  1. Stereotactic radiosurgery (SRS)/stereotactic radiotherapy (SRT) (**ML**)
  3. Conventional radiation therapy (**ML**)
- Cerebral arteriovenous malformations (AVMs):
  1. Stereotactic radiosurgery (SRS)/stereotactic radiotherapy (SRT) (**ML**)

Radiotherapy for Palliation

- Cerebral metastasis:
  1. Whole brain radiotherapy (**CL**)
  2. Stereotactic radiosurgery (SRS)/stereotactic radiotherapy (SRT) (**CL**)
- Malignant spinal cord compression:
  1. Palliative radiation therapy (**CL**)
  2. Palliative post-operative radiation therapy (**CL**)
- Bone metastasis:
  1. Palliative radiation therapy (**CL**)
  2. Palliative radiation following surgical interventions (**CL**)
  3. Stereotactic radiosurgery (SRS)/stereotactic radiotherapy (SRT) (**CL**)
  4. Re-irradiation (**CL**)
- Superior Vena Cava Syndrome:
  1. Palliative radiation therapy (**CL**)
- Palliative radiation therapy for other obstructive conditions (e.g., airway, GI)

Skin

- Non-melanomatous skin tumors:
  1. Definitive radiation therapy (**CL**)
  2. Post-operative radiation therapy to local site (**CL**)
  3. Post-operative radiation therapy to nodal regions (**ML**)

- Melanoma:
  1. Post-operative radiation therapy to the primary site and nodal regions (**ML**)
  2. Radiation therapy for advanced disease/metastatic disease (**ML**)
- Kaposi's sarcoma:
  1. Radiation therapy for Kaposi's sarcoma (**ML**)

Pediatric Tumors

All are **ML**

- Developmental malignancies:
  1. Retinoblastoma
  2. Neuroblastoma
  3. Wilms' tumor
- Hematological malignancies:
  1. ALL
  2. Hodgkin lymphoma
- Musculoskeletal malignancies:
  1. Rhabdomyosarcoma
  2. Ewing's Sarcoma
  3. Osteosarcoma
- CNS malignancies:
  1. Medulloblastoma
  2. Ependymoma
  3. Brainstem glioma and other gliomas
  4. CNS germ cell tumors

Appendix – 8: Direct Observation of Procedural Skills (DOPS)

Center: **Level of trainee:**
Name: **Registration number:**
Rotation: **Period:**

Program director:

Procedure	Below Expectation 1	Displays Competency 2	Displays Confidence 3
Vaginal vault applicator insertion			
Uterine tandem and ring insertion			
Flexible endoscopy of ear, nose, and throat			
Core biopsy			
Punch biopsy			
Paracentesis			

Comments:

I certify that I have read all the parts of this evaluation report and I have discussed it with the evaluators

Resident's name:---------- Signature:----------

Evaluator's name:---------- Signature:----------

Program director:---------- Signature:----------

Appendix – 9: Final In-Training Evaluation Report (FITER)/Comprehensive Competency Report (CCR)

Adapted from the Royal College of Physicians and Surgeons of Canada

Reference no:
Name and identification no:
Evaluation covering the last year as a resident:

In the view of the Residency Program Committee, this resident has acquired the competencies of the specialty/subspecialty as prescribed in the *Objectives of Training* and is competent to practice as a specialist.

[ ] YES **[ ] NO**

The following sources of information were used for this evaluation:

- written examinations
- clinical observations (e.g., ITERs) from faculty
- feedback from health care professionals
- completion of a scholarly project
- oral examinations
- structured assessment of treatment/ planning evaluation report (STAPLER)
- OSCEs
- other evaluations_____

COMMENTS:

Date	Name of Program Director/Assessor for CCR	Signature
Date	Name of Postgraduate Dean/Assessor for CCR	Signature
Date	Name of Resident	Signature

This is to attest that I have read this document.

FITER: (Medical Expert Competency)
Trainee Name:
Trainee SCFHS Number:

	EXPECTATIONS					
	*Rarely meets	*Inconsistently meets	*Generally meets	*Sometimes exceeds	*Consistently exceeds	Not Applicable
Medical Expert						
a) **Demonstrates the basic scientific and clinical knowledge relevant to the specialty of radiation oncology:**						
▪ **Anatomy**						
▪ **Tumor pathology**						
▪ **Medical physics, including principles applied to treatment planning**						
▪ **Radiation biology, including the principles applied to clinical decision-making**						
▪ **Clinical oncology, including medical, surgical, and preventive oncology**						
▪ **Diagnostic imaging**						
▪ **Radiation treatment planning**						
▪ **Early and late normal tissue radiation effects**						
b) Completes accurate and well organized history and physical examinations, including specific oncologic and gynecologic physical examinations						
Please comment on the strengths and weaknesses of the candidate and provide a rationale for your ratings. Make direct reference to the objectives and give specific examples wherever possible.						

***Rarely meets ≤ 30%**
***Inconsistently meets > 30–60%**
***Generally meets > 60–80%**
***Sometimes exceeds > 80–90%**
***Consistently exceeds > 90%**

FITER: (Medical Expert Competency)
Trainee Name:
Trainee SCFHS Number:

	EXPECTATIONS					
	*Rarely meets	*Inconsistently meets	*Generally meets	*Sometimes exceeds	*Consistently exceeds	Not Applicable
Medical Expert						
c) Uses all of the pertinent information to arrive at complete and accurate clinical decisions:						
▪ **Describes appropriate use of imaging and other investigations to arrive at the diagnosis and staging**						
▪ **Demonstrates appropriate use of imaging in treatment planning and delivery, and in monitoring tumor and normal tissue response to radiation**						
▪ **Demonstrates effective patient management during radiotherapy, including a clear understanding of how co-morbidities can affect decision-making in radiation oncology**						
d) Recognizes and manages emergency conditions, resulting in prompt and appropriate treatment and communication. Remains calm, acts in a timely manner and prioritizes correctly						
e) Demonstrates evidence-based decision-making to define clinical practice						
f) Articulates the relevance of clinical trials in clinical practice, and offers this option regularly where appropriate						
g) Describes the procedure for systemic administration of radioisotopes						

h) Demonstrates understanding of principles of radiation safety relevant to treatment utilizing external beam radiotherapy, brachytherapy, and systemic administration of radioisotopes						
Please comment on the strengths and weaknesses of the candidate and provide a rationale for your ratings. Make direct reference to the objectives and give specific examples wherever possible.						

***Rarely meets ≤ 30%**
***Inconsistently meets > 30–60%**
***Generally meets > 60–80%**
***Sometimes exceeds > 80–90%**
***Consistently exceeds > 90%**

FITER: (Procedures and Clinical Skills Competencies)
Trainee Name:
Trainee SCFHS Number:

	EXPECTATIONS					
	*Rarely meets	*Inconsistently meets	*Generally meets	*Sometimes exceeds	*Consistently exceeds	Not Applicable
PROCEDURES AND CLINICAL SKILLS						
Demonstrates the ability to perform diagnostic and therapeutic procedures/skills described in the Radiation Oncology Residency Training Curriculum						
a) Describes the procedure for and the management of emergencies and complications arising from intra-cavitary brachytherapy						
b) Identifies and contours appropriate clinical target volumes and critical structures in the planning of external beam radiation therapy, utilizing 3D imaging						
c) Develops a safe inverse treatment plan in patients considered appropriate for intensity-modulated radiotherapy (IMRT) and discerns the relative merit of the plan by using dose-volume histograms						
d) **Performs ear, nose, and throat endoscopies capably**						
e) Demonstrates competence in planning brachytherapy treatments, especially in gynecological cancer patients						
f) Describes the use of brachytherapy in other sites where this is appropriate						
g) Demonstrates understanding of the procedure, immobilization, volume determinations, and dose schedules for stereotactic radiation treatment of the head and body						

Minimizes risks and discomforts to the patient						
Overall, is proficient in clinical and procedural skills relevant to radiation oncology						
Please comment on the strengths and weaknesses of the candidate and provide a rationale for your ratings. Make direct reference to the specific objectives and give specific examples wherever possible.						

***Rarely meets**
***Inconsistently meets > 30–60%**
***Generally meets > 60–80%**
***Sometimes exceeds > 80–90%**
***Consistently exceeds > 90%**

FITER: (Communicator Competency)
Trainee Name:
Trainee SCFHS Number:

	EXPECTATIONS					
	*Rarely meets	*Inconsistently meets	*Generally meets	*Sometimes exceeds	*Consistently exceeds	Not Applicable
COMMUNICATOR						
a) Establishes a comfortable and professional rapport with patients and their families, and also with other members of the health care team						
b) Provides clear, thorough explanations of diagnoses, investigations, and management						
c) Presents patient management plans clearly, concisely, and correctly in the clinical setting, in formal presentations, and in written records						
d) Obtains informed consent by presenting a treatment plan, discussing potential side effects with the patient and the patient's family, and answering their questions						
e) Discusses complex issues effectively with patients and families such as poor prognosis, relapse, termination of active therapy, and end-of-life care						
f) Demonstrates awareness of the importance of involving community care services and accessing bereavement counseling, when appropriate						
Please comment on the strengths and weaknesses of the candidate and provide a rationale for your ratings. Make direct reference to the objectives and give specific examples wherever possible.						

***Rarely meets ≤ 30%**
***Inconsistently meets > 30–60%**
***Generally meets > 60–80%**
***Sometimes exceeds > 80–90%**
***Consistently exceeds > 90%**

FITER: (Collaborator Competency)
Trainee Name:
Trainee SCFHS Number:

	EXPECTATIONS					
	*Rarely meets	*Inconsistently meets	*Generally meets	*Sometimes exceeds	*Consistently exceeds	Not Applicable
COLLABORATOR						
a) Interacts effectively with peers and other health professionals, recognizing and acknowledging their roles and expertise						
b) Collaborates appropriately in the management of patients						
c) Consults and delegates appropriately						
d) Demonstrates an awareness of own limits, seeking advice when necessary						
e) Handles conflict situations well, using appropriate strategies to achieve resolution of problems						
f) Assumes appropriate share of team assignments						
g) Participates effectively in inter-professional team meetings, including tumor boards						
Please comment on the strengths and weaknesses of the candidate and provide a rationale for your ratings. Make direct reference to the objectives and give specific examples wherever possible.						

***Rarely meets ≤ 30%**
***Inconsistently meets > 30–60%**
***Generally meets > 60–80%**
***Sometimes exceeds > 80–90%**
***Consistently exceeds > 90**

FITER: (Manager Competency)
Trainee Name:
Trainee SCFHS Number:

	EXPECTATIONS					
	*Rarely meets	*Inconsistently meets	*Generally meets	*Sometimes exceeds	*Consistently exceeds	Not Applicable
MANAGER						
a) Makes cost-effective use of health care resources based on sound judgment						
b) Uses information technology effectively, such as methods for searching medical databases						
c) Sets realistic priorities in order to optimize professional performance						
d) Demonstrates effective time management skills and models the importance of punctuality, especially when working in a team environment						
e) Makes judicious use of complex technologies. Demonstrates an understanding of the relative cost of newer technologies and the supportive evidence for their application						
f) Describes the principles and processes used to ensure patient and public safety during the therapeutic use of ionizing radiation						
g) Describes factors to consider in planning human and facility resources to ensure appropriate access to radiation therapy services						
Please comment on the strengths and weaknesses of the candidate and provide a rationale for your ratings. Make direct reference to the objectives and give specific examples wherever possible.						

***Rarely meets ≤ 30%**
***Inconsistently meets > 30–60%**
***Generally meets > 60–80%**
***Sometimes exceeds > 80–90%**
***Consistently exceeds > 90%**

FITER: (Health Advocate Competency)
Trainee Name:
Trainee SCFHS Number:

	EXPECTATIONS					
	*Rarely meets	*Inconsistently meets	*Generally meets	*Sometimes exceeds	*Consistently exceeds	Not Applicable
HEALTH ADVOCATE						
a) Demonstrates the specialist role to advocate on behalf of patients with respect to the social, economic, and biologic factors that may impact on their health						
b) Demonstrates knowledge of the unique role of radiotherapy in preventive and therapeutic interventions in cancer patient management and is able to advocate for its use in clinical and other public forums						
c) Describes the specialist role to advocate on behalf of the community with respect to the social, economic, and biologic factors that may impact on community health						
d) Identifies opportunities for advocacy, health promotion and disease prevention, including but not limited to smoking cessation, managing obesity, and exercise programs						
Please comment on the strengths and weaknesses of the candidate and provide a rationale for your ratings. Make direct reference to the objectives and give specific examples wherever possible.						

***Rarely meets ≤ 30%**
***Inconsistently meets > 30–60%**
***Generally meets > 60–80%**
***Sometimes exceeds > 80–90%**
***Consistently exceeds > 90%**

FITER: (Scholar Competency)
Trainee Name:
Trainee SCFHS Number:

	EXPECTATIONS					
	*Rarely meets	*Inconsistently meets	*Generally meets	*Sometimes exceeds	*Consistently exceeds	Not Applicable
SCHOLAR						
a. Demonstrates a commitment to continuous learning. Develops and implements an ongoing and effective personal learning strategy						
b. Critically appraises sources of medical information, taking an evidence-based approach to management problems						
c. Describes the principles of adult learning and helps others learn by teaching, providing guidance, and giving constructive feedback						
This resident has successfully completed a research or scholarly project related to radiation oncology	[ ] Yes			[ ] No		
Please comment on the strengths and weaknesses of the candidate and provide a rationale for your ratings. Make direct reference to the specific objectives and give specific examples wherever possible.						

***Rarely meets ≤ 30%**
***Inconsistently meets > 30–60%**
***Generally meets > 60–80%**
***Sometimes exceeds > 80–90%**
***Consistently exceeds > 90%**

FITER: (Professional Competency)
Trainee Name:
Trainee SCFHS Number:

	EXPECTATIONS					
	*Rarely meets	*Inconsistently meets	*Generally meets	*Sometimes exceeds	*Consistently exceeds	Not Applicable
PROFESSIONAL						
a) **Demonstrates integrity, honesty, compassion, and respect for diversity**						
b) **Fulfills medical, legal, and professional obligations of the specialist**						
c) **Participates in peer review processes**						
d) Accepts advice and integrates feedback into subsequent performance, such as treatment planning peer review, clinical case conferences, morbidity, and mortality rounds						
e) **Meets deadlines, monitors patients, and provides follow-up**						
f) **Explains the principles of research ethics**						
g) **Explains the principles of medico-legal liability**						
h) **Demonstrates confidentiality of the medical record at all times**						
i) Demonstrates respect when providing feedback to peers and colleagues and is accepting of feedback from peers and colleagues						
j) Demonstrates awareness of one's own limits, seeking advice when necessary						
Please comment on the strengths and weaknesses of the candidate and provide a rationale for your ratings. Make direct reference to the objectives and give specific examples wherever possible.						

***Rarely meets ≤ 30%**
***Inconsistently meets > 30-60%**
***Generally meets > 60–80%**
***Sometimes exceeds > 80–90%**
***Consistently exceeds > 90%**

Appendix – 10:

Resident Presentation Evaluation by Staff Supervisor

Resident name:----------Level:----------

Staff supervisor:----------

Date of presentation:----------

Topic: ----------

Please use the following scale to evaluate the presentation:

Very weak	Weak	Acceptable	Good	Very good
1	2	3	4	5

Medical Expert	1	2	3	4	5
- Demonstrated thorough knowledge of the topic					
- Presented at an appropriate level and with adequate details					
- Comments (optional)					
Communicator					
- Provided objectives and an outline					
- Presentation was clear and organized					
- Used clear, concise, and legible materials					
- Used an effective method/style of presentation					
- Established good rapport with the audience					

Collaborator					
- Invited comments from learners and led discussion					
- Worked effectively with supervisor in preparing the session					
- Comments (optional)					
Health advocate					
- Managed time effectively					
- Addressed preventive aspects of care if relevant					
- Comments (optional)					
Scholar					
- Posed appropriate learning questions					
- Accessed and interpreted the relevant literature					
- Comments (optional)					
Professional					
- Maintained patient's confidentiality if clinical material is used					
- Identified and managed relevant conflicts of interest					
- Comments (optional)					