**CANADIAN ASSOCIATION OF RADIATION ONCOLOGISTS**
**ASSOCIATION CANADIENNE DES RADIO-ONCOLOGUES**

# Radiation Oncology Scope of Practice in Canada

Prepared by:

The Canadian Association of Radiation Oncologists (CARO)
Manpower and Standards of Care Committee

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## BACKGROUND

In 2001, the CARO Board of Directors requested that the Manpower and Standards of Care Committee consider an initiative to define the scope of practice that should be encompassed within the specialty of Radiation Oncology. This directive was taken at a time in which numerous professional bodies, including the Canadian Medical Association and the American Society of Therapeutic Radiology and Oncology have made it a priority to outline principles and criteria for determining scopes of practice (1,2). These deliberations are occurring in a background of a changing, dynamic healthcare environment. The factors that are impacting the scope of practice in Radiation Oncology include:

- Changing demographics
- Increasing healthcare costs
- Shortages of physicians, nurses, radiation therapists, medical physicists and other providers
- Advances in technology in both treatment and diagnostic modalities
- Increasing patient consumerism
- Emerging use of alternative therapies
- Alternative funding mechanisms
- Private ownership of radiation oncology service delivery, and
- Other uses for radiation such as expanding use of radiation in vascular disease (i.e. coronary artery radiotherapy – CART) and treatment of functional CNS lesions using stereotactic brain irradiation.

All these issues, which currently face the professional specialty of Radiation Oncology, raise the issue of: how should the profession respond? Primarily, the purpose of this document is to initiate a discussion of how our specialty can meet the healthcare needs, and interests of patients, safely, efficiently, and competently. It is the prerogative of CARO to undertake this process independently in order to allow the specialty to ready itself for the challenges of the next several decades. This prerogative remains vital to the future of CARO regardless of future changes in patterns of care; regulations regarding practice ownership, and setting of practice. Such a discussion must reflect the needs of society, such as the needs for public access to services, public expectations, public preferences, while at the same time reflecting economic realities. Scopes of practice determination can be used by stakeholders such as CARO in discussing with government, cancer care organizations, and regulatory bodies, potential new roles for the specialty.

## INTRODUCTION

There is extensive literature on the notion of scope of practice. Much of the literature focuses on scope of practice of physicians and nurses, however it is clear there are many other professional groups that have overlapping scopes of practice. The definition for scope of practice is "…the activities for which the professional is educated, and authorized to perform; and is influenced by the setting in which the professional practices, the requirements of care delivery organizations, the needs of the patients or clients" (3). Thus the notion of scope of practice reflects essentially the practice of the profession and is used as a guide to the profession and public.

### Historical Practice - Radiation Oncology in Canada

The specialty of Radiation Oncology has a long and illustrious history dating back to the dawn of the use of therapeutic irradiation in medicine. Our predecessors, more commonly referred to as radiotherapists, were experts in the clinical assessment of cancer patients, and understood and in some cases documented and advanced the knowledge of disease progression in malignancy. These pioneering efforts help to develop generations of specialists whose clinical skills remain the foundation of the treatments we apply in our practices today. Early technology for imaging, treatment planning and treatment delivery was much more rudimentary than the current standard. The establishment of the efficacy and safety of radiation therapy, without excessive acute and late toxicity, evolved in an empiric

fashion. Skill in case selection, adaptation of radiation safety standards, clinical implementation of megavoltage x-rays and electron beams, and CT-based treatment planning are all developments which have improved therapeutic outcomes and eased the burden of morbidity compared to the earlier era.

The specialty of Radiation Oncology in Canada continues to develop new generations of specialists through formally evaluated and accredited training programs, including certification of competence by the Royal College of Physicians and Surgeons of Canada (RCPSC) and ongoing maintenance of competence programs. The RCPSC Office of Education has defined Radiation Oncologists as:

- Medical specialists with unique knowledge, understanding and expertise in the diagnosis of patients with malignant disease
- Integrally involved in the formulation and execution of the management plan of cancer patients
- Using an evidence-based approach, they are responsible for the appropriate recommendation, prescription and supervision of the therapeutic ionizing radiation.
- Competent and ethical discharge of these responsibilities results in improved quality of life and/or survival for cancer patients, which in turn benefits families, society and future care.

The CARO Manpower and Standards of Care Committee has considered this definition, and defines the current practice of radiation oncology as follows:

The Radiation Oncologist:

- Is a physician with clinical competence and experience in the acute and chronic biological effects of radiation on both neoplastic and normal tissues.
- Has a solid background in the sciences basic to the understanding of malignant diseases.
- Is well versed in the physical and biological mechanisms of radiation and other anticancer modalities, and their modulation by physical, pharmacologic and biologic agents.
- Is expert and technically proficient in the therapeutic uses of external beam radiation and brachytherapy (both sealed and unsealed sources). This includes expertise in radiation dose, fractionation and timing, mode of administration, and integration with anticancer modalities.
- Has expert clinical skills in the care of both ambulatory and hospitalized patients, and is integral to coordinating care with primary care physicians, specialists from other oncologic disciplines, and other members of the health care team.
- Is knowledgeable in the diagnosis and treatment of acute and chronic morbidity associated with ionizing radiation.
- Is able, in association with radiation physicist, radiation dosimetrists, radiation therapists and radiation oncology nurses, to develop standards for radiation safety and efficacy, and utilize such standards to integrate useful emerging technologies with regard for radiation protection of patients, members of the health care team and the general public.
- Today, Radiation Oncologists increasingly subspecialize in both a tumor-specific and modality-specific sense recognizing the pace of development in the field. This trend is predicted to become the norm.
- In addition, Radiation Oncology has matured and flourished as a sub-discipline of academic medicine in Canada. Increasingly, centres with Royal College approved training programs also possess faculty with academic appointments in the faculties of medicine of their respective universities.
- In addition to providing exemplary patient care, these faculties are strongly involved in curricula for undergraduates and postgraduates as well as original research and publication of scholarly manuscripts

## DELIVERY OF CARE – CURRENT AND FUTURE TRENDS

Among the factors shaping how we deliver care as professionals are: increasing health care costs, an aging population, advances in the treatment of disease, strong imperatives to improve quality of care, advances in information technology by our profession increasing patient consumerism, a shift to ambulatory-based care, broadening indications for emerging technology, policy makers emphasis on

preventive and primary health care, new models of integrated care delivery (such as tumor group models), and non-physician provision of care.

The use of non-physician providers is projected to increase over the next 15 years (4). If there are insufficient numbers of medical professionals available to "perform the procedure in the necessary volume, then, as has been the case, time and time again, a technician or therapist will emerge as the delegate of the physician to perform the procedure" (5). In the past, nurses may have been viewed as dependent upon physicians, however ample evidence indicates that nurses are independent, unique and integral members of the health care system. The concept of nurse practitioner has evolved from one of "physician extender" to autonomous practitioners working in collaboration with physicians. The literature indicates that nurse practitioners do not perceive of their role as "mini-doctors" but rather as new health care providers, complimentary to and not substituting for physicians. The Canadian Medical Association has recognized professional roles of this type in policy statements, as complimenting existing specialties rather than replacing them.

Many health care tasks overlap between professions. Some theorists argue that scope of practice definitions couched in statutory/exclusionary terms are inadequate. Indeed occupations and professions are dynamic and evolve; rigid definitions of particular skill sets, which in the legislative/regulatory domain seek to prevent transgression of occupational boundaries, fail to consider this intrinsic evolution. Radiation therapists are an important group to consider in terms of evolving patterns of care delivery. Formal discussions about inter-professional roles and responsibilities and their potential evolution have begun in some countries (eg. United Kingdom), and will increasingly occur in the Canadian environment.

From a legal standpoint, (6) "responsibility for performance of a controlled act also remains with the delegating physician unless the individual performing the controlled act is a regulated health professional and is authorized to perform the act". Therefore, when delegating a task to a non-physician provider, a physician may not always be responsible for the negligent acts of others (7,8).

This does not appear to apply in the majority of cases where nurses are employed in a hospital setting. The issues of integration and collaboration in practice are complex and require regulatory review; the resolution of these issues requires the cooperative efforts of the medical profession, the nursing profession, medical physicists, radiation dosimetrists, radiation therapists, provincial regulatory bodies, and governments.

**Recommendation**

Where non-physician providers become involved in the delivery of care to patients with malignant disease, Radiation Oncologists should retain input into the delegation of duty, training, certification and ongoing supervision of these members of the Radiation Oncology Team. This document identifies high priority areas for discussion of scope of practice policy.

## RADIOTHERAPY FOR NON-MALIGNANT DISEASE

Ionizing radiation is a unique therapeutic modality with anticancer, antiproliferative, immunosuppressive, anti-inflammatory and antivascular effects. While ionizing radiation has demonstrated utility in the management of cancer, there are also indications for the use of radiation in the treatment of non-malignant and benign diseases. Radiation Oncologists have the training, experience and competence to best assess the benefits and risks of using radiation in this setting, and assure appropriate treatment delivery.

The scope of radiation therapy applications in non-malignant disease is broad and, in many cases, supported by reports of efficacy (9,10). Radiotherapy may be considered in the management of:

1. Benign intracranial disease processes and functional neurological disorders

- Cranial nerve schwannoma
- Meningioma
- Arteriovenous malformations
- Pituitary adenoma
- Trigeminal neuralgia

2. Arterial disorders

- Coronary arteries – management of stent re-stenosis
- Peripheral vascular disease – femoral/popliteal artery

3. Miscellaneous clinical indications

- Graves ophthalmopathy
- Keloid prophylaxis
- Pterygia prophylaxis
- Heterotopic bone formation prophylaxis

**Recommendations**

In some cases, clear indications for radiotherapy have been established. In other instances listed above, ongoing follow-up of case series and maturation of randomized clinical trials will allow assessment of efficacy and toxicity.

1. Radiation Oncologists should possess a fundamental understanding of the antiproliferative, immunosuppressive, anti-inflammatory and anti-vascular effects of radiation, which make ionizing radiation a potentially valuable therapeutic modality for benign conditions. Close interaction with colleagues in neurosciences, cardiovascular medicine, transplantation medicine, dermatology, ophthalmology, orthopedic surgery, plastic surgery and hematology is essential to enable multidisciplinary assessment and management of patients with these conditions. This is often best achieved through patient management conferences, which may occur outside of cancer care site teams.
2. Radiation Oncologists should be skilled in the planning and delivery of stereotactic radiation using linear accelerator and gamma-isotope based techniques.
3. Radiation Oncologists, radiation therapists, medical physicists and other members of the radiation team should be knowledgeable about radiotherapy to prevent arterial stent re-stenosis. It is recognized that the complexity and risk of cardiac catherization will require close collaboration with interventional cardiology, in order to maximally exploit this emerging therapy for the benefit of patients.
4. Radiation Oncologists should participate, either directly or as consultants to other medical specialists and health professionals, in the long-term care and follow-up of patients with benign conditions treated with ionizing radiation. This will assure optimal patient care and ongoing quality assurance.

## DELIVERY OF PATIENT CARE IN RADIATION ONCOLOGY

**Introduction**

The specialty of Radiation Oncology is broad in scope with slight variations in practice, which have evolved according to the individual needs within a geographic area. However, patient care remains a cornerstone in the teaching and practice of radiation oncology. As our knowledge base and responsibilities expand, we are at risk of neglecting patient care issues, compromising our role as cancer physicians and ultimately allowing our specialty to gain a reputation only as radiation delivery experts. It is

the opinion of CARO that Radiation Oncologists have a responsibility to facilitate comprehensive oncological care for their patients. If we are to maintain and strengthen our function as oncologists, several patient care areas need to be addressed.

**Combined Modality Therapy**

The management of many adult and pediatric malignancies has evolved to include the utilization of more than one modality. The successful use of radiation concurrently with pharmacologic (cytotoxics, radiosensitizers, radioprotectors), immunologic, molecular and biologic agents continues to progress. Additionally, sequencing of surgical management with radiation remains an important strategy to gain tumour control, reduce toxicity, and maximize cosmetic and functional outcomes. The improved patient care resulting from these combination therapies over radiation alone has established new standards of management for many tumours. Radiation Oncologists must remain knowledgeable in the use of other modalities in combination with radiation. Also, it is critical that Radiation Oncologists contribute to and frequently direct research aimed at optimal integration of both conventional and innovative modalites with radiation therapy. It is important to realize that toxicity often varies from single modality treatments (enhanced, reduced or uniquely different) and may be further modified as the methods of radiation delivery changes (altered fractionation, brachytherapy, newer technology, etc). The unique knowledge of radiation effects possessed by Radiation Oncologists is necessary to properly exploit therapeutic gains from such combined modality strategies.

**Combined Modality Therapy - Recommendations**

Radiation oncologists should continue to assess patients in a multidisciplinary fashion and have an integral role in formulating a combined modality management plan. This can be achieved through participation in cancer site teams and patient management conferences.

1. Radiation Oncologists should be knowledgeable about the pharmacology, mechanism of action and administration of traditional cytotoxic systemic agents, hormonal agents, radiosensitizers, radioprotectors and new biologic agents, which modify the effects of radiation therapy. Radiation Oncologists may prescribe and supervise the use of such agents and manage related toxicity, where they have appropriate training and competence. Radiation oncologists should be skilled in assessment and management of toxicity related to combined modality therapy, including supportive care and symptom control.

2. Radiation oncologists need to work with other specialists to generate common toxicity indexes for acute and late effects of combined modality treatments.

3. The radiation oncologist must maintain participation in the organization of long-term care and follow up of patients treated with combined modalities.

**Inpatient and Outpatient Care**

Although the majority of patients treated with radiotherapy are outpatients, there remains a significant proportion who must be managed as inpatients. Inpatients often have unique oncological problems, which Radiation Oncologists need to be able to recognize and manage. Some radiotherapy delivery such as brachytherapy requires admission to hospital. In the interests of good patient care, we need to maintain our role as oncologists and not just radiation delivery specialists. To do this, we must continue to participate in the comprehensive management of cancer patients.

**Inpatient and Outpatient Care - Recommendations**

1. Where appropriate Radiation Oncologists should provide direct inpatient care to patients requiring radiotherapy as part of their management plan, in addition to providing outpatient care.

2. Proficiency should be maintained in managing common oncologic problems, which should be included as topics for continuing education and refresher courses and not only components of residency training programs.

3. While Radiation Oncologists should participate in comprehensive cancer care, the ability to provide comprehensive medical care (including intercurrent, non-malignant illness) is restricted by the limited resources available to Radiation Oncologists. Radiation Oncologists should work in conjunction with general practitioners, hospitalists, and other medical specialists to ensure that such care is provided.

**Palliative Care**

As a significant portion of radiotherapy is delivered with palliative intent, Radiation Oncologists are required to be competent in dealing with palliative and supportive care, symptom management and end-of-life issues. Comprehensive oncologic patient care cannot be achieved if this is neglected since in many cases, improved quality of life is the main objective.

**Palliative Care - Recommendations**

1. Radiation Oncologists should coordinate and integrate radiotherapy delivery into comprehensive palliative and supportive care management.

2. Although included in residency training programs, continuing education opportunities for Radiation Oncologists in areas of palliative and supportive care, treatment management and end-of-life issues are inadequate and should be enhanced.

3. Radiation Oncologists should contribute to and lead research in palliative care and quality of life issues in cancer patients.

**DEVELOPMENT AND IMPLEMENTATION OF TECHNOLOGICAL ADVANCES IN RADIATION ONCOLOGY**

Radiation Oncology is a medical specialty that, while primarily focused on the clinical care of patients with malignant disease, is driven by developments in tumor biology and technology. The ability to safely deliver radiation to a specified target volume while sparing adjacent normal tissues has improved over the years in parallel with technologic developments, such as megavoltage photon and electron beam therapy and afterloading pulse-modulated brachytherapy techniques. Technology in radiation treatment planning and delivery is presently expanding at an unprecedented rate, and has great potential to contribute to improvements in tumor control and reductions in treatment complications. High resolution imaging of tumors and normal tissues, functional imaging of tumor biology, optimized three-dimensional radiation dose calculations, computer-controlled treatment setup and delivery, and real-time electronic treatment verification are available in an increasing proportion of radiation departments. Intensity-modulated radiotherapy (IMRT), which allows continuous dynamic variation of radiation beam orientation, size, shape and intensity during treatment, has the potential to very precisely conform radiation delivery to the tumor while minimizing the dose to adjacent normal tissues. This improvement in the therapeutic ratio should facilitate radiation dose escalation and improvements in local tumor control.

While these technologies offer immense opportunity, they also pose significant hazards if all facets of treatment planning and delivery are not carefully evaluated and understood. For example, accurate delineation of the clinical (CTV) and planning (PTV) target volumes and critical normal tissues is more

important with IMRT than with conventional radiation treatment delivery. The presence of high dose gradients at the edges of these volumes requires that uncertainties in patient setup and in tumor and normal tissue internal movement be carefully addressed during radiation planning and delivery. In addition, understanding of the radiation dose–volume relationships for normal tissues is necessary to assure the safety of this approach.

The safe implementation of new radiation technology in the clinic will require the combined effort of a number of professional groups with specific domains of expertise, including radiation oncologists, physicists, dosimetrists, radiation therapists and nurses. Coordination and communication among these stakeholders, both at a local level within individual institutions and more broadly in the radiation medicine community, will be essential to assure that important technical and patient-related issues are adequately addressed. Radiation Oncologists must take the lead in supervising patient safety throughout the process of new technology implementation, and in evaluating the efficacy of these new treatments in the context of overall patient care and cost to the health care system.

**Recommendations**

1. It is the responsibility of Radiation Oncologists to establish the appropriateness of all radiation treatments with respect to efficacy and patient safety. Radiation Oncologists therefore need to have a high level of understanding of the technical and patient-related components of new technologies, and an understanding of how to rationally integrate technology into clinical practice.

2. Radiation Oncologists require detailed knowledge of tumor biology and natural history in order to optimally utilize new technologies that allow precise anatomic targeting. Gross tumor and potential sites of microscopic extension must be defined with the greatest possible accuracy. This implies a high level of understanding of the capabilities and limitations of medical imaging techniques, and close collaboration with diagnostic imagers.

3. Radiation Oncologists must have complete understanding and knowledge of the treatment-planning process and associated uncertainties to rationally determine target volumes. The determination of the PTV is a judgment balancing the probability of local recurrence against the risk of complications. Treatment planning includes patient positioning and immobilization, image acquisition and registration, dose calculation, plan optimization, plan evaluation and plan implementation.

4. Radiation Oncologists should be familiar with the purpose and scope, benefit, and regulatory requirements associated with technical quality assurance protocols that are widely accepted in the field. Technical quality assurance encompasses: 1) measurement of planning, delivery and verification of equipment performance characteristics; 2) comparison of equipment performance characteristics with existing technologic standards and established specifications; and 3) identification of appropriate tolerance limits, action levels, and procedures to maintain or regain equipment performance. In this contest, Radiation Oncologists play a key role in advocating and articulating the need for and roles of specialized personnel, especially physicists, dosimetrists and radiation therapists.

5. Radiation Oncologists require an understanding of computer systems and medical informatics, which are the underpinnings of current and developing targeted treatment planning and delivery systems. Radiation Oncologists must work closely with computer system specialists to assure the reliable and safe integration of these systems.

## SUMMARY AND CONCLUSIONS

Radiation Oncologists, by virtue of comprehensive training and experience, have a unique responsibility to oversee the use of ionizing radiation in the treatment of malignant and benign disease.

The practice of Radiation Oncology is undergoing significant change with the move to image based treatment planning, increasing use of multi-modality treatment, and the re-emergence of treatment of benign diseases as a sub-specialty. These factors, together with ever increasing demand for service, mean that the specialty of Radiation Oncology faces significant future challenges. Fundamentally, these challengers revolve around the need to improve technical standards while maintaining and indeed improving access to appropriate care.

The specialty must ensure that the medical aspects of Radiation Oncology care (patient evaluation and multidisciplinary decision-making) do not lose out as more time is devoted to improving the quality of technical treatment planning and delivery. This will involve prioritizing the components of Radiation Oncologists practice in relation to the responsibilities and capabilities of other existing and newly evolving health-care professions. This will require continued discussion so that a clear consensus of Radiation Oncology core business can be developed to help provide exemplary patient care now and in the future.

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