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Clinical Perspective

# Patterns of Practice in Canadian Radiation Treatment Centres: Results of a National Survey

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## ABSTRACT

**Purpose:** Radiation therapy has changed rapidly over the past decade due to the application of technological advances. A survey was conducted of radiation treatment centres in Canada to establish current patterns of practice across the country. Areas of inquiry included treatment techniques and image verification, as well as roles and responsibilities of radiation therapists (RTs).

**Methods and Materials:** In January 2016, a survey was sent to managers of the 46 radiation treatment centres in Canada. This survey sought information on a range of staffing and practice variables for the fiscal year 2014/2015.

**Results:** Of the 46 centres contacted, 37 centres responded, representing an 80.4% response rate. Survey results showed that the use of volumetric arc therapy and intensity-modulated radiation therapy is common across Canada for several anatomic sites, as well as the use of daily pretreatment image verification. A high degree of variability exists for imaging modality (two dimensional vs. three dimensional) for some sites, including brain, head and neck, and lung. RTs' responsibilities have expanded uniformly across the country, with RTs involved in organ-at-risk contouring and on-treatment image approval at the majority of centres. Despite this role expansion, specialty roles in areas of quality and applications expertise are still rare.

**Conclusions:** Radiation therapy in Canada has transitioned to high-technology treatment techniques with relative consistency across the country. There is, however, variation in the imaging modality used for daily verification. Canada may benefit from consensus guidelines on the application of three-dimensional imaging for treatment verification. While RTs have expanded their responsibilities, role definition for RTs working in supervisory or supporting positions has not kept pace at many centres and it is unclear if RTs are supported in their expanded accountabilities.

## RÉSUMÉ

**But :** La radiothérapie a évolué très rapidement au cours de la dernière décennie, en raison de l'application des avancées technologiques. Un sondage a été fait auprès des centres de radiothérapie au Canada afin de déterminer les modèles de pratique actuels à travers le pays. Les questions portaient sur les techniques de traitement, la vérification des images, ainsi que les rôles et les responsabilités des radiothérapeutes.

**Méthodologie et matériel :** En janvier 2016, un questionnaire a été envoyé aux gestionnaires des 46 centres de radiothérapie au Canada. Le sondage portait sur une gamme de variables de dotation et de pratique pour l'exercice 2014/2015.

**Résultats :** Vingt-sept des 46 centres contactés ont répondu au questionnaire, pour un taux de réponse de 80,4%. Les résultats indiquent que l'utilisation de l'arthérapie volumétrique et de la radiothérapie à modulation d'intensité est courante au Canada pour différents sites anatomiques, tout comme le recours à la vérification quotidienne des images avant le traitement. Il existe un degré élevé de variabilité dans les modalités d'imagerie (2D ou 3D) pour certains sites, incluant le cerveau, la tête et le cou ainsi que les poumons. Les responsabilités des radiothérapeutes se sont accrues de façon uniforme à travers le pays, les technologues participant au contourage des organes à risque et à l'approbation des images en cours de traitement dans la plupart des centres. Malgré cette expansion, les rôles spécialisés dans les domaines de la qualité et de l'expertise des applications restent rares.

**Conclusions :** La radiothérapie au Canada a fait la transition vers les techniques de traitement de haute technologie de façon relativement uniforme à travers le pays. Il existe cependant des variations dans les modalités d'imagerie utilisées pour les vérifications quotidiennes. Le Canada pourrait bénéficier de lignes directrices consensuelles sur l'application de l'imagerie tridimensionnelle pour la vérification des traitements. Bien que les responsabilités des radiothérapeutes

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se soient élargies, la définition du rôle pour les radiothérapeutes occupant des postes de supervision ou de soutien n'a pas suivi le rythme

*Keywords:* Radiation therapy; Radiation therapist; Education; IGRT; IMRT

## Introduction

In the past decade, health care has seen rapid technological advancement. This is especially true in the field of radiation oncology. The increasing use of intensity-modulated radiation therapy (IMRT), volumetric-modulated arc therapy (VMAT), and stereotactic radiation therapy has all resulted in highly conformal, patient-specific dose distributions. With this increase in the technology used in radiation therapy planning comes an inherent need for increased focus on accuracy and safety at the point of treatment delivery. Treatment plans are now routinely verified and modified at the point of treatment delivery with the application of image-guided radiation therapy (IGRT). Moreover, patient and/or organ motion are now frequently managed by the use of four-dimensional imaging and complex motion management techniques.

It has been suggested that, of all the radiation oncology disciplines, radiation therapists (RTs) are most heavily impacted by technological change [1], and as technology has evolved so has radiation therapy practice. Specialty roles have emerged at some treatment centres which identify distinct areas of expertise associated with this evolution, such as “application specialist” and “quality coordinator.” A small number of RTs have advanced their roles to include tasks traditionally done by physicians and are working as “advanced practice radiation therapists” or “clinical specialist radiation therapists.” While recognising the evolution of these new radiation therapy roles that practice above the traditional RT position, the majority of practicing RTs working in traditional roles in simulation, dosimetry, and treatment have had to integrate new responsibilities into their roles as the result of advancements. RTs’ use of image guidance in radiation treatment delivery requires the acquisition of new competencies and increased clinical judgement [1]. Many have recognised that an increase in education and training for radiation therapy staff should accompany the introduction of more complex techniques [2–7].

A recent publication from the ESTRO-HERO project noted that new technologies, such as IMRT and IGRT, had been unevenly applied across European countries [8]. Canada has a complex health care system, which is run under provincial jurisdictions. There have historically been few national standards or guidelines for the delivery of radiation therapy, and there is no existing data on the uptake of technology. It is also unclear how Canadian RTs are being supported to acquire and maintain new competencies, and the number of specialty roles that currently exist in radiation treatment facilities in Canada is unknown.

dans de nombreux centres et l'on ne peut dire clairement si les radiothérapeutes sont appuyés dans leurs responsabilités élargies.

This study aims to report on the patterns of practice for RTs in Canada. Specifically, it will highlight the degree to which new technology has been adopted into radiation therapy practice across Canada and how this has influenced the responsibilities of RTs and the emergence of specialty roles for RTs.

## Methods and Materials

In January 2016, a survey (provided in Appendix A) was sent to the 46 radiation treatment centres in Canada. This survey requested information on a variety of staffing and practice variables. Respondents were asked about the equipment and treatment programs at their centre as well as the treatment techniques and image guidance used for a variety of anatomic sites commonly treated with radiation therapy. There were questions about the various roles and responsibilities of RTs at their centre. The survey also sought information regarding staffing models, staffing levels, and workload; however, these responses will not be examined in this article. All information sought was for the fiscal year 2014/2015.

Research ethics board approval was granted for this study by the University of British Columbia–British Columbia Cancer Agency Research Ethics Board (REB# H15-02622). Surveys were electronic and used the Provincial Health Services Authority Fluid Survey Tool. An invitation to participate in the study was emailed to all managers of Canadian radiation treatment centres. Clarification regarding some questions was requested via email or telephone from several managers. The survey was closed in October 2016.

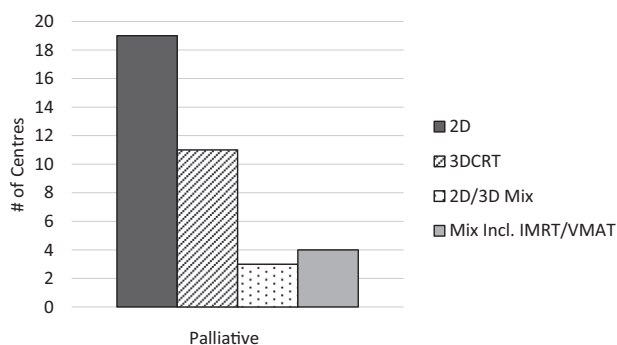


Figure 1. Most frequently used technique for palliative treatments. 2D, two dimensional; 3D, three dimensional; 3DCRT, three-dimensional conformal RT; IMRT, intensity-modulated radiation therapy; VMAT, volumetric-modulated arc therapy.

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