The Radiation Therapy Workforce in Canada: Current Landscape and Gaps in Knowledge

Hillary Hei Man Chan[1]

[1] Michener Institute of Education at UHN, Toronto, ON, Canada

E-mail: 17hc5@michener.ca

Received 12/08/2019
Published 16/09/2019

Abstract

Radiation Therapy is one of the main careers in the field of Radiation Oncology. Radiation Therapists are healthcare professionals who use latest technology to plan and deliver high energy radiation treatments to patients with cancer. Many technological advancements and treatment outcomes in radiation therapy have been reported in literature. However, changes in the workforce of radiation therapy have not been well-documented. More specifically, literature on the supply and demand of radiation therapists in Canada is limited. This review presents current full time equivalent positions in different key areas of radiation therapy with attempts to identify areas of significant growth and key drivers of such demand.

1. Introduction

Radiation Therapy, like many allied health professions, has often been overlooked or misunderstood by the general public. Different from diagnostic Radiological Technologist, Radiation Therapists are health care professionals who plan and deliver radiation treatments to cancer patients. Radiation Therapists often work with oncologists, nurses and medical physicists in hospitals with radiation therapy facilities. The practice of Radiation Therapy in Canada is centralized with 47 cancer centres that are governed by 10 provincial cancer care organizations (1). Funding and equipment for radiation treatments are only provided by provincial governments, therefore privately funded or operated radiation therapy services are not permitted in Canada (1).

Understanding current trends in the practice of Radiation Therapy has been a common interest for students in training and incoming students. Such aspects of the practice include trends in the supply and demand of Radiation Therapists, growth of the profession and future directions in technological advancement etc (2). Internet searches and getting in contact with practicing Radiation Therapists or current Radiation Therapy students are the most common ways of obtaining such information. However, results or responses from these sources can be inconsistent, inconclusive and subjective to individual experience. Although governing organizations such as the Canadian Association of Medical Radiation Technologists (CAMRT) have made efforts to convey current trends in the workforce, key drivers for the demand of Radiation Therapists have yet to be identified and addressed (3). This review presents the current and future landscape for the Radiation Therapy workforce as well as current gaps in knowledge about the radiation therapy in Canada.

1.1 Current Landscape

The Canadian Association of Medical Radiation Technologists (CAMRT) and the Canadian Institute for Health Information (CIHI) are the only two organization that conduct workforce studies and provide free access databases on Radiation Therapy in Canada.

2. CAMRT on the Current Landscape of Radiation Therapy Workforce in Canada

CAMRT is the national professional association that certifies radiation therapists and other medical radiation technologists with required competencies for clinical practice (3). CAMRT also supports members of this profession in advocacy, education and research (3). Since 2015, CAMRT conducted a Health Human Resources Survey for medical imaging and radiation therapy facilities across Canada (4). CAMRT conducted the same survey in 2017 with attempts to capture changes of human resources requirement in this field. CAMRT reported that the purposes of this survey are (3):

- Improve forecasting of future human resources needs in imaging and radiation therapy
- Building a health human resource database from the MRT community

- Identify where potential vacancies or growth are located

In the most recent Health Human Resources Survey, CAMRT reported findings on current full-time equivalent positions per facility in different areas of radiation therapy, projected areas of growth, projected retirements that serve as estimations of the upcoming demands in radiation therapy across Canada (3). Figure 1 indicates the reported average full time equivalent (FTE) per facility in different departments within radiation therapy by CAMRT. Based on these collected data, CAMRT suggested that brachytherapy, dosimetry or treatment planning, external beam treatment and CT simulation are areas of significant growth in the next 3 years (3). It was also estimated that the overall staffing increase for accommodating to the increase in service volume is 1.11 FTE per facility in the next 3 years (3). In terms of geographic distribution, most radiation therapists were reported to be working in Ontario and Quebec while Prince Edward Island, Newfoundland and Labrador and Saskatchewan (Figure 2) (3).

CAMRT also made projections on retirement and employment over the next 5 years based on survey results. The estimated number of eligible staff members who would retire in 5 years is 3.09 and 5.09 in 10 years (3). With regards to hiring new staff, most managers indicated their preference for experienced radiation therapists from another Canadian facility and new Canadian radiation therapy graduates over radiation therapists who were trained internationally, as shown in Figure 3 (3). It was also reported that most managers agree with the statement "prefer to hire staff who have training in multiple modalities" (3). Results in this category suggested that managers might prefer candidates with Canadian training experience and those with training in multiple imaging modalities.

The 2017 Health Human Resources Survey concluded that the mean FTE for radiation therapy in 2018 is 47.56, while FTE vacancies are 0.57 (3). These survey results have also captured that most respondents were anticipating a 0.01 to 9.99% change in service volume, with the most common reasons being increased workload, patient demographics and practice changes (3).

3. Canadian Institute for Health Information on Current Landscape of the Radiation Therapy Workforce in Canada

CIHI is a non-profit and independent organization that provides data and information to accelerate improvements in healthcare system performance and population health across Canada (5). CIHI has collected data on the employment and demographic trends of Canada's medical radiation technologists from 2006 to 2015. For the purpose of this data collection, CIHI defined workforce as CAMRT registrants who were employed in the profession at the time of annual registration, including those who were on leave (6). It was also noted that national associations submit membership registration data to CIHI for provinces and territories (6). This submission can be voluntary.

Based on the collected data, CIHI reported that distribution of radiation therapists was centralized in the province of Ontario from 2008 to 2015 (6). Newfoundland and Labrador, Prince Edward Island and Nova Scotia were reported to have the least number of radiation therapists throughout 2008 to 2015 (6). Figure 4 also showed a consistent small increase in the number of radiation therapists from 2008 to 2015 in most provinces, except for Ontario and Quebec (6). Ontario and Quebec seemed to have undergone a cyclic pattern in the number of radiation therapists within this time frame.

CIHI has collected data on medical radiation technologists based on areas of practice. Figure 5 indicates the changes on the reported percentage of MRTs who are practicing radiation therapists in Canada (6). These percentages presented a cyclic pattern for the number of employed radiation therapists between 2008 to 2015 (6). Percentages in year 2010, 2013 and 2014 could indicate decreases in the demand for radiation therapists.

4. Discussion

CAMRT and the CIHI both conducted surveys that reported general findings on the workforce distribution, demands and projected areas of growth in the field of radiation therapy (3Canadian Association of Medical Radiation Technologists, 2018; 6CIHI, 2017). Data collected by both organizations suggested that radiation therapists were mostly distributed in Ontario and Quebec (3,6). Prince Edward Island, Newfoundland and Labrador and Nova Scotia have been reported by both organizations to have the least number of radiation therapists compared than the average in Canada (3,6).

Survey results reported by the CAMRT represent the opinions and projections from managers and staff members across different Canadian cancer facilities, as these survey results were self-reported (3). This survey has also identified reasons such as increased workload, patient demographics and practice changes as reasons for the perceived or anticipated changes in the radiation therapy workforce (3). Although vague, these identified reasons could become determinants of demands in the radiation therapy workforce.

The Medical Radiation Technologists database created by CIHI reported findings on distribution, demographics, areas of practice between 2008 to 2015 consecutively (6). This collection of data is necessary to identify any trends among the radiation therapy workforce. Data collected on the percentage of radiation therapists suggested that the expansion of the radiation therapy workforce might follow a cyclic pattern. Furthermore, 2010, 2013 and 2014 have been identified as years in which the radiation therapy workforce experienced a decreased proportion of staff (6). Such decreases could be associated with other events or incidences that occurred during those years.

Workforce studies are not considered as novelties in the healthcare field. Previous literature has performed workforce studies on professions such as nursing and medicine (1). With regards to careers in radiation oncology, previous studies have examined trends in the radiation oncologists workforce but rarely in radiation therapy. Loewen et al. (1) recently examined the national trends in the Canadian radiation oncology workforce from 1990 to 2018 and found that "chronic staffing shortages, high service workloads and inadequate funding for physician recruitment contributed to the decline in medical student interests for the field of radiation oncology." These factors in combination were identified to have contributed to the significant regression in the supply of radiation oncologists; from 129 in 1996 to 56 in 2001 (1). Loewen et al. (7) had also identified that government funding commitments secured for infrastructure expansion and physician

recruitment simulated trainee growth from 2001 to 2008. Some of these findings such as high service workloads and staffing shortages appear like concerns that have been reported by radiation therapists in the CAMRT 2018 Health Human Resources Survey.

The second part of the Loewen et al. study explored the relationship between cancer incidence and the radiation oncologist workforce from 1990 to 2018 (1). Loewen et al. (1) reported that despite a 3% steady increase in annual cancer incidence, the national workforce growth was not consistent; from 1990 to 2004, the average net annual expansion was 6 radiation oncologists per year whereas from 2004 to 2018, the average growth rate was 17 radiation oncologists per year. This study also pointed out that excessive wait times for radiation therapy in the early 2000s served as a strong indicator for the Canadian government to invest in radiation therapy equipment and staff in order to meet the demands of the public (1). Findings from this part of the study suggest that increasing cancer incidence rates and excessive wait times could result in a higher demand for radiation oncology staff, including radiation therapists (1).

Based on previous literature on the radiation oncology workforce, service workload, radiation therapy demands, wait times and cancer incidence rates are all factors that can be examined with the trends in the radiation therapy workforce (1). A recent study suggested that the current demand for radiation therapy is outpacing the supply of radiation oncology workforce (7). However, when examining the wait times for radiation therapy, 97% of patients are receiving radiation treatments within 28 days in Canada (8). This result meets the national recommended wait time of >90% of patients receiving radiation treatment within 28 days; suggesting that the capacity for radiation therapy is adequate in 2019 (8). A study published in 2015, examined the evidence-based estimates of appropriate lifetime rate of radiation therapy use and concluded that there may be an overestimation for the need for radiation therapy in the province of Ontario (9).

Based on this finding, there may be disagreements about the actual need or demand of radiation therapy for cancer patients in academia. In terms of cancer incidences, it is expected that incidence rates will increase in Canada (10). Porrier et al. (10) projected cancer incidence to increase 83% from 2012 to 2042, with prostate, breast lung and colorectal cancer accounting for over 50% of cancer diagnoses in Canada. Although the rise in cancer incidences in Canada may seem evident, the need for radiation therapy among these projections have not been considered.

5. Conclusion

Radiation therapists make up an important component of the radiation oncology workforce. Although efforts have been made to understand the trends of the radiation therapy workforce, key determinants for the supply and demand of radiation therapy remain to be gaps in knowledge. These gaps in knowledge can be filled through establishing consistent data collection and the collaboration between the CAMRT and independent research organizations such as the CIHI to build a comprehensive database. Having this comprehensive database will help visualize areas of growth and ultimately advance the current health care system.

References

1) Loewen, S. K., Doll, C. M., Halperin, R., Parliament, M., Pearcey, R. G., Milosevic, M. F., … Brundage, M. (2019). National Trends and Dynamic Responses in the Canadian Radiation Oncology Workforce From 1990 to 2018. *International Journal of Radiation Oncology*Biology*Physics*, *105*(1), 31–41. https://doi.org/10.1016/j.ijrobp.2019.04.019
2) Garibaldi, C., Jereczek-Fossa, B. A., Marvaso, G., Dicuonzo, S., Rojas, D. P., Cattani, F., … Ricotti, R. (2017). Recent advances in radiation oncology. *Ecancermedicalscience*, *11*. https://doi.org/10.3332/ecancer.2017.785
3) Canadian Association of Medical Radiation Technologists. (2018). Human Resources Survey: Medical Imaging and Radiation Therapy 2017. Retrieved from: https://www.camrt.ca/wp-content/uploads/2018/11/CAMRT-HHR-Survey-Report-2017.pdf
4) Canadian Association of Medical Radiation Technologists. (2016). Human Resources Survey: Medical Imaging and Radiation Therapy 2015. Retrieved from: https://www.camrt.ca/wp-content/uploads/2017/03/CAMRT-2015-MRT-HR-Survey-Report.pdf
5) About CIHI: CIHI. (2019, August 15). Retrieved from https://www.cihi.ca/en/about-cihi
6) Information (CIHI), C. I. for H. (2017, January 12). Medical Radiation Technologists, 2015 [text]. Retrieved August 18, 2019, from https://secure.cihi.ca/estore/productFamily.htm?locale=en&pf=PFC3361&lang=en&_ga=2.211990292.1259928308.1565316663-126405153.1559612503
7) Loewen, S. K., Doll, C. M., Halperin, R., Delouya, G., Archambault, J., Stuckless, T., & Brundage, M. (2019). Taking Stock: The Canadian Association of Radiation Oncology 2017 Radiation Oncologist Workforce Study. *International Journal of Radiation Oncology*Biology*Physics*, *105*(1), 42–51. https://doi.org/10.1016/j.ijrobp.2019.04.035
8) Radiation Treatment Wait Times. CIHI. (n.d.). Retrieved August 18, 2019, from https://yourhealthsystem.cihi.ca/hsp/inbrief?lang=en#!/indicators/003/radiation-treatment-wait-times/;mapC1;mapLevel2;overview;/
9) Mackillop, W. J., Kong, W., Brundage, M., Hanna, T. P., Zhang-Salomons, J., McLaughlin, P.-Y., & Tyldesley, S. (2015). A Comparison of Evidence-Based Estimates and Empirical Benchmarks of the Appropriate Rate of Use of Radiation Therapy in Ontario. *International Journal of Radiation Oncology*Biology*Physics*, *91*(5), 1099–1107. https://doi.org/10.1016/j.ijrobp.2014.11.026
10) Poirier, A. E., Ruan, Y., Walter, S. D., Franco, E. L., Villeneuve, P. J., King, W. D., … Brenner, D. R. (2019). The future burden of cancer in Canada: Long-term cancer incidence projections 2013–2042. *Cancer Epidemiology*, *59*, 199–207. https://doi.org/10.1016/j.canep.2019.02.011

Figures

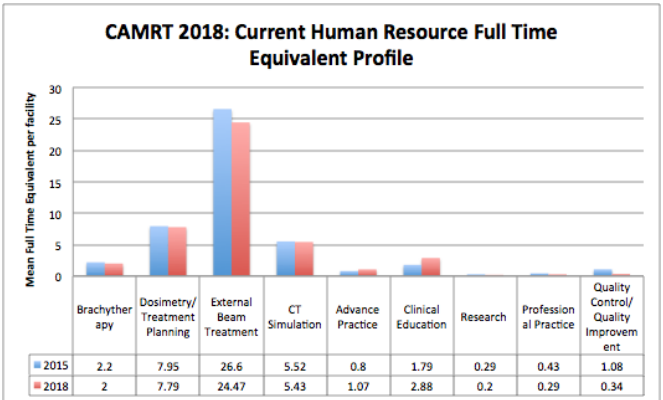

Figure 1. Current Human Resource full time equivalent profile: Comparing the mean full time equivalents (FTE) per facility in Canada for key areas in Radiation Therapy between 2015 and 2018 (3).

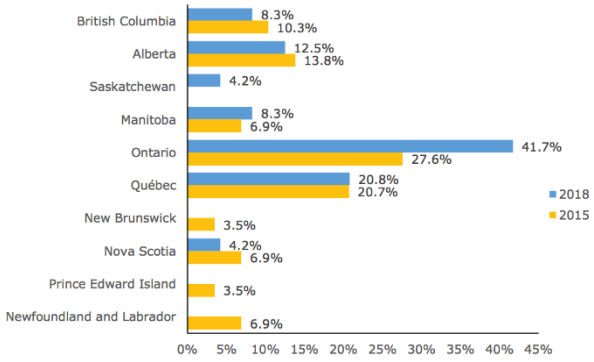

Figure 2. Dispersion of Radiation Therapists working across Canada Figure from: (3)

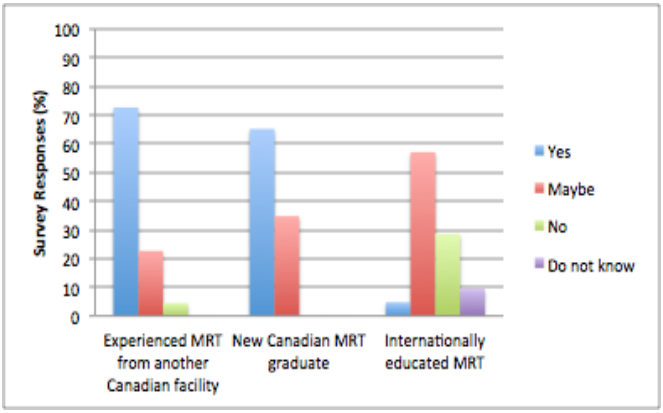

Figure 3. Survey Responses from Managers across different cancer facilities when asked their preferences about hiring new radiation therapy staff. Data source: (3)

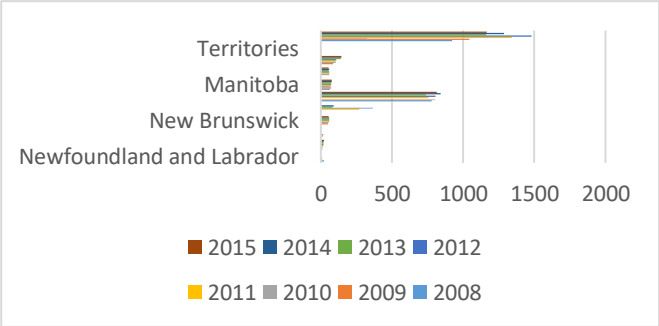

Figure 4. Reported Radiation therapy workforce in each province compared with the total radiation therapy workforce combined in Canada from 2008 to 2015. Data source: (6)

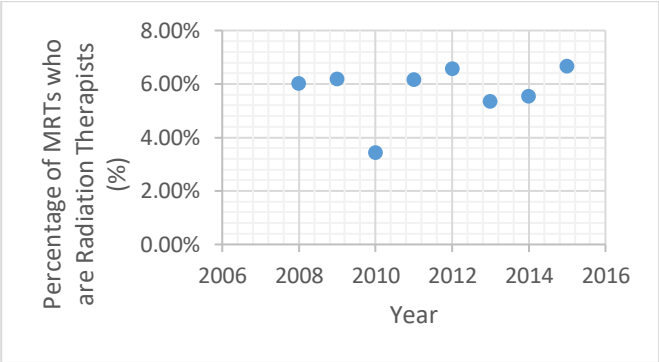

Figure 5. The reported changes in percentage of Medical Radiation Technologists (MRT) who are Radiation Therapists from 2008 to 2015 across Canada Data source: (6)