

## Scientific Article

# Employment Outcomes for Canadian Radiation Oncology Graduates: 2020 Assessment and Longitudinal Trends



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## Abstract

**Purpose:** Canadian radiation oncology (RO) trainees have experienced employment challenges after residency training. The present study was conducted to evaluate current employment trends and perform comparisons to prior reported assessments.

**Methods and Materials:** A survey was administered to all 13 Canadian RO program directors requesting the employment status and location of their graduates during the past 3 years, and their perceptions on graduates' employment challenges. Visa trainees were excluded. Findings were compared with surveys performed in 2014, 2016, and 2018.

**Results:** The response rate from RO program directors was 100%. There were 77 graduates identified who completed their residency training between 2017 and 2020. All had known employment status and location. Two (17%) 2020 graduates, 16 (84%) 2019 graduates, 17 (81%) 2018 graduates, and 24 (100%) 2017 graduates had staff employment. Of the 59 graduates with staff positions, 86% were in Canada. Some graduates (28%) obtained staff or locum employment in a province other than their training program. The proportion of graduates obtaining staff positions 1 year after residency increased to 84% from 46%-48% in prior assessments. Most program directors (62%) did not perceive any difficulties with their graduates finding staff employment or trainees transferring to training programs in other disciplines owing to perceived workforce challenges.

**Conclusions:** Compared with 3 prior employment outcome assessments, this study observed a higher proportion of graduates with staff positions in Canada, fewer total graduates, fewer graduates seeking staff employment or in fellowship positions, and a trend for fewer graduates seeking employment or fellowships abroad. These findings support the view that the Canadian RO job market continues to improve. Although employment challenges for newly certified, Canadian-trained radiation oncologists still exist, national corrective measures to regulate resident intake in 2011 appear to have had a positive effect on the employment outcomes of recent Canadian RO graduates.

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## Introduction

Canadian Radiation Oncology (RO) graduates have faced employment difficulties after residency training and this issue has been well documented.<sup>1-3</sup> Furthermore, workforce planning parameters and the effect of the number of residency graduates on RO workforce supply and demand have been modelled, suggesting a transient staffing oversupply relative to radiation therapy demand.<sup>4</sup> In response, the Canadian Association of Radiation Oncology (CARO) Executive Board, CARO Human Resources Committee, and program directors across Canada collaborated to reduce residency intake positions from 25 to 21 per year and minimize transfers into the specialty starting in 2011.<sup>5</sup> These changes affected two RO training programs located in Alberta, one in Ontario, and one in Quebec.

In 2014, employment challenges for Canadian RO graduates persisted with delayed workforce entry and high rates of emigration to the United States.<sup>6</sup> Repeat assessments of employment outcomes of more recent RO graduate cohorts performed in 2016 and 2018 have shown modest improvements in the proportion of graduates securing staff positions and less graduate emigration for work outside Canada.<sup>7</sup> The now 10-year-old Canadian RO workforce-planning model projected a staffing deficit starting in 2020,<sup>4</sup> and reevaluation of the radiation oncologist job market in Canada will help inform model validation. Furthermore, the number of job advertisements in the career opportunities section of the CARO website has increased and a reassessment of graduates' employment outcomes was warranted. In this report, we provide an update of employment outcomes for Canadian RO graduates, performed in 2020, as part of ongoing monitoring efforts of the Canadian RO workforce by the CARO Human Resources Committee.

## Methods and Materials

A fill-in-the-blank spreadsheet was distributed to all thirteen Canadian RO training programs. Program directors submitted employment and location information, as of July 1, 2020, for 4 graduating cohorts (2017-2020) from their training programs. International visa trainees were excluded from this study because these medical graduates hold a visa permitting temporary postgraduate trainee status and are obligated to return to their home country after graduation. The survey was administered between July 1, 2020, and August 30, 2020, and a response rate of 100% was achieved. This study obtained institutional research ethics approval.

Program directors classified the employment status of their graduates as permanent staff, temporary locum, fellowship, or "other." If "other" was selected, an explanation was required for why this category was used. Employment location information was collected, including if graduates held a staff or locum position in the same province as their residency training and if they were located in Canada or abroad. Perceptions from program directors on whether their graduates had difficulties finding a staff position and how many trainees had transferred to another training program in a different discipline owing to perceived post-training employment difficulties were evaluated. Program directors were also asked to specify any limitations or assumptions in their responses, and to specify the number of 2016 or earlier RO graduates who were still seeking staff employment. To avoid disclosing geographic training information that might unintentionally lead to graduate identification, the regional analysis excluded 3 graduates with employment status categorized as "other."

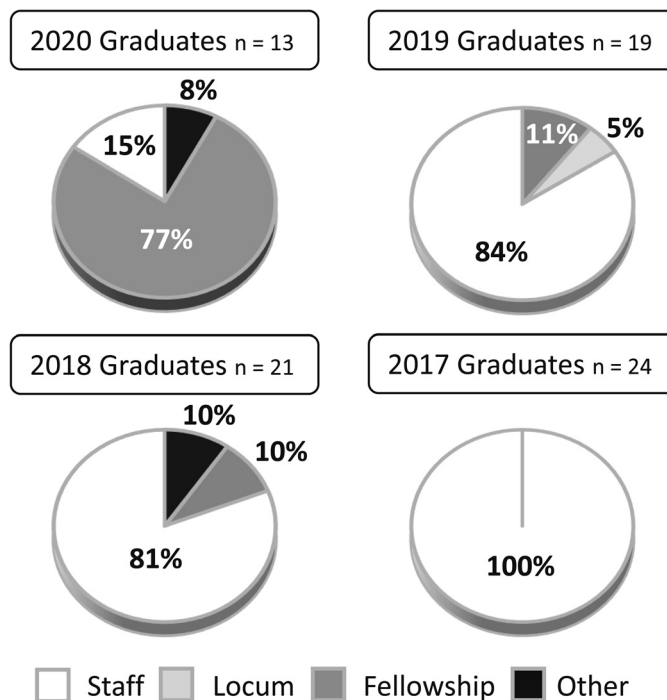
The study's employment outcomes data were compared with assessments performed in 2014, 2016, and 2018.<sup>6,7</sup> All surveys had 100% response rates and used a similar survey instrument and methodology to permit comparison. However, 3-year postgraduation employment outcome data was only available in this study and the 2014 assessment, so this data were excluded from comparative analysis. The Fisher exact test was used to compare graduates' employment status by graduation year, regional training location, and employment location, as well as by employment outcomes between surveys for equivalent graduating cohorts. A *P* value of  $\leq .05$  was considered statistically significant.

## Results

### Employment status

Figure 1 shows the employment status of graduates according to graduation year. The proportion employed in staff positions increased with time from graduation and those in fellowships decreased ( $P < .01$ ). Very few graduates (1%) had locum positions. There was one 2020 graduate in the "other" category; this graduate was affected by the COVID-19 pandemic and was still actively searching for employment at the time of this survey. There were also two 2018 graduates in the "other" category; both were working in Canada but not employed in RO as of July 1, 2020. In total, 16 of 77 graduates (21%) did not have permanent staff positions. An additional six 2016 or earlier graduates were identified without permanent staff positions.

As of July 2020 ( $p < 0.01$ )



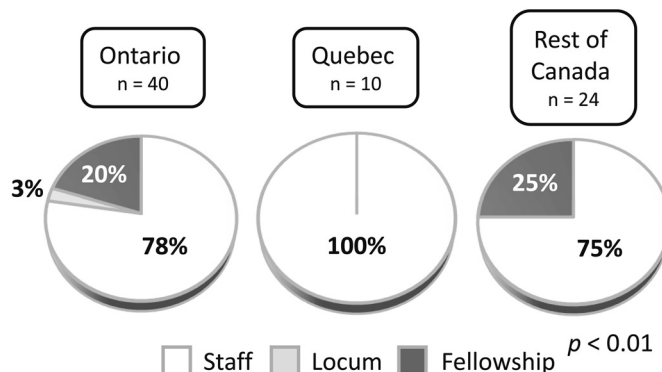
**Fig. 1** Employment status of 2017-2020 radiation oncology graduates by employment type. Graduation date was June 30 of each year. “Other” refers to graduates who were not employed in radiation oncology owing to various reasons. Proportions shown may not add up to 100% because of rounding.

Figure 2 shows the employment status of graduates according to regional training location. Graduates were divided into 3 groups: Ontario (containing 5 training programs), Quebec (3 programs), and elsewhere in Canada (2 programs in Alberta and one program each in British Columbia, Manitoba, and Nova Scotia). The Quebec training region had the highest proportion of their graduates in staff positions at 100%, followed by Ontario and the remaining training programs at 78% and 75%,

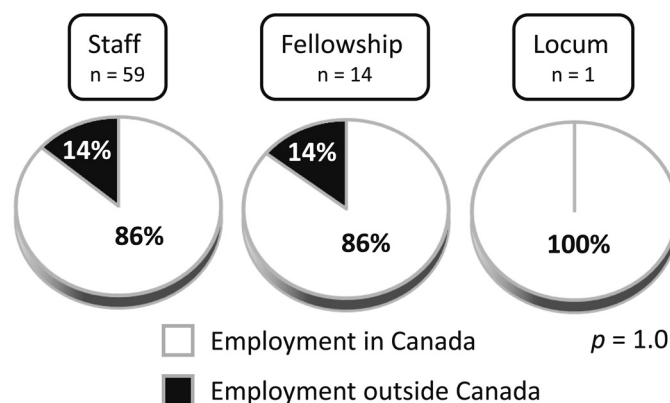
respectively ( $P = .01$ ). One graduate who trained in Ontario had a temporary staff locum position.

**Employment location**

The employment status of graduates by location within Canada versus abroad is shown in Fig 3. The proportions of 2017-2020 graduates with staff, fellowship, and locum



**Fig. 2** Employment status of 2017-2020 radiation oncology graduates by residency training region. “Rest of Canada” refers to training programs located in British Columbia, Alberta, Manitoba, and Nova Scotia. Three graduates classified as “other” were excluded from the regional analysis to avoid unintentional identification. Proportions shown may not add up to 100% because of rounding.



**Fig. 3** Employment status of 2017-2020 graduates by location within Canada versus abroad.

positions within Canada were 86%, 86%, and 100%, respectively ( $P = 1.0$ ). Of the 8 graduates with staff positions outside Canada, 7 (88%) were located in the United States.

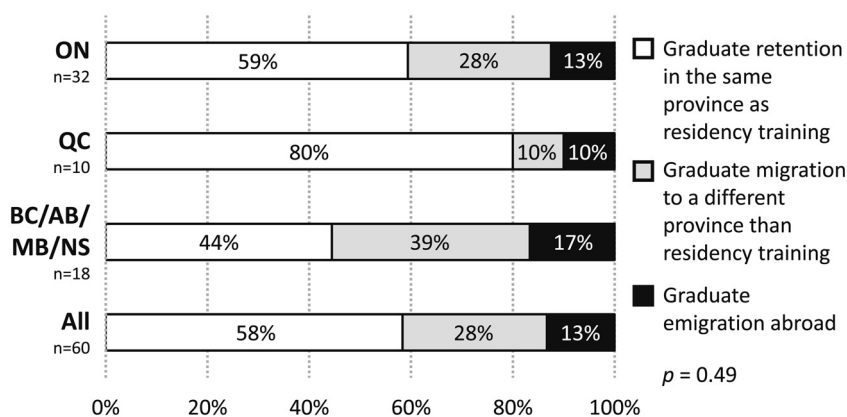
### Graduate retention or relocation by residency training program jurisdiction

Figure 4 shows the proportion of graduates with staff or locum positions who are employed in the same or different jurisdiction as their training program within Canada, along with the proportion of graduates who are found staff or locum positions abroad. For the purposes of this analysis, training programs outside of Ontario and Quebec were grouped together due to few graduates per program and often only one training program in a given jurisdiction. This may lead to spuriously large proportional differences if data was not pooled. Quebec had the highest proportion of retained graduates at 80% whereas Ontario retained 59% of its graduates and had

the highest absolute number of retained graduates at 19. In the aggregate group, graduate retention in the same province as residency training (British Columbia, Alberta, Manitoba, and Nova Scotia) was 42%. There was no statistical difference in the location of graduates with staff of locum positions by training program jurisdiction ( $P = .49$ ). Overall, 58% of graduates with staff or locum positions remained in the same jurisdiction as their training program and 28% relocated to a different Canadian jurisdiction.

### Perceptions of employment challenges

Eight out of 13 program directors (62%) reported that they were not aware of any difficulties in their graduates finding a staff RO position. Of the 5 that reported employment difficulties for the graduates, there were various reasons including graduates' family circumstances and desires for specific locations. Two program directors described graduates performing multiple fellowships but did not



**Fig. 4** Retention, migration, and emigration outcomes of 2017-2020 graduates with staff or locum positions by residency training program jurisdiction. Retention was defined as graduates located in the same Canadian province as their training program. Migration was defined as graduates located in a different Canadian province than their training program. Proportions shown may not add up to 100% because of rounding. Abbreviations: AB = Alberta; All = all training program jurisdictions; BC = British Columbia; MB = Manitoba; NS = Nova Scotia; ON = Ontario; QC = Quebec.

specify how recently this occurred. The effect of the COVID-19 pandemic was identified as an issue for one graduate who was experiencing challenges finding employment.

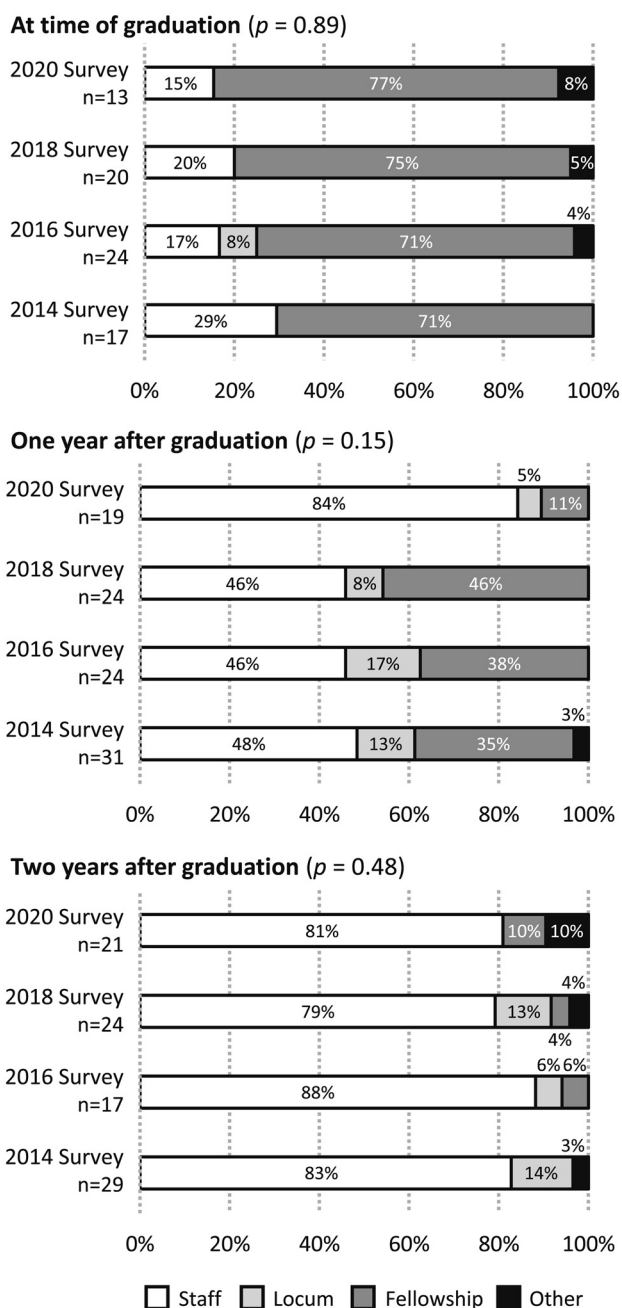
Similarly, 8 out of 13 program directors (62%) reported that they were not aware of their residents expressing a desire to leave the training program in the past 5 years. Five trainees were identified who left their training program before completion. Program directors attributed this decision to a perceived difficult job market in 3 of the 5 trainees (60%), while one was possibly related, and one was unrelated to job market conditions.

### Cross comparison to prior surveys

A comparison of the employment outcomes over time for equivalent graduate cohorts is shown in Fig 5. The proportion of graduates with staff and locum employment at graduation trended lower with time from 29% to 15% despite fewer graduates in the present study. Immediately postresidency, most graduates (71%-77%) performed fellowship training. The proportion of graduates in staff positions 1 year after residency was 84% in the present study compared with 46% to 48% in prior assessments, although this finding was not statistically significant ( $P = .15$ ). At 2 years postresidency, most graduates (79%-88%) had staff employment. Notably, fewer graduates at 1 year after graduation and no graduates at 2 years after graduation had temporary locum positions in the present study compared with prior assessments.

### Discussion

This latest iteration of the RO graduates' employment outcomes assessment shows some encouraging trends, but also some challenges. The 2020 survey found that 84% of graduates secured staff positions 1 year after residency training that was double the proportion observed in all past assessments, and locum employment in 1-year postresidency cohorts decreased from 8%-17% in prior surveys to 5%. Previous studies had shown that at least 2 years from graduation was required for  $\geq 80\%$  of RO graduates to obtain staff positions. Furthermore, the number of RO graduates within 2 years of graduation was 53, compared with 65 to 77 in prior studies. This demonstrates that the regulatory efforts implemented in 2011 to reduce RO trainee numbers has led to fewer graduates over time. Moreover, the estimated number of graduates seeking staff positions decreased by 31%, from 32 in the 2018 assessment<sup>7</sup> to 22 in our present study. Similarly, the number of graduates in fellowship positions decreased by 50% from 28 in the 2018 assessment<sup>7</sup> to 14 in the present study. Although all 2017 graduates had staff positions in the current study, program directors reported 6



**Fig. 5** Comparison of employment outcomes of Canadian radiation oncology graduates over time. Employment outcomes of equivalent cohorts at graduation and 1 and 2 years after graduation are shown. Data from prior employment outcome assessments performed in 2014, 2016, and 2018 were obtained from the published literature.<sup>6,7</sup> Proportions shown may not add up to 100% because of rounding.

graduates from the class of 2016 or earlier still seeking staff employment, possibly due to specific geographic preferences for these individuals or other issues with respect to employability. Taken in combination, the study's findings support the view that the supply of RO



graduates is reaching better balance with the availability of staff positions in Canada.

A slight increase in proportion of graduates in staff positions finding employment abroad was observed in the present study compared with the 2018 assessment (14% vs 6%, respectively).<sup>7</sup> However, graduate emigration for staff employment outside Canada remained much lower than previously reported in 2014 at 26% and in 2016 at 27%.<sup>6,7</sup> In addition, the proportion of graduates in fellowship positions abroad had decreased, from 30% in 2014, 22% in 2016, and 19% in 2018,<sup>6,7</sup> to 14% in the present survey. It is unclear whether the first wave of the COVID-19 pandemic in Canada in March 2020 had a meaningful effect on employment and postresidency training opportunities abroad. Our findings did not confirm any pandemic-related effect on employment abroad. However, this would be difficult to measure with our present cohort, considering the potential lead time between contract negotiations and hiring, and variable jurisdictional policies during the pandemic with respect to business-related travel. Fellowship employment offers may be more variable, with shorter lead times until a start date, which could be more susceptible to effect from the evolving pandemic situation.

Graduates' employment location outcomes within Canada relative to the Canadian jurisdiction of their residency training programs was reported for the first time. Notably, Quebec had the highest retention of their graduates who found staff positions in the province after residency training. Quebec is a Canadian province with a Francophone-predominant population where French is the preferred spoken language. Canada's two Francophone RO training programs are in Quebec, and there are several cancer centers located in French-speaking regions in the province. Therefore, French language of study and graduates' preference to live and work in French-speaking communities may contribute to Quebec's higher retention of their graduates.

Most graduates found staff or locum positions in the same province as their training program. Graduate migration to attain staff employment in a different Canadian jurisdiction than that of their residency training was expected because there are 10 geographically distributed radiation jurisdictions but only 6 of these jurisdictions have RO training programs. The 4 Canadian provinces without RO training programs (Saskatchewan, New Brunswick, Newfoundland and Labrador, and Prince Edward Island) also have employment opportunities; thus, relocation of some RO graduates is required to address national staffing needs. Contributing factors to graduate retention or migration include employment opportunities after graduation in preferred locations, and personal or family considerations. Furthermore, some graduates may have relocated for residency training and prefer to find staff employment closer to home. However, graduates' geographic preferences for employment opportunities and overall satisfaction levels with their

employment decisions were not assessed. Future studies may inform an understanding of graduates' ranking criteria when considering opportunities for staff employment or motivations to pursue fellowship training.

Program directors reported that 7 of the 8 graduates with staff positions outside Canada were in the United States. Canada shares a land border with the United States and Canadian RO trainees often attend RO scientific meetings held in the United States with opportunities for networking. For graduates who pursue fellowship training in the United States, staff recruitment at American academic centers is relatively common.<sup>8</sup> Our findings are also consistent with a pan-Canadian survey of RO residents performed in the 2017-2018 academic year that reported 88% planned to work in Canada,<sup>9</sup> indicating that some graduates intended to work abroad after the completion of their training. In addition, efforts to reduce RO trainee numbers may have contributed to a higher proportion of graduates finding staff positions within Canada. Nonetheless, it will be important to continue to monitor emigration trends and better understand these graduates' motivations to explore employment opportunities abroad given potential implications on both domestic and international workforce planning.

The Canadian RO workforce continues to expand the number of practicing radiation oncologists to address the rising number of cancer cases diagnosed annually in Canada. National staffing levels increased by 32 radiation oncologists from 547 in 2017 to 579 in 2020,<sup>10</sup> demonstrating that workforce entry exceeded departures. The number of radiation oncologists aged 60 years or older in 2020 was 105 (18% of the RO workforce), and the number aged 65 or older was 51 (9% of the RO workforce).<sup>10</sup> Both age cohorts have doubled in number in the past ten years with an increasing trend in the proportion of the workforce, indicating some retention of radiation oncologists past the traditional retirement age of 65 years old. However, the proportion of the workforce aged 70 years or older has remained stable between 3% to 4% for the past ten years, suggesting that more retirements are expected in the future that will create job opportunities for new graduates.

CARO has taken a stewardship role to continually monitor workforce issues within the RO community, including employment challenges of graduates. The 10-year needs-based workforce projection developed in 2010, using 25 graduates per year and 285 new patient consultations per provider as baseline parameters, suggested a slow return to a perceived balanced state by 2019 followed by an emergent staff shortage in subsequent years.<sup>4</sup> Using projected cancer incidence data to calculate the number of full-time equivalent (FTE) radiation oncologists and assuming no change in average workload by FTE, the model predicted a workforce expansion of 115 FTE positions from 2009 to 2020. By comparison, the physician workforce database from the Canadian Institute for Health Information reported an increase of 144 radiation oncologists from 425 in 2009 to

579 in 2020 (excluding hiring for replacement positions due to retirements or departures).<sup>10</sup> Accordingly, the average new patient consultation workload decreased from 285 to between 257 and 267 per provider calculated in 2014 to 2018,<sup>11,12</sup> in agreement with the model. This also suggests that prior perceptions of radiation oncologist oversupply issues in Canada are influenced by the capacity of the workforce to endure changes in clinical workload per provider to accommodate recruitment of more Canadian RO graduates.

Our results suggest that employment challenges for graduates persist, but this is likely due to a shift in the perceived balance point between supply and demand over time. It is also important to note that reduced trainee intake in 2011 required 5 years before fewer graduates were produced starting in 2016. The employment situation in Canada for RO graduates has improved over time consistent with this study's findings, longitudinal comparisons to prior employment outcome studies, and with the modeling exercise that forecast better alignment between supply and demand trajectories. Nevertheless, in the context of the model, our findings also indicate that delayed graduate entry into the workforce was still observed in 2020 and an undersupply had not occurred. An updated need-based workforce projection is required using revised parameters to determine the estimated timeframe to achieve supply and demand balance.

Strengths of our study include a 100% survey response rate capturing data for all 2017-2020 RO graduates and inclusion of comparison data from past surveys, also with 100% response rates, to permit longitudinal assessment. Although it was generally felt that program directors have excellent knowledge of their graduates, the study did not confirm employment outcomes with the graduates themselves and therefore recall errors, reporting bias, or misclassification of graduate status by their program directors may have occurred. A potential latency period may also exist between any update in a graduate's employment status and when their program director became aware of the status change. Furthermore, we acknowledge that assessment of a trainee's desire to leave their training program, the length of time from graduation to obtaining a staff position, the effect of the COVID-19 pandemic, and employment outcome satisfaction levels may be more informative by surveying trainees or graduates directly. The study also did not assess hiring practices at Canadian cancer centers to fully evaluate the radiation oncologist job market, which may include recruitment of international medical graduates who did not train in Canadian residency programs.

## Conclusion

Despite graduates' persistent challenges with delayed staff employment after residency training, the 2020

assessment of Canadian RO graduates' employment outcomes provides more optimism that job market conditions in Canada have improved compared with prior assessments with fewer graduates without permanent staff positions, a higher proportion of graduates remaining in Canada, and less graduate emigration abroad to secure staff or fellowship employment. It will be important to continue longitudinal monitoring of employment outcomes for Canadian RO graduates to inform workforce planning efforts, particularly given the unknown effect of the COVID-19 pandemic on workforce supply and demand balance.

## Acknowledgments

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