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Long-term impact on contouring skills achieved by online learning. An ESTRO-FALCON-IAEA study

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Purpose/Objective(s): The weakest point in conformal radiotherapy (RT) is heterogeneity in contouring of target volumes (TV) and organs at risk (OAR). Interactive online learning has shown immediate improvement of homogeneity in contouring but the long-term effect is unknown. The aim of this multicenter study was to evaluate the short- and long-term impact of online learning on homogeneity in contouring for 3D RT and to evaluate the feasibility of blended learning in centers from low- and middle-income countries (LMIC) that have recently transitioned from 2D to 3D RT.

Materials/Methods: 60 Radiation Oncologists (RO) from 14 centers in 13 countries were invited. Participants delineated TV and OAR on a treatment planning CT in the FALCON-EduCase online system. The teaching program involved three tumor sites: head and neck (HN), lung and cervix. Four delineations per tumor site were planned: one before the teaching period, two during the teaching period (at 1 week and 1 month) and finally a fourth without teaching 6 months later. As soon as one teaching program had finished another started for another site. In total 12 delineations for 3 cases were contoured over a year. Participants were blind to the DICE index and qualitative measures, which would be used as endpoints.

Results: Compliance to the program was >50%. The majority (88%) used 3D RT routinely. For HN part, 57 RO delineated, significant increases were seen in homogeneity of contouring for TV and OAR. DICE increased immediately during the teaching sessions and remained high even 6 months after teaching ($p<0.0001$ for the elective CTV and right parotid for example). That was also reflected qualitatively with an increase from 4% to 94% RO delineating the levels suggested by the guidelines after 6 months. Similar improvements were recorded for OAR. For the cervical cancer part, 46 RO delineated, significant increases were seen in homogeneity of contouring for TV and OAR except for sigmoid colon (table 1). CTV T and N DICE increased immediately after teaching, remained high after 1 month, and showed a slight decreasing trend at 6 months. Similar results were recorded for OAR, such as bladder and rectum (table 1). Qualitative improvement was observed with an increase from 12% to 79% and 59% of the RO who correctly included parametria in the CTV T from first delineation to the delineation at 1 month and at 6 months, respectively. The trend to partly lose learning benefit was also seen with this qualitative analysis.

Abstract TU_4_2929; Table 1 Mean DICE for TV and OAR of cervical cancer case

	before lecture (n=30)	1 week (n=35)	1 month (n=19)	6 months (n=27)
CTV T	0.58	0.77	0.79	0.71
CTV N	0.51	0.67	0.71	0.61
Rectum	0.65	0.72	0.74	0.68
Bladder	0.64	0.80	0.80	0.74
Sigmoid	0.19	0.20	0.23	0.21

Conclusion: Online teaching in LMIC seems feasible with an acceptable compliance to the learning program. The learning obtained on a short-term basis was shown to be sustainable 1 and 6 months after teaching but the benefit might be decreasing over time suggesting the need for continuous medical education in the field of contouring.

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Analysis of "gap year" prevalence, productivity, and funding among radiation oncology residency applicants

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Purpose/Objective(s): Medical students often take one or more years off during medical school (a "gap year") to strengthen their applications for competitive specialties such as radiation oncology. This has a significant opportunity cost (delaying residency) and financial costs (for living expenses, if unfunded gap year). We characterized the prevalence, nature, and funding of gap years taken by radiation oncology applicants, and the association of gap years with research productivity.

Materials/Methods: All ERAS applications (n=176) received by one residency program were reviewed and data was collected on gender, age, medical school rank (per U.S. News), and other graduate degree(s) obtained. Foreign graduates and those switching from other residency programs (n=9) were excluded. MD/PhD students were analyzed separately. A gap year was defined as any additional year during medical school not part of the standard four-year or MD/PhD program. We classified gap years by primary activity (clinical or lab research, masters' degree, illness, or family/personal). If specified, funding source was noted. We collected the number of publications and inferred gap year productivity from timing of publications, and their authors.

Results: A total of 167 applicants were analyzed (72% male and 28% female). Their average age was 28.1 (IQR 26.1-30.1), with average of 5.5 publications. Of the non M.D./Ph.D. applicants, 24% took a gap year. Other characteristics are listed in the table. The most common gap year activity was research (67.7%, n=21), 12.9% (n=4) obtained an additional degree, 9.7% (n=3) had illness and 9.7% (n=3) had family/personal reasons. Fifteen of 31 (48.4%) applicants listed a source of funding (5 by medical school, 8 by grants, and 2 other). For the remaining 16, no source of gap year funding was apparent.

Conclusion: Nearly a quarter of non-Ph.D. applicants take a gap year, usually for research, and this gap year results in a significant increase in publications. Gap year applicants are comparable in age but are more likely from higher-ranked medical schools. Nearly half of gap-year applicants may lack a source of funding to support their gap year, raising the question of whether the expectations to take a gap year favors applicants

Abstract TU_4_2930; Table : Comparison of applicants (95% Confidence Interval in parenthesis)

	No Gap Year	Gap Year	M.D./Ph.D.
Applicants	101	31	35
Average Age	27.5 (26.9-28.1)	26.3 (25.5-27.1)* *Adjusted for gap year	30.2 (29.7-30.9)
Average Medical School Ranking	39.3 (33.0-45.6)	14.8 (8.3-21.3)	36.7 (26.4-47.0)
Total Publications	4.1(3.1-5.1)	Pre-gap: 2.1 (1.4-2.8) Post-gap 6.4 (4.8-7.8)	8.8 (7.2-10.5)

with existing financial resources. We are designing a survey to query applicants directly about their motivations and resources when deciding whether to take a gap year. This data may inform a broader discussion about how residency programs value research experience and the implicit burden this places on potential applicants.

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Developing Young Leaders in Global Radiation Oncology: Results of a Pilot Program for a Global Oncology Scholarship for Radiation Oncology Trainees

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Purpose/Objective(s): Surveys conducted by the International Communications Workgroup of the Canadian Association of Radiation Oncology (CIC) revealed that half of radiation oncology residents were interested in Global Health electives, yet only one resident had completed such an elective between 2007 and 2013. Studies on Global Health electives frequently identify a lack of financial resources and difficult-to-find information on placements as two important barriers to address. In order to promote personal and professional development, provide trainees with a unique perspective on global cancer control, and foster international collaboration, our objective was to increase the number of radiation oncology trainees completing electives in Global Health.

Materials/Methods: The CIC created a Radiation Oncology Global Health Scholarship, available to residents (PGY 2-5) and fellows. It provides $2500 in travel and lodging expenses for oncology-related Global Health electives, requires applicants to reflect on CanMEDS competencies acquired on elective, supports pre-departure training, and encourages familiarity with the ethics of Global Health. Recipients are encouraged to present their experience at the Canadian Association of Radiation Oncology annual meeting and must complete an exit evaluation. The scholarship is supported by an industry- supported unrestricted educational grant. Potential applicants are provided with resources to find opportunities, including a network of previous participants, and access to a worldwide elective database through GlobalRT.org, an initiative of the Young Leaders Program of the Global Task Force on Radiotherapy for Cancer Control.

Results: Three scholarships were awarded from 2014-2017. A PGY-3 resident traveled on elective to Accra, Ghana, collaborating on cervical cancer research and helping establish a distance-learning program with The Princess Margaret Cancer Centre. A PGY-3 traveled to Zambia for a clinical elective focused on gynecological malignancies, and a PGY-2 is conducting research on access to radiotherapy in the territory of Nunavut. Preliminary data from exit evaluations suggest electives have contributed to personal and professional development, provided unique perspectives on global cancer control, developed CanMEDS competencies, and fostered international collaboration.

Conclusion: Between 2014 and 2017, the CIC Radiation Oncology Global Health Scholarship has increased the number of radiation oncology trainees completing Global Health electives in Canada and abroad. In exit evaluations, electives have met defined goals for the Scholarship.

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Results from the 2017 Survey of Radiation Oncology Residents in Canada

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Purpose/Objective(s): Previous Pan-Canadian surveys of Radiation Oncology (RO) residents performed in 2003 and 2009 identified job availability as a major concern, and characterized a perceived decline in employment opportunities for radiation oncologists in Canada. The Canadian post-MD education registry indicates that Canadian RO trainee levels rose from 130 in 2003 to reach a peak of 209 in 2009 before declining to approximately 130 in 2017. Recognizing that RO has entered another period of transition, we investigated resident perspectives among a more contemporary cohort of RO trainees in Canada.

Materials/Methods: Surveys were distributed electronically to residents at each RO training program in Canada. Surveys consisted of 116 multiple choice and open-ended questions assessing center demographics, motivations for choosing RO, clinical experiences, didactic learning, research experiences, professional relationships, resident satisfaction, and career aspirations. Questions were constructed based on the 2003 and 2009 Canadian survey, and on previous Association of Residents in Radiation Oncology reports from the United States. Anonymized, aggregate responses from completed surveys were abstracted, and descriptive statistics were calculated.

Results: Out of 128 eligible residents, 84 completed the survey (65.6% response rate) with representative sampling from each training year (17.1% - 22.4% each year). Demographics reveal 52.6% were male, 68.4% were Canadian medical school graduates (CMGs), 22.4% held either a master's degree or doctorate, and 2.6% held additional medical certification. Nearly all respondents (97.9%) were satisfied with their specialty and training program. The most frequently perceived weakness in training was feeling unprepared to be competitive in the job market (42.6%), and 78.7% plan to pursue a post-residency fellowship. Most CMGs (86.1%) plan to practice in Canada, but only 12.8% of respondents believe there is strong demand for RO in Canada. Few respondents believe they can obtain staff positions treating their preferred tumor sites (38.3%), and at their preferred geographic location (27.7%). The job market was perceived by 40.4% to be less competitive than it was 5 years ago, and 59.6% predict it will be less competitive 5 years from now.

Conclusion: Canadian RO residents feel adequately trained as competent physicians, and a majority of trainees pursue post-residency fellowships, similar to prior surveys. Although current perceptions of the Canadian job market remain guarded, RO residents are highly satisfied with their choice of specialty and training program, and are more optimistic about their future job prospects. Our survey update provides continued insights into RO residency training in Canada, and identifies opportunities for