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## EDUCATION AND TRAINING

# Opportunities to Improve Radiation Oncology Medical Education in the Post-Pandemic Era



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As waves of the COVID-19 pandemic rise and recede throughout the country, challenges relevant to the practice of radiation oncology and the education of its trainees are likely to persist for many years to come. In this article on behalf of the Association of Residents in Radiation Oncology (ARRO) Executive Committee, we highlight several topics relevant to the impact of the COVID-19 pandemic on graduate medical education that are of primary concern to radiation oncology residents, including disruption of the job market, changes in didactic and clinical training, and recruitment of medical students to the specialty. We also present potential strategies that, if implemented with stakeholder collaboration, may enable radiation oncology graduate medical education to emerge in an even better state than before the first patient was diagnosed with COVID-19.

## Job Market

Although concerns regarding the health of the radiation oncology job market are not new, the potential impact of the

economic uncertainty triggered by the pandemic has additional implications for both short- and long-term workforce considerations. Budgetary deficits experienced by health care systems due to the pause in “nonessential” care during the first months of the COVID-19 pandemic have resulted in organizations instituting hiring or onboarding freezes, voiding contracts, or adjusting compensation packages in an effort to limit institutional losses.<sup>1</sup>

To determine the impact of the pandemic regarding employment offers for this year’s graduating residents, the ARRO Executive Committee administered a survey to 190 residents from the class of 2020 between May 14 and June 7, 2020. Of the 190 residents invited to participate, 94% (n = 179) completed the survey. Eighty-four percent (n = 151) of surveyed respondents reported they had signed a contract for employment after graduation, while 14% (n = 25) had a written (n = 19) or verbal (n = 6) offer without a signed contract. Only 2 residents (1%) reported having no offer at the time of survey completion. Of the 179 respondents, 26 residents (15%) reported that the COVID-19 pandemic had impacted their job search and/or job offer in some capacity. Of these,

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4 reported withdrawal or cancellation of the offer or contract, 7 reported an indefinite delay in start date, 4 reported a delay in receiving a contract, 5 reported a decrease in their compensation package, and 6 stated that job offers or interviews they had anticipated were no longer forthcoming. Although 89% of the surveyed respondents with a signed contract ( $n = 135$  of 151) reported their contracts were being honored, the full impact of persisting economic uncertainty on this upcoming year's job search for the class of 2021 is worrisome.

Senior residents typically begin the job search process in the early summer the year preceding graduation. Strategies that have historically been relied upon during the initial stages of the search, such as proactive engagement of alumni networks and personal contacts or direct outreach to private practices or department chairs, may be less effective due to the uncertainty of budgetary recovery. For many, informal interviews at the American Society for Radiation Oncology Annual Meeting unofficially kickstarts the interview season. With the transition of many conferences to a virtual format, it will be important that meeting programmers prioritize the development of meaningful alternative networking opportunities. This year, in particular, it will be crucial for department faculty to meaningfully advocate on behalf of their senior trainees with practices or departments that may be a good mutual fit, particularly in geographic regions of interest. Importantly, it is the hope of the ARRO Executive Committee that the administrators of departments and practices will commit to offering full staff or physician level employment for newly board-eligible radiation oncologists, as opposed to fellowship positions that may not offer meaningful additional training.

## Didactic and Clinical Training

Virtual resident didactics have been favorably received overall, in large part due to increased flexibility regarding attendance and participation. With institutional travel restrictions, the development of the Virtual Visiting Professor Network, spearheaded by the University of Colorado, represents a primary example of a high-quality shared educational resource accessible to radiation oncologists across the country (Brian Kavanagh, personal communication, June 11, 2020). Such innovative programs pave an initial pathway toward improved didactic education for all radiation oncology trainees by facilitating access to experts across a variety of disease sites and subjects. Such an effort will be well-received, as demonstrated by a recent ARRO survey that found only 51% and 40% of surveyed residents considered their home institution's didactic course in physics and radiobiology, respectively, to be an "important" resource when preparing for the American Board of Radiology initial certification basic science examinations.<sup>2</sup> Continued development of high-quality shared educational resources via virtual platforms may help to address the long-appreciated heterogeneity in the quality of didactic instruction at programs across the country.

The emergence of COVID-19 obligated health care organizations to rapidly transition the majority of in-person nonprocedural visits to a telemedicine platform. Although many radiation oncology departments hope to return to full clinical capacity, telemedicine is likely to remain an integral part of the future practice of radiation oncology particularly for long-term or survivorship follow-up. Incorporation of residents into the telemedicine workflow for patient encounters with meaningful educational value will be important with the development of new clinical competencies unique to telemedicine, such as "webside manner."<sup>3</sup>

## Medical Student Education

Exposure to radiation oncology has historically been limited for the majority of medical students in both the preclinical and clinical settings. Away rotations have therefore played an important role for medical students interested in radiation oncology to confirm specialty choice, obtain letters of recommendation, and assess mutual fit with a program of interest.<sup>4</sup> In-person external rotations are likely to be limited for the foreseeable future; therefore, we believe this may represent an important opportunity to invest in the concept of the "virtual medical student rotation." With strong collaboration among medical educators, departments, and stakeholder organizations, development of a well-designed, productive, and meaningful educational experience may effectively increase exposure of radiation oncology to a greater number of medical students, including those not pursuing the specialty as a career. The recently introduced Radiation Oncology Virtual Education Rotation program hosts biweekly, virtual, multi-institutional, case-based review sessions that are accessible and relevant to medical students of all stages of training.<sup>5,6</sup> This kind of innovative rotation could address a "gap" regarding a meaningful introduction of radiation oncology as an integral component of oncologic management, which has long been appreciated within the medical school curriculum. Although the emergence of virtual learning paradigms has been accelerated as a result of the COVID-19 pandemic, innovative online educational models are a relatively unexplored medium by which increased exposure to radiation oncology for a variety of audiences may be facilitated in the coming years.

## Residency Interviews

Consistent with the recommendation by the American Association of Medical Colleges, leadership of the Association of Directors of Radiation Oncology Programs recently announced a wholly virtual interview season for the 2021 National Residency Match Program.<sup>7</sup> It will be important for program directors and coordinators to

consider creative strategies by which a program's unique environment, research opportunities, and clinical experience can be effectively conveyed to ensure a meaningful interview experience. Although virtual interviews cannot replace the intimacy of an in-person visit, this transition will likely be a welcomed change for many applicants given the not insignificant financial burden associated with the extensive travel that has traditionally been required for a successful interview season.

An unforeseen consequence of this logistical change, however, may result from the minimization of scheduling conflicts and cost concerns that had previously obligated applicants to decline interview offers. This may exacerbate an already appreciated issue regarding an ineffective distribution of interviews across applicants.<sup>8</sup> It will benefit both applicants and programs if strategies can be implemented that help ensure that interview slots are ultimately filled primarily by those applicants with a meaningful interest in a particular program. Per the 2018 National Residency Match Program "Charting Outcomes in the Match," 98% of US senior applicants from allopathic medical schools who contiguously ranked 11 or more programs successfully matched at a radiation oncology program.<sup>9</sup> As a result, an interview spot filled by an applicant unlikely to rank the program among his or her "top 10" may be more likely to result in a successful "match" if extended to a candidate with a meaningful interest in that program.

Strategies that may help optimize interview distribution across applicants could include program collaboration for designation of an agreed-upon date for the coordinated release of interview invitations, development of an interview calendar that minimizes scheduling conflicts, and broad support of a culture in which applicants are encouraged to decline or cancel interviews with programs unlikely to be among the final top 10 contiguous ranks. In future years, a system could be conceived in which an initial brief "virtual interview" is held online for a larger number of applicants, with a reduced number of applicants invited for an on-site interview based on mutual interest. We hope that improved coordination between programs will persist so that the financial burden associated with residency interviews can be reduced while improving satisfaction with the outcome of the Match for all participants.

## Conclusion

Radiation oncology will continue to face challenges that directly affect trainees long after the full impact of COVID-19 is clearly realized and recovery is underway. Already, we have witnessed the positive impact of innovation and collaboration on clinic operations and trainee education. The ARRO Executive Committee believes that the challenges our specialty is currently facing due to the pandemic can be seen as opportunities to achieve meaningful progress in radiation oncology graduate medical education, with the ultimate goal of raising the profile and impact of radiation oncology in oncologic care.

## References

1. Flaherty C. Frozen searches: Scores of institutions announce faculty hiring freezes in response to the coronavirus. Available at: <https://www.insidehighered.com/news/2020/04/01/scores-colleges-announce-faculty-hiring-freezes-response-coronavirus>. Accessed June 15, 2020.
2. Campbell SR, Jeans EB, Albert A, et al. Radiation oncology initial certification qualification examinations: The resident experience in 2019 [e-pub ahead of print]. *Pract Radiat Oncol*. <https://doi.org/10.1016/j.prro.2020.04.010>. Accessed June 29, 2020.
3. Holstead RG, Robinson AG. Discussing serious news remotely: Navigating difficult conversations during a pandemic [e-pub ahead of print]. *JCO Oncol Pract*. <https://doi.org/10.1200/OP.20.00269>. Accessed June 29, 2020.
4. Sidiqi BU, Gillespie EF, Lapen K, et al. Patterns and perceptions of "away" rotations among radiation oncology residency applicants [e-pub ahead of print]. *Int J Radiat Oncol Biol Phys*. <https://doi.org/10.1016/j.ijrobp.2020.04.024>. Accessed June 29, 2020.
5. Pollom E, Sandhu N, Frank J, et al. Continuing medical student education during the coronavirus disease 2019 (COVID-19) pandemic: Development of a virtual radiation oncology clerkship [e-pub ahead of print]. *Adv Radiat Oncol*. <https://doi.org/10.1016/j.adro.2020.05.006>. Accessed June 29, 2020.
6. Virtual radiation oncology for medical students. Available at: <https://www.radoncvirtual.com/rover>. Accessed June 14, 2020.
7. American Society for Radiation Oncology. Associate for Directors Radiation Oncology Program (ADROP) statement on COVID-19 and the impact on medical students interested in radiation oncology. Available at: [https://www.astro.org/ASTRO/media/ASTRO/AffiliatePages/ADROP/PDFs/ADROP\\_COVID\\_MedStudents\\_Statement.pdf](https://www.astro.org/ASTRO/media/ASTRO/AffiliatePages/ADROP/PDFs/ADROP_COVID_MedStudents_Statement.pdf). Accessed June 10, 2020.
8. Lee AH, Young P, Liao R, et al. I dream of Gini: Quantifying inequality in otolaryngology residency interviews. *Laryngoscope* 2019;129:627-633.
9. National Resident Matching Program. Charting outcomes in the match: U.S. allopathic seniors. Available at: [https://mk0nrmp3oyqui6wqfm.kinstacdn.com/wp-content/uploads/2019/10/Charting-Outcomes-in-the-Match-2018\\_Seniors-1.pdf](https://mk0nrmp3oyqui6wqfm.kinstacdn.com/wp-content/uploads/2019/10/Charting-Outcomes-in-the-Match-2018_Seniors-1.pdf). Accessed June 14, 2020.