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A Paradigm Shift in Radiation Oncology Training

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A Paradigm Shift in Radiation Oncology Training

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Abstract

The COVID-19 pandemic is intertwined with the movement for racial justice in the United States, and has highlighted and risks aggravating educational and workforce disparities within radiation oncology. We discuss wide-ranging changes within radiation oncology training that are essential to developing and maintaining diversity, including utilization of competency-based educational models that allow for streamlining of training and examinations; responsiveness to the needs of residents and medical students of different gender, racial/ethnic, and socioeconomic groups; and technological integration to increase educational efficiency and decrease barriers.

Thomas Kuhn, the famed philosopher who wrote *The Structure of Scientific Revolutions*, was a physics student during the atrocities of World War II and the Holocaust. His term “paradigm shift” has slipped into our vernacular. Informed by the unprecedented societal and technological changes that rollicked his training, Kuhn argued that the accumulation of scientific understanding is not achieved in an orderly, additive process. Rather, there are revolutionary phases – extraordinary times of uncertainty and turmoil – that are marked not only by upheaval but also by the rapid development of new models, new *ways* of thinking that may expose practices that are no longer useful.¹

Like Kuhn’s generation, trainees in radiation oncology (RO) are facing unrelenting societal and technological change. Thus far, the COVID-19 pandemic has caused an unimaginable death toll within the United States, one that has been inextricable from racial injustice in this country. It has caused the disproportionate deaths of Black, Latinx, and Indigenous people and coincides with a nationwide reckoning on police brutality and racism as a public health emergency.² The recession it has created will create economic hardships for millions of Americans, the effects of which will be disproportionately felt in Black, Latinx, and Indigenous communities.²

Are we in a revolutionary phase? Before the pandemic, modern medicine would be unrecognizable to practitioners a generation ago. Millennials have gone through education with infinite information at their fingertips; it now takes less than a minute to access nearly every paper or guideline from a smartphone. Artificial intelligence technologies are being integrated into research and practice. Social media has amplified the ability to build communities and organize activism. Medical schools and graduate medical education (GME) are undergoing

unprecedented innovation, with increased emphasis on social determinants of health and competency-based educational models (CBEMs) that allow individualization of training.³

Current Inequalities and Inefficiencies

Women outnumber men in medical schools, but in RO, only 33% of trainees and 26% of practicing physicians are women.⁴ In a study of women RO residents, 52% felt gender-specific bias existed in their programs.⁵ We recognize that gender is not binary, and the dynamics of gender discrimination are even more complex. Meanwhile, people from racial and ethnic groups underrepresented in medicine (UIM) compose 16% of medical school graduates but only 7% of RO trainees and 7% of practicing radiation oncologists.⁴ UIM trainees face considerable obstacles throughout medical education and bear the emotional burden of being cultural mediators at their institutions.⁶

Layered upon these unequal experiences during training is the COVID-19 pandemic. While many states have reopened, the future of public health safety remains unclear. In addition to the nationwide attention it has brought to racial injustices and socioeconomic disparities, the pandemic has caused an abrupt shift towards telemedicine. Telemedicine poses unique challenges for the apprenticeship model, making informal mentorship and off-the-cuff teaching more difficult. Male and white medical trainees have been shown to have more assertiveness and less reticence than women and Black, East Asian, and Indigenous trainees.⁷ The distancing effects of telemedicine may thus compound educational gaps, as some trainees are more assertive in repeatedly requesting formal teaching. This impact may be particularly seen in RO, where many women and/or UIM residents find themselves in gender, race, and/or ethnicity-discordant attending-resident dyads. The diminishing yield of education, possibly disproportionately

experienced by UIM and/or women, is thus a cause for alarm that prompts not only consideration of how to supplement education, but also an awareness that perhaps efficiency and quality should be emphasized over length.

At the same time, residents and fellows have faced stress during reassignment to frontline care of patients with SARS-CoV-2 at expense of clinical, research, and study time. UIM trainees faced the additional emotional toll of seeing their racial/ethnic identities disproportionately reflected in the population hospitalized and dying during this pandemic. Concerns about exams and RO careers compounded the stress as the American Board of Radiology (ABR) rescheduled the three written RO certifying exams to December 2020. The oral exam was initially rescheduled to October 2020, and then moved to September 2021.

Potential Solutions

This time of turmoil, however, may mean we are in the midst of a *Kuhnian* paradigm shift that will transform RO training. The need for a suitable response has been thrown into sharp relief by the appalling disparities in the pandemic's effects as well as educational concerns about transitions to telemedicine and scheduling of certifying examinations. The answer will be to restructure RO training in order to develop and maintain diversity at every level, via the following mechanisms:

1. CBEM: Decreasing training length lessens its economic burdens, making the path easier for those without access to generational wealth. In medical education more generally, there is a movement towards CBEM rather than strict time or case requirements.³ Emanuel and Fuchs have argued that reducing internal medicine residencies by 30% would not sacrifice physician competency.⁸ In light of the pandemic, RO program directors have already started to emphasize

competency rather than sheer case numbers. Implementation and standardization of high-quality and concrete competency assessment across programs will both allow for decreased bias in evaluation and increased personalization and effectiveness of training, allowing for its streamlining.

2. Exam Streamlining: Streamlining of exams may also help decrease burdens on trainees. RO takes more certifying exams than any other medical field. Having multiple exams has economic costs and creates more obstacles for trainees to plan family and career decisions around. These exams have been shown to have a significant negative impact on research, mental health, clinical development, and family life.⁹ During the COVID-19 pandemic, there were additional adverse effects on trainees as they were rescheduled. In light of these issues, the Society of Chairs of Academic RO Programs (SCAROP) has called for consolidation into one written exam.

There was also significant stress precipitated by rescheduling of the oral exams, which has financial and personal implications and may pose safety risks in the post-COVID-19 era to examiners and examinees. Fortunately, virtual exams have now been instituted with extended lengths of exam completion times. This policy change will reduce the burden on trainees, and demonstrates responsiveness to the needs of women, and all caregivers, within RO. The subjectivity of the oral clinical exams, allowing for susceptibility to unconscious bias, is also of concern, however. They also bear little resemblance to real-world clinical decision-making processes, providing additional impetus to re-evaluate their utility.

3. Didactics and Rotations: How will training efficiency improve? RO Education Collaborative Study Group (ROECSG) has already developed and continues to develop interventions, such as use of simulation. Formal dedicated teaching time must be set aside for all trainees, not merely those who ask the most persistently. It is also essential that all trainees have independent access

to the virtual platforms used by attending physicians for patient visits and RO workflow.

Trainees should be encouraged to take the lead in seeing patients with attending observation and feedback. Screen-sharing through a number of platforms can allow for real-time contour and plan review with immediate feedback, and contouring edits can also be recorded through many platforms, such as Zoom. Increased utilization of virtual conferencing platforms provides the benefit of sharing lectures, conferences, and chart rounds across sites and institutions, while research collaborations have never been more accessible. Residents can also come together to advocate for resources that support Black, Latinx, Indigenous, and other racial/ethnic group patients, broader insurance acceptance, and improved curriculums in health systems/policy that integrate data on local/state disparities in access to cancer care. Virtual teaching, mentorship, and social media interactions across institutions build a sense of community, which may be lacking for UIM and/or women in RO and is particularly necessary in this time of isolation.

Let us take this moment to also consider medical students. We have quietly accepted the economic burdens on students of away rotations, research years, and in-person interviews. While there are difficulties with the virtual determination of program “fit” for applicants, this is also an opportunity to evaluate the default process. To increase diversity in racial/ethnic, socioeconomic, and gender composition in RO, Nead et al. describe the need to not only concretely define and apply evaluation criteria for medical students, but also directly reach out to promising candidates from underrepresented backgrounds and de-emphasize costly away rotations.¹⁰ The transition to the “virtual” has thrown such an opportunity into the lap of RO. It has been heartening to see the resultant, rapid creation of virtual medical student rotations. For example, the Harvard Radiation Oncology Intensive Shadowing Experience (RISE) provided UIM students from outside institutions, many without associated radiation oncology residencies, the opportunity to

participate in a remote immersive RO experience and connect with resident and attending mentors. Curriculums aimed at outreach to UIM trainees that transcend institutional walls should continue to be in place following the pandemic. Residents can serve as mentors to students who have limited or no access to a RO residency program within their home institution, fostering greater collaboration and mentorship. Virtual residency interviews are also a legacy of COVID-19 that will decrease the economic burden and promote applicant safety.

The direction that RO takes now, in the midst of the COVID-19 pandemic and reckoning on racial injustice, will determine the field's future. Kuhn's generation was later called the "Greatest Generation" by historians. This generation came out of a time of incredible turmoil with the ability to adapt, but also with a collective purpose of working towards social good. The current generation of trainees, who have adapted remarkably to being on the frontlines of caring for patients with SARS-CoV-2, share a collective purpose as well – improving care for our cancer patients by tearing down structures that perpetuate inequality and exclusion in our profession. COVID-19 will thus have the legacy of leading to a paradigm shift in medical training. This restructuring should intentionally foster diversity, inclusion, and equity. In radiation oncology, let us lead the way.

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