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Increasing Medical Student Engagement through Virtual Rotations in Radiation Oncology

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Abstract:	

Increasing Medical Student Engagement through Virtual Rotations in Radiation Oncology

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With the advent of COVID-19, the landscape of medical student education has completely transformed, with students no longer permitted on-site for the vast majority of clinical rotations. Elective rotations to further explore specialties at outside institutions are essentially cancelled indefinitely. As hospitals adapted to legal restrictions and public health recommendations, many specialties have learned how to convert in-person patient care to telehealth, and medical educators have quickly and effectively transitioned resident education to virtual platforms[1]. Radiation oncology, a technology-forward specialty, is particularly well-positioned to both create and innovate virtual medical student education[2].

At Oregon Health & Science University, a virtual two-week radiation oncology elective for medical students was created that integrated traditional didactic education with hands-on learning and telehealth patient exposure. The elective comprised pre-recorded 30-minute lectures on the basics of radiation oncology, palliative radiation , radiation-based management of oncologic emergencies, as well as eight sub-site disease-specific lectures using a mix of both new and established content[3,4]. In addition, representatives from dosimetry, radiation therapy, and medical physics developed video-based lectures for these students.

The experience of creating and implementing this type of elective has helped provide novel feedback on educational elements that may augment future rotations. As well as, similar to telemedicine in the clinic, the development of robust virtual education platforms may establish a unique niche within medical education in the future.

Hands-on Learning

Hands-on exposure is one of the most critical aspects of learning in the medical school curriculum[5]. These live experiences have been proven to be effective in prior simulation-based education studies with medical students[6,7]. To provide students in the current environment a hands-on exposure to radiation oncology, students were given access to an institutional contouring platform along with seven to nine clinical vignettes and accompanying CT simulation images, as well as instructions to contour both specific target volumes and organs-at-risk. Students also spend time with dosimetry through lectures and with residents to understand treatment planning aspects. Each day, faculty, residents, and medical students virtually met daily for contour and case review via chart rounds. Additionally, four times a week, residents gave 30-minute case presentations on a particular topic. Students were paired with a resident each week to discuss cases as well as integrate into telehealth visits. Medical students observed virtual and telephone telehealth visits and were "patched in" to both types of visits with permission of the patient. Discussions of these telehealth visits was also done separately with students prior and/or after to discuss nuances of the case with the student. Lastly, students gave final 15-minute presentations to the department on a topic of their choice.

Didactics

There is a relative lack of didactic radiation oncology exposure for medical students, with less than 1/3rd of medical students reporting any didactic training geared towards their level of training[8]. In this 2-week virtual elective, pre-recorded 30-minute lectures that were designed to focus on the basics of a specific cancer or disease site and are targeted for medical students can

continue to be used for future medical clerkship rotations. These mini lectures could be utilized just as the ASTRO spring refresher education sessions are used for residents and attendings, as overviews and resources on specific topics. These videotaped lectures are accessible to medical students at different institutions as an open learning repository[9]. At the end of the course and after watching these didactic lectures, students were asked to complete a 48-question multiple choice exam that included general questions on radiation oncology as well as disease-specific questions which were reviewed by content experts for content and appropriateness.

Student Feedback and Experience

Results from 12 initial participants revealed a significant improvement in overall knowledge about radiation oncology from baseline to post-elective ($p<0.001$) from April 27, 2020 to June 5, 2020 (Figure 1) performed from a paired t-test. General feedback on the course from learners was positive, with participants reporting excitement to contour, and enjoyment of direct feedback and faculty relationships as well as exposure to a field that they would not have typically had the opportunity to experience. Some participants expressed a desire to spend more time with telehealth consult and follow-up patients as well as learning more about treatment planning.

Future of Medical Student Clerkships in Radiation Oncology

There are several strengths to this virtual medical student clerkship approach. First, it provided a formalized set of didactics often missing in medical student training[4]. These pre-recorded lectures required no additional investment of time from teaching faculty and can be employed to

augment future medical student rotations, both in-person and virtual. These lectures have been added to a repository on www.radoncvirtual.com and are able to be accessed from any institution, and perhaps internationally[9]. Medical students may watch a pre-recorded lecture prior to being paired with a disease specific attending and utilize the appropriate contouring case in conjunction with the clinical exposure.

Another strength of the virtual approach is the time and financial convenience. Visiting or away clerkships in radiation oncology have become increasingly common and necessary for successful match outcomes prior to COVID-19. Over 1/3rd of medical students match into an institution in which they visited as an away rotation. Students spend an average of 2-3 rotations in radiation oncology outside of their home institution, often in another city and/or state[10,11]. This utilization of away rotations as prolonged "sub internships" decreased the opportunity for many students with personal or financial constraints to consider radiation oncology as a specialty. For example, for a medical student to find lodging, travel, and food during a single rotation has been estimated to cost nearly $1000 [12]. A virtual rotation decreases those barriers and allows for students to "visit" a diverse set of programs. A virtual rotation may also enhance access and exposure to medical students whose medical schools do not have academic radiation oncology programs.

Finally, a strength of this virtual elective is that it lowers barriers for medical student exposure to our small field. As residency applications for radiation oncology decrease and medical student interest appears to be waning[13], this begs the question of inadequate exposure to radiation oncology for medical students in this field[14]. Additional innovations in education include the recently launched Radiation Oncology Virtual Education Rotation (ROVER) a series of virtual

educational sessions open to medical students around the world[9]. These virtual sessions include case-based discussions on disease-specific topics with faculty from institutions across the country and like virtual electives, can also help fill the gap left by suspended away rotations this summer.

A key aspect of radiation oncology electives is not only educating future radiation oncologists but future physicians entering various specialties that refer to or work with radiation oncology. Virtual medical student radiation oncology electives, while not ideal, augment and allow for many aspects of the in-person rotation to be improved and offer new areas to be explored post COVID-19 and pandemic.

We also acknowledge limitations to this approach. Our field's experience with virtual electives is still limited and warrant further follow-up with more students. Virtual electives may limit in-person patient and attending/resident interactions. The inability to sit next to a cancer patient and their families is one of the greatest limitation as students who may consider radiation oncology must have a passion for working with cancer patients. This virtual approach, while developed out of necessity and lacking the benefit of extensive piloting, attempts to overcome the current limitations in direct patient exposure due to COVID-19, while offering additional educational benefits that might not have been innovated without the crisis.

COVID-19 necessitated many changes in our clinical and operational environment, but it also provided an opportunity for ingenuity in medical student education. We are now working to

expand this virtual elective to multiple institutions across the country in order to continue to improve educational resources and future rotations for medical students.

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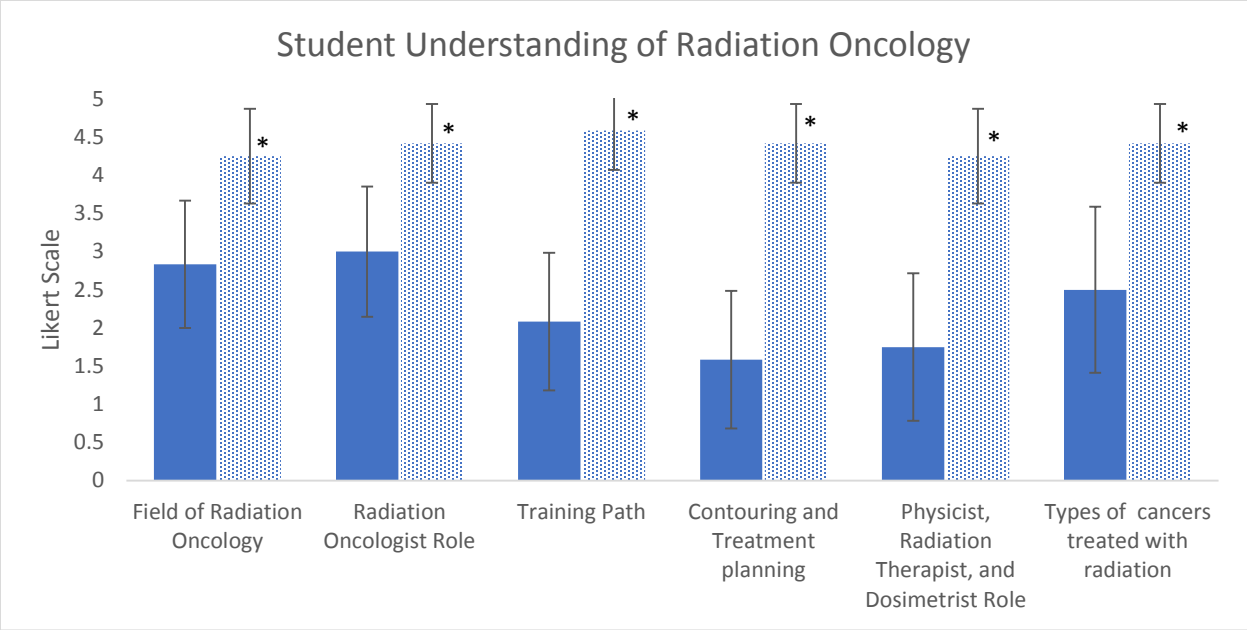

Figure 1: Medical Student understanding of radiation oncology and components including understanding the field of radiation oncology, radiation oncologist role; radiation oncology training path; contouring and treatment planning; understanding the role of a physicist, radiation therapist, and dosimetrist; types of cancers treated by radiation oncologists (n=12) by Likert scale over 3 elective courses from April 27, 2020-June 5, 2020 all p values <0.001.