



FOURTH ANNUAL SPRING SYMPOSIUM

**“ASSESSMENT IN RADIATION
ONCOLOGY EDUCATION: BEYOND
BASIC COMPETENCE”**

MAY 14, 2021

CHICAGO, ILLINOIS

**2021 SYMPOSIUM CHAIR:
JILLIAN GUNTHER MD, PHD, MD ANDERSON CANCER CENTER**



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2021 ROECSG SPRING SYMPOSIUM SCHEDULE

All times Chicago/CDT (UTC/GMT -5 hours)

8:30 - 10:00 CDT: Asynchronous Oral Presentations, Coffee, and Zoom Networking

10:00 - 10:10 CDT: Welcome Remarks and Introductions - Jillian Gunther, MD, PhD

10:10 - 10:15 CDT: Overview of ROECSG symposium abstract review process – Simon Duke, MBBS, FRCR

10:15 - 10:20 CDT: The Radiation Oncology Education Collaborative Study Group 2020 Spring Symposium: Is Virtual the New Reality? – Kaitlyn Lapen, MD

10:20 - 12:20 CDT: Session #1 “Expanding the Field: Avenues to Optimize Training”

Moderators: Christian Fernandez, MD, and David Kok, MBBS, MEd, FRANZCR

12:20 - 12:25 CDT: Overview of expanded ROECSG organizational structure – Daniel Golden, MD, MHPE

12:25 - 1:00 CDT: Lunch, networking, and breakout rooms to discuss ROECSG working groups

1:00 - 1:05 CDT: Report from ARRO – Austin Sim, MD, JD

1:05 - 1:10 CDT: Report from ADROP – Emma Fields, MD

1:10 - 2:20 CDT: Session #2 “Framing the Field: Radiation Oncology for New Learners”

Moderators: Elizabeth Jeans, MD, MEd, and Brandi Page, MD

2:20 - 2:30 CDT: Break

2:30 - 3:00 CDT: Keynote Address:

“Measuring Competence through Systems of Assessments: Best Practices and Guidelines for Clinical Assessments”

[Yoon Soo Park, PhD](#)

Associate Professor, Harvard Medical School

Director of Health Professions Education Research, Massachusetts General Hospital

3:00 - 3:10 CDT: Keynote Discussion/Break

3:10 - 4:40 CDT: Session #3 “Redefining the Field: Seeing Radiation Oncology As More Than The Clinic”

Moderators: Paris Ann Ingledew, MD, FRCPC, MHPE, and Anna Laucis, MD, MPhil

4:40 - 4:50 CDT: Closing remarks - Jillian Gunther, MD, PhD

4:50 - 6:00 CDT: Post-Symposium Virtual Networking

Keynote Address

“Measuring Competence through Systems of Assessments: Best Practices and Guidelines for Clinical Assessments”

[Yoon Soo Park, PhD](#)



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Yoon Soo Park, PhD, is Associate Professor at Harvard Medical School and the inaugural Director of Health Professions Education Research at the Massachusetts General Hospital.

Park’s experiences include both academic and industry settings, with research interests and experiences across multiple disciplines in psychometrics, biostatistics, educational psychology, and medicine. Park’s research agendas have focused on assessment methods in health professions education, advancing the preparation of learners in clinical reasoning and measurement of competencies through validity studies. He has also contributed to psychometric methods, focusing on statistical modeling of educational and psychological processes using latent class models and item response theory models. His psychometric research has contributed to methods that reduce statistical error for complex data structures. He has also actively engaged in interdisciplinary research in the social sciences, collaborating with diverse researchers and practitioners across disciplines.

Park is Chair of the Research in Medical Education (RIME) committee of the Association of American Medical Colleges (AAMC). He is also Vice President and Member of Council for the American Educational Research Association (AERA), serving Division I: Education in the Professions.

The Radiation Oncology Education Collaborative Study Group 2020 Spring Symposium: Is Virtual the New Reality?

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Purpose: Because of the COVID-19 pandemic, the Radiation Oncology Education Collaborative Study Group (ROECSG) hosted its annual international symposium using a virtual format in May 2020. This report details the experience of hosting a virtual meeting and presents attendee feedback on the platform.

Approach/Methods: The ROECSG symposium was hosted virtually on May 15, 2020. A postsymposium survey was distributed electronically to assess attendee demographics, participation, and experience. Attendee preference and experience were queried using 3-point and 5-point Likert-type scales, respectively. Symplur LLC was used to generate analytics for the conference hashtag (#ROECSG).

Results/Outcomes: The survey was distributed to all 286 registrants, with a response rate of 67% (191 responses). Seventeen nonattendee responses were omitted from this analysis, for a total of 174 included respondents. Eighty-two attendees (47%) were present for the entire symposium. A preference for a virtual symposium was expressed by 78 respondents (45%), whereas 44 (25%) had no preference and 52 (30%) preferred an in-person meeting. A total of 150 respondents (86%) rated the symposium as "extremely" well organized. Respondents who had not attended a prior in-person ROECSG symposium were more likely to prefer the virtual format ($P = .03$). Seventy-eight respondents (45%) reported a preference for the virtual platform for reviewing scholarly work, and 103 (59%) reported a preference for an in-person platform for networking. On the day of the symposium, #ROECSG had 408 tweets and 432,504 impressions.

Discussion/Significance: The 2020 ROECSG symposium was well received and can serve as a framework for future virtual meetings. Although the virtual setting may facilitate sharing research, networking aspects are more limited. Effort is needed to develop hybrid virtual and in-person meetings that meet the needs of participants in both settings. Social media is a significant avenue for dissemination and discussion of information and may be valuable in the virtual setting.

Keywords: Education, Virtual platform, Research scholarship

ORAL SESSION 1:

EXPANDING THE FIELD: AVENUES TO OPTIMIZE TRAINING

Moderators: Christian Fernandez and David Kok



Exploring Current Gaps in Radiation Oncology Resident Teaching: A Thematic Analysis of Free-Text Responses from the Radiation Oncology Residents-As-Teachers Targeted Needs Assessment

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Purpose: Achieving competency as educators is increasingly recognized as a critical part of residents' training in graduate medical education across many specialties. Radiation oncology residents often play a vital role in medical student, peer, and interprofessional education. We conducted a survey to define radiation oncology resident needs and goals for developing skills in teaching.

Methods: An anonymous, internet-based survey was developed and distributed to resident physicians at U.S. Radiation Oncology programs identified using the Association of Residents in Radiation Oncology directory. The survey included respondent demographics, experience with teaching, and interest regarding a formal "Residents-As-Teachers" curriculum and contained open-ended questions regarding desired teaching opportunities and aspects of teaching to improve. Responses were analyzed using inductive thematic analysis to inform future curriculum development.

Results: There were 170 completed survey responses (27.4% response rate). The respondents were 46 (27.1%) PGY2s, 37 (21.8%) PGY3s, 43 (25.3%) PGY4s, and 42 (24.7%) PGY5s. Median reported residency program size was 10 residents (range, 3-28). Residents were asked what teaching opportunities they would like to have during residency, with 76 (44.7%) total free-text responses. The majority of the responses involved a desire for increased opportunities involving teaching different types of populations, including medical students, co-residents within radiation oncology, and members of departments outside of radiation oncology. Many residents also expressed interest in teaching about specific topics/content and in various settings. 68 (40.0%) residents provided responses when asked what aspects of teaching they would like to improve. Common areas for improvement included preparing teaching material, presentation skills, developing confidence with teaching, audience management and engagement, and feedback about teaching.

Discussion: Previous research on residents-as-teachers curricula has demonstrated that such initiatives can significantly improve residents' teaching skills (1). Most of these curricula have been developed for residency programs in traditional "core clinical clerkships," such as internal medicine, pediatrics, and general surgery (2). Currently, formal Residents-As-Teachers training is not routinely employed in radiation oncology residency programs, even though residents serve a primary role in teaching medical students (3). Our survey analysis suggests that radiation oncology residents are interested in more opportunities to teach a variety of populations across a multitude of topics and settings. However, many identified a lack of confidence in teaching and expressed interest in improvement across many aspects of teaching.

Significance: The gaps in teaching experience and skills identified from this national survey of radiation oncology residents will guide the development of a radiation oncology-specific Residents-As-Teachers curriculum.

Keywords: Teach, Needs, Residents

References:

1. Post RE, Quattlebaum RG, Benich JJI. Residents-as-Teachers Curricula: A Critical Review. *Academic Medicine*. 2009;84(3):374-380.
2. Morrison EH, Friedland JA, Boker J, Rucker L, Hollingshead J, Murata P. Residents-as-teachers Training in U.S. Residency Programs and Offices of Graduate Medical Education. *Academic Medicine*. 2001;76(10):S1.
3. Braunstein SE, Gunther JR, Spektor A, et al. Role of the Resident as a Teacher (RAT) in the Medical Student (MS) Clerkship: A Report From the Radiation Oncology Education Collaborative Study Group. *International Journal of Radiation Oncology, Biology, Physics*. 2015;93(3):E379.

Improving Radiation Oncology (RO) Resident Communication Skills by Leveraging the DiSC Assessment Tool

Presenter: Ammoren Dohm
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Purpose: Difficulty adapting to new communication styles on interprofessional teams can result in dysfunction that can negatively affect patient care and team morale. Communication skill development is recognized as important in medicine but remains poorly implemented in postgraduate medical training (1). As part of our RO resident leadership curriculum, we piloted a session on enhancing team communication to bridge this gap.

Approach/Methods: We used a validated personal assessment tool (DiSC)(2), to help radiation oncology residents gain insight into the personality and communication styles of the residents and the clinical and physics faculty within the department. A modified DiSC assessment survey was administered to the residents and faculty. This assessment categorized participants into four primary +/- secondary personality types: Dominance (direct, strong-willed, and forceful), Influence (sociable, talkative, and lively), Steadiness (gentle, accommodating, and soft-hearted), and Conscientiousness (private, analytical, and logical). The results were used as a platform for a case-based, one-hour leadership training session with two guest faculty facilitators.

Results/Outcomes: A total of 10 residents and 12 faculty members completed the assessment. The DiSC assessment tool has been shown to have excellent assessment statement reliability with a median coefficient alpha of 0.87 and test-retest reliability of 0.86 (3). Distributions of primary or secondary preferences among residents were as follows: 15% Dominance (n=4), 31% influence (n=4), 31% Steadiness (n=4), and 23% Conscientiousness (n=3) Distributions among the faculty participants included: 14% Dominance (n=2), 29% Influence (n=4), 21% Steadiness (n=3), and 36% Conscientiousness (n=5). During the training session, facilitators first guided analysis of each resident's preferred style and then guided leveraging this knowledge to adapt or "flex" this style to improve team communication and relationship management.

Discussion: Our residents preferred Influence and Steadiness styles, and faculty Conscientiousness and Influence. The DiSC assessment tool and leadership training raised resident self-awareness and provided a common language for improving teamwork, communication, and patient care within our department by teaching residents to flex their styles. Next year, we plan to incorporate DiSC in quality improvement projects aimed at allowing residents to practice flexing their communication styles on interprofessional teams. **Significance:** As team leaders, radiation oncologists need strong communication skills but receive little training in residency. Use of the DiSC assessment tool is a potential strategy for improving emotional awareness, workplace relationships, and patient care.

Keywords: Communication, Leadership, DiSC

References:

1. Hoffe S, Quinn J, Frakes J, Dilling T, Saeed N, Harrison LB. (2017). Emotional intelligence-centric leadership training for radiation oncologists. *Applied Radiation Oncology*, December 2017, 8-12.
2. Marston, W. M. (1928). *Emotions of normal people*. London: K. Paul, Trench, Trubner & Co. Ltd.
3. Scullard, M., & Baum, D. (2015). *Everything DiSC Manual (1st ed.)*. Wiley.

Developing a New Virtual Professional Development Education Model for Radiation Oncology and Medical Physics Residents

Presenter: Anna Laucis

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Purpose: To develop a new virtual professional development education model to address topics not traditionally covered in residency programs with the ultimate aim of improving trainee wellness.

Approach/Methods: We received financial support via an internal grant from the wellness office at our institution for this program. The initiative was co-developed by a senior clinical radiation oncology resident and a medical physics faculty member. We developed a novel virtual professional development curriculum focused on topics traditionally underrepresented in trainee curricula, including contract negotiation, financial planning, grant writing, and conflict resolution / conversational intelligence. For each session we developed a series of pre- and post-assessment questions to evaluate the impact of our curriculum on trainee confidence and knowledge in each of these topics. Additionally, with a focus on wellness, we evaluated baseline and post-session participant well-being through use of the validated Well-Being Index. [1]

Results/Outcomes: Data collection is ongoing and at the time of this abstract submission we have successfully implemented two out of four planned quarterly sessions. The first two professional development seminars focused on employment contract negotiation and financial planning, respectively. Participants completed pre- and post-assessment surveys and preliminary results will be available for presentation at the time of the 2021 ROECSG meeting. We invited outside speakers who were content experts in each of the session topics, and provided relevant books to each participant as supplementary material.

Discussion: We anticipate that these seminars will result in a favorable improvement in confidence and knowledge levels of participants in each of the content areas and that these types of professional development efforts will continue to be supported by our department and institution. We also hope to see a reduction in burnout levels of trainees as a result of this curriculum; however, we acknowledge that burnout is a multifactorial process and that we may not see a direct measurable impact on trainee well-being scores from implementation of our curriculum alone.

Significance: The overall significance of this work is to demonstrate a commitment to trainee well-being and professional development at our institution. At the faculty level there are multiple professional development series, but these opportunities may be less available or accessible to trainees. Given the relationship between stressors such as finances and job market concerns with trainee burnout, [2] we hope to improve the well-being of trainees through this program and continue to offer similar opportunities for personal and professional development in the future.

Keywords: Wellness, Professional Development, Educational Curriculum

References:

1. Well-Being Index. Accessible at: <https://www.mywellbeingindex.org/>. Accessed 10 Jan 2021.
2. Royce TJ, Davenport KT, Dahle JM. A Burnout Reduction and Wellness Strategy: Personal Financial Health for the Medical Trainee and Early Career Radiation Oncologist. *Practical Radiation Oncology* 2019; 9(4):231-238.

Protocol for a Prospective Trial to Assess Novel Contouring Education Interventions for Radiation Oncology Residents Using an Interactive Online Platform

Presenter: Michael Sherer
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Purpose: Multiple studies have demonstrated that variations in contouring by radiation oncologists are common and associated with worse clinical outcomes including increased toxicity and decreased survival. (1) Some of this variation may be due to lack of a standardized contouring curriculum during residency training. Success of the currently utilized apprenticeship model depends on the expertise and skill of the attending physician, the number and variety of cases encountered during the rotation, and the time available to provide feedback. A recent survey of US residents demonstrates the inconsistent results of this system, with 43% of respondents stating they reviewed contours with an attending half the time or less. (2)

Methods: This project will develop novel educational contouring interventions targeted at resident physicians utilizing a platform that allows for interactive web-based contouring and provides personalized feedback. First, we will develop educational modules designed for use over the course of a three-month rotation in head and neck, gastrointestinal or gynecologic cancer. The second intervention will incorporate a contouring task into end-of-rotation examinations. After both interventions are tested in a single institution pilot and appropriate refinements are made, their efficacy will be tested in a 2x2 factorial multi-institutional randomized trial with a target enrollment of 40 participants.

Outcomes: The primary endpoint of contouring accuracy will be assessed with a conformation number, which quantifies the difference in resident contours compared to expert (gold standard) contours. As we expect improvement in all participants over the course of the study (due to completion of a dedicated rotation in the particular disease site), we will utilize a difference-in-difference analysis approach with a two-tailed student's t-test to compare the degree of improvement between study arms. Secondary endpoints will include qualitative and quantitative feedback from resident and faculty participants using the Technology Assessment Model.

Discussion: This project will be the first rigorous investigation of educational strategies for improving contouring skill within the existing residency training structure. We expect to demonstrate that our interventions result in a significant improvement in contouring skill when compared to the current curriculum alone.

Significance: If successful, the web-based modules and examinations could readily be disseminated to additional training programs nationwide and expanded to include additional disease sites. As such, this project offers the potential to decrease contouring variability once residents enter independent practice and improve outcomes for cancer patients receiving radiotherapy.

Keywords: Contouring, education, trial

References:

1. Ohri N, Shen X, Dicker AP, et al. Radiotherapy protocol deviations and clinical outcomes: A meta-analysis of cooperative group clinical trials. *J Natl Cancer Inst* 2013;105:387-93.
2. Wu SY, Sath C, Schuster JM, et al. Targeted needs assessment of treatment planning education for united states radiation oncology residents. *Int J Radiat Oncol Biol Phys* 2020;106:677-682.

Clinical Physics Boot camp for Radiation Oncology Residents: A Pilot Study

Presenter: Einsley-Marie Janowski

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Purpose: The physics curriculum is a source of anxiety both for medical students considering radiation oncology (RO) as a possible career and for current residents facing the physics boards(1-3). To improve the orientation process for residents and medical students, we created a physics boot camp utilizing clinically relevant patient vignettes to teach about physics fundamentals.

Methods: The boot camp was a week-long program of 1.5-2 hours daily, with each day consisting of a didactic session and a hands-on lab. Topics covered included physics fundamentals, electron treatments, photon treatments, brachytherapy, and urgent, clinical setups. Students completed pre and post-surveys, where each rated their knowledge and comfort level with RO workflow from simulation to patient treatments. In addition, students completed daily knowledge based assessments testing the information presented prior to and after these daily sessions. A total of 10 participants were included, eight residents and two students. Participant scores were paired for analysis.

Results: All participants reported significantly increased confidence in the physics aspects of the RO workflow (mean 3.24 versus 4.18, $p=0.0023$). However, when comparing those self-assessment scores from participants with more than a year of physics background to those earlier in their training, only the early training participants' scores remained significant (advanced students: mean 4.0 versus 4.38, $p=0.129$, early students: mean 2.66 versus 4.02, $p=0.0025$). All participants had improved scores on their knowledge based assessments (mean 74% versus 89%, $p=0.0001$). When broken down by learning level, both the early and advanced students improved, early students: mean 68% versus 87%, $p=0.0005$; advanced students: mean 84% versus 93%, $p=0.0447$.

Discussion: A formal physics boot camp orientation improves both resident comfort level and knowledge base with clinical physics, with participants early in their training deriving the greatest benefit.

Significance: Our boot camp provides a comprehensive introduction into physics, which is currently recommended by ASTRO as a part of physics core curriculum (4). By building on clinical scenarios often encountered in RO clinics to emphasize the clinical relevance of physics in the safety and precision of patient radiation treatments, we hope that we will both alleviate learner anxiety and provide early learner connections in the physics fundamentals of radiation oncology treatments.

Keywords: boot camp, physics, introductory curriculum

References:

1. Wu TC, McCloskey SA, Wallner PE, Steinberg ML, Raldow AC. The Declining Residency Applicant Pool: A multi-institutional medical student survey to identify precipitating factors. *Adv Radiat Oncol* 2020.
2. Kahn J, Goodman CR, Albert A, et al. Top Concerns of Radiation Oncology Trainees in 2019: Job Market, Board Examinations, and Residency Expansion. *Int J Radiat Oncol Biol Phys* 2020;106:19-25.
3. Campbell SR, Jeans EB, Albert A, Agarwal A, Tye K, Goodman CR. Radiation Oncology Initial Certification Qualification Examinations: The Resident Experience in 2019. *Practical radiation oncology* 2021;11:5-12.
4. Burmeister J, Chen Z, Chetty IJ, et al. The American Society for Radiation Oncology's 2015 Core Physics Curriculum for Radiation Oncology Residents. *Int J Radiat Oncol Biol Phys* 2016;95:1298-303.

Near Peer Teaching in Radiation Oncology: Proof of Principle Study for Treatment Planning Skills

Presenter: Gerard Walls
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Purpose: Radiotherapy techniques are expanding in range and complexity, therefore protecting learning environments where residents nurture treatment planning skills is critical. The evidence base for 'near peer' teaching (NPT), where professionals at a similar career stage assist in each other's learning, is growing across hospital-based disciplines. Although this teaching format occurs according to anecdotal accounts, it has not been reported on or optimised in radiation oncology. The feasibility of a resident-led teaching program for developing treatment planning skills was investigated herein through a quality improvement (QI) methodological approach.

Approach/Methods: Following consultation with attendings (n=10) and all residents (n=17) at the two cancer centres in the region, a regular NPT session focused on planning skills was initiated at the largest centre, with video-linking to the second centre. Tutorials were case-based and pitched at the level of qualifying examinations. Plan-Do-Study-Act (PDSA) cycles were designed based on primary and secondary improvement drivers derived by group consensus among residents, with tutorials adopted accordingly. Participation, content and satisfaction were monitored for 20 months.

Results/Outcomes: Mean resident participation was 67% (range 33-100). Six PDSA cycles reformed the tutorial format, leading to pedagogical benefits including interdisciplinary contributions and enhanced interactivity, as well as logistical improvements. Tutorials occurred on 85% prescribed occasions (n=45) during the subsequent 18 months' follow-up, with 25 distinct tumour sites featured. A medical dosimetrist participated in 60% sessions. An attending was available for 20 sessions (44%) and radiation therapist input was utilized for 5 sessions (11%). Improvement in 'on the job' learning from the sessions increased from 83% to 100%. The proportion of respondents indicating that senior residents and junior residents benefitted from the tutorials increased from 46% to 100%, and 38% to 50% respectively. The value of attending input was rated as crucial by all residents at all time-points. The frequency of interruptions for non-emergency clinical scenarios was stable throughout the study. Tutorials were paused for the first 2 months of the SARS-CoV-2 pandemic only. No costs were incurred in the organisation or maintenance of the program.

Discussion: A sustainable, high quality and cost-effective regional, trainee-led teaching program on treatment planning was feasible and cost-effective in this study. Important elements to consider for integrating NPT in radiation oncology include interdisciplinary collaboration, attending engagement and QI methodology.

Significance: Near peer teaching is a readily adoptable learning resource for residents with additional benefits including interdisciplinary collegiality, teaching and leadership experience.

Keywords: Near-peer teaching, interdisciplinary, quality improvement

Remote Contouring and Virtual Review During the COVID-19 Pandemic (RECOVR-COVID19): Results of a Quality Improvement Initiative for Virtual Resident Training in Radiation Oncology

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Purpose: The urgent need to minimize in-person interactions during the ongoing COVID-19 pandemic has limited trainee access to clinical learning opportunities. With ongoing utilization of virtual platforms for resident education, efforts to maximize their value are essential. Herein we describe a resident-led quality improvement initiative to optimise remote contouring and virtual contour review.

Methods: From April to June 2020, radiation oncology residents at our institution were assigned modified duties. We implemented a program to source and assign cases to residents for remote contouring, and to promote and optimize virtual contour review. Senior residents used a mentorship model to match cases with junior residents. Microsoft Teams software was used for virtual review with the supervising radiation oncologist, including direct observation with immediate feedback. Resident-perceived educational value was prospectively collected and analyzed. Case logs completed after contour review integrated our institution's competency-based medical education (CBME) assessment platform.

Results: All 9 radiation oncology residents at our institution (PGY1-5) participated in the program, and 97 cases were contoured during the evaluation period. Introduction of the RECOVR program coincided with a significant increase in mean cases contoured per week, from 5.5 to 17.3 ($p=0.015$), and an increased proportion of cases receiving virtual review, from 14.8% to 58.6% ($p<0.001$). Residents agreed that the overall educational value of virtual review was comparable to in-person review (4.4 ± 0.1 vs. 4.5 ± 0.3 , $p=0.993$; mean \pm standard error; 5-point Likert scale), and significantly better than no review (3.1 ± 0.4 , $p=0.003$). The value of immediate feedback during virtual review was highly rated at 4.6 ± 0.1 , similar to that of in-person review (4.5 ± 0.2 , $p=0.803$), and significantly higher than feedback received post hoc (e.g., email, phone; 3.6 ± 0.2 , $p<0.001$).

Discussion: The implementation of a remote process for contour review led to significant increases in contouring and contour review and was rated as highly as in-person interactions. Challenges of program implementation included issues with software deployment requiring technical support. A strength of this program was that this was a trainee-led initiative. However, the workflow was dependent on added responsibilities for senior residents.

Significance: This initiative led to transformational change in the contour review process at our institution even after apprenticeship rotations were reinstated. It provided residents with a novel means of achieving their educational milestones and ultimately attaining the core RO competencies during the pandemic and beyond. Future work on contour assessment and feedback as part of CBME may be helpful.

Keywords: Contouring, virtual medical education, feedback

Analysis of Resident and Faculty Assessment Methods used by United States Radiation Oncology Residency Programs

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Purpose: Resident evaluations are based on the Accreditation Council for Graduate Medical Education's (ACGME) Six Core Competencies: practice-based learning and improvement (PBLI), patient care (PC), systems-based practice (SBP), medical knowledge (MK), interpersonal communication skills (ICS), and professionalism (PR). While training programs incorporate aspects of these core competencies in their resident evaluations, there is limited data regarding the degree to which they are used across different institutions. This study analyzes assessments within radiation oncology (RO) to determine characteristics of existing assessment methods for resident and faculty evaluations. We hypothesize that both faculty and resident evaluations vary significantly in length and criteria used.

Approach/Methods: Twelve academic RO residency programs provided evaluation forms: faculty resident evaluation (FRE), n=12, and resident faculty evaluation (RFE), n=11. Data on the frequency and types of questions were collected. Questions were coded into nine categories for RFE: teaching skills, patient care, personal qualities (approachability, responsiveness, demeanor, attitude), result of rotation (degree to which faculty increased knowledge, desire to learn and independent inquiry), knowledge, mentoring skills, learning climate, research, and communication. Analysis-of-variance (ANOVA) was used to determine differences between institutions and between categories.

Results: Across all institutions, FRE was based on the Six Core Competencies with an average of 19 questions (standard deviation (SD) 11, range 5-47) in total. PR had the most questions (mean 3.7, SD 2.9) followed by PC (mean 3.3, SD 2.8). SBP and PBLI had the fewest questions. While ANOVA did not show a significant difference in the number of questions between categories (F=0.78, p=0.6), there was a significant difference in the mean number of questions used across institutions (F=6.6, p<0.01). RFE varied in length, formatting, and content of evaluations across institutions (F=7.8, p<0.01). Teaching and personal qualities were evaluated the most with 9/11 institutions posing ≥ 1 question about these factors.

Discussion: FRE is primarily based on ACGME core competencies for RO with some competencies such as PR and PC represented more than others. Programs could potentially use feedback from other radiation oncology health professionals (e.g., nurses, physicists, dosimetrists, therapists) to better assess the less represented competencies. RFE varies widely by institution; thus, a standardization of the evaluation criteria might help faculty obtain more valuable feedback that can be used to improve residency programs.

Significance: This study is part of a larger project collecting resident and faculty perspectives with the goal to ultimately develop consensus recommendations for FRE and RFE.

Keywords: Resident and Faculty Assessments Core Competencies

Radiation Oncology Deliberative Curriculum Inquiry: Feasibility of a National Delphi Process

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Purpose: A formal United States (US) radiation oncology (RO) curriculum is needed to guide resident education and qualifying examinations. Deliberative curriculum inquiry can be used to gain consensus on a curriculum from multiple stakeholder groups. Competency-based training, including entrustable professional activities (EPAs), provides an outcomes-based approach to modernize graduate medical education. This study aims to formalize a US curricular framework by identifying content domains (CDs) and EPAs for US RO using a Delphi method.

Approach/Methods: The Radiation Oncology Education Collaborative Study Group (ROECSG) Core Curriculum Project Leadership Committee (LC) developed initial EPAs and CDs. Following recruitment of stakeholders, a Delphi process was used for consensus. In the first Delphi, EPAs and CDs were reviewed for inclusion/exclusion, clarity, training level (EPAs only), and time allocation (CDs only). Participants submitted additional EPAs/CDs for consideration. Any EPA or CD one standard deviation below the median underwent LC review. All participants completing the first Delphi were invited to the second. New EPAs or EPAs undergoing major revisions were re-reviewed. Percent allocated curriculum time was finalized for CDs and for a single subdomain (SD).

Results/Outcomes: 186 participants volunteered to participate. 114 (61.3%) completed the first Delphi. Participants were 45% female and 55% male with a median age range 31-40 (range, 21 - 80). Of 114 participants, 35% were academic clinical radiation oncologists, 8% private practitioners, 3% academic physician scientists, 28% residents, 2% fellows, 11% physicists, 1% dosimetrists, 8% therapists, 3% nurses or NP/PAs, and 1% internal medicine physicians. 3% had secondary medical education expertise. Leadership in multiple US RO professional organizations was represented. Participants included 3 chairs, 13 program directors, 5 assistant program directors and 5 medical school clerkship directors. 18% of participants were involved in ABR examination processes and 3% in the In-Service training exam. Following the first Delphi, 6/9 CDs met consensus, 1 CD was removed, 2 CDs were combined. Of 114 invited, 77 (67.5%) participants completed the second Delphi. Of 55 initial EPAs, 52 final EPAs met consensus. Percent time allocation met consensus. 4 SDs of a single CD (Applied Sciences) were reviewed and met consensus.

Discussion/Significance: Deliberative curriculum inquiry successfully achieved consensus on US RO CDs/SDs and EPAs to guide educational curricular structure and time in training programs and to help inform weighting for qualifying examinations. Participants were successfully recruited from multiple stakeholder groups to participate in the Delphi process. Future iterations should aim to recruit diverse participants for participation in the deliberative curriculum inquiry process.

Keywords: Curriculum Inquiry, Graduate Medical Education, Delphi Consensus

ORAL SESSION 2:

**FRAMING THE FIELD: RADIATION ONCOLOGY
FOR NEW LEARNERS**

Moderators: Elizabeth Jeans and Brandi Page



Radiation Oncology Virtual Elective Rotation for Medical Students and Residents: Implementation of a National Virtual Education Resource

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Purpose: Radiation Oncology Virtual Education Rotation (ROVER) is a virtual education platform developed to support radiation oncology (RO) education for medical students and residents. This national education platform was implemented to improve interest and knowledge in RO.

Methods: ROVER comprises a series of virtual educational panels with case-based discussions across cancer disease sites tailored to medical students and residents (ROVER 2.0) in RO. Sessions are moderated by RO resident and faculty and feature faculty panelists from programs across the country. Sessions are hosted on Zoom and include case discussions, interactive poll questions, and Q&A. Pre- and post-surveys of student participants assess the effectiveness of the sessions and are used to iteratively improve ROVER. Sessions are advertised via social media, national organizations, and through direct emails to individual programs and medical schools.

Results/Outcomes: Six ROVER sessions were held from 6/2020-8/2020 and 5 ROVER 2.0 sessions were held between 10/2020-3/2021 have been held. ROVER and ROVER 2.0 included 42 panelists from 28 institutions; ROVER 32 panelists/24 institutions; 41% female and 44% assistant professors and ROVER 2.0: 16 panelists/15 institutions, 44% female; 31% assistant professors. Collectively the ROVER platform had a total of 1295 registrants (n=427 and 868 respectively), with 231 and 445 attendees, respectively. Among medical students, 79% had prior exposure to RO and signed up for education (90.6%). Similarly, in ROVER 2.0, the majority (73.5%) of registrants signed up for the opportunity to hear from a diverse expert panel. Of ROVER and ROVER 2.0 attendees, 140 (60.6%) and 152 (34%) completed post-session surveys, respectively. ROVER respondents had an improvement in perceived knowledge due to participation in the sessions (p<0.001); ROVER 2.0 attendees similarly felt the sessions were valuable or very valuable (98% of respondents). Over 60% of ROVER 2.0 respondents felt that virtual platforms were equal or superior to in person learning.

Discussion: The ROVER platform is a practical and feasible virtual education platform for medical students and RO residents. Attendees found the platform improved their knowledge for medical students and was equal to superior to in-person learning among most RO residents.

Significance: This virtual education platform facilitates accessible and equitable education for medical students and RO residents throughout the country. The format of these sessions includes case-based discussions which allows for interactive education. The use of virtual education platform can be further delineated to include more lectures, panels, and webinars to medical students and residents in RO.

Keywords: virtual education, radiation oncology education, interactive webinar

RISE: An Equity and Inclusion-based Virtual Pipeline Program for Medical Students Underrepresented in Medicine

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Purpose: The emergence of a global pandemic forced disruptive innovations in medical education, including creation of virtual clerkships. Medical students underrepresented in medicine (MS UIM), less likely to attend schools with associated radiation oncology (RO) programs, were disproportionately disadvantaged when away rotations were cancelled due to COVID. We describe the creation and implementation of a novel virtual approach to proactively mitigate inequities in RO opportunities.

Approach/Methods: The one-week, virtual, Radiation oncology Intensive Shadowing Experience (RISE) was targeted to MS UIM interested in RO and currently attending US-affiliated medical schools. Recruitment occurred through social media, correspondence with minority serving institutions, and collaboration with national organizations for MS UIM. A google form was used to determine eligibility. Pre- and post-program surveys, distributed to RISE participants, were analyzed using descriptive statistics.

Results/Outcomes: Fifty-three students submitted google forms: 19 non-US affiliated programs, 14 <MS3, 2 non-UIM. Of 18 eligible MS UIM, 14 participated in RISE (100% survey response). Among participants, 29% were the first in their family to attend college, 43% were the first to attend graduate school, 36% had family in healthcare, and all reported average parental annual income <\$150,000 (79% <\$100,000). The most common source of information about RISE was social media (43%). On pre-survey, 43% were interested in learning more about RO and 43% were interested in applying into RO, increasing to 50% on post-survey. Motivation for participation was interest in the field, desire to learn more about the field, and interest in learning new technologies. Participants were very satisfied with patient interactions (71%), panel of minority residents/attendings (71%), morning didactics (86%), capstone presentation (86%), and assigned mentors (86%). All students agreed the goals of the program were stated clearly, coursework was appropriate for level of training, course was helpful in deciding on specialty, and would recommend course to other students. The majority were very satisfied with the overall program (86%), and agreed strongly that they planned to utilize what they learned for their future practice (93%).

Discussion: The RISE program, specifically targeted toward senior MS UIM interested in RO and impacted by COVID-19, was a unique opportunity to center equity and inclusion within medical education. This experience was not only feasible, but desired and highly rated by participants.

Significance: We expect our experience and reported outcomes will serve as a model and catalyst for other RO programs, and competitive specialties with workforce diversity challenges, particularly in the wake of COVID-19.

Keywords: Workforce Diversity, Virtual Education, COVID-19

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Implementation of Multi-Institutional Virtual Radiation Oncology Clerkship

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Purpose: In-person rotations were restricted in medical schools due to the pandemic. This led to the development of virtual clerkships in radiation oncology (RO). Virtual electives allowed medical students to obtain exposure to RO through a combination of asynchronous lectures, hands-on learning, and synchronous education. We sought to analyze the impact and feasibility of implementing RO education into multi-institutional virtual clerkships.

Approach/Methods: An IRB-approved virtual clerkship was implemented at 7 institutions. Students enrolled in 1-4 week home or away rotations. Curriculum embodied all aspects of in-person clerkships in a virtual format. Clerkships used pre-recorded lectures on www.radoncvirtual.com which included general and subsite-specific oncology topics targeted to medical students. Each clerkship added telehealth visits, chart rounds, contouring, and capstone presentations. Surveys were given pre-and post-clerkship to assess baseline comfort and knowledge. On completion, students took a 48-question course exam and auxiliary feedback survey to assess their perceptions of the field. Clerkship directors were given a survey to assess the comfort and ease of implementing the virtual clerkship. Surveys were analyzed using Wilcoxon Signed rank test and t-test, 2-sided.

Results/Outcomes: 72 medical students enrolled at 7 institutions between 4/2020 and 2/2021. Each institution's median of students doing an away rotation was 4 (range 3-9) and home rotation 2 (range 0-36). Median length of each rotation was 2.5 weeks (range: 1-4 weeks). 71%(n=51) of students had never previously enrolled in a RO elective. Majority of students were MS4 (57%) and MS3(33%) with equal distribution in gender. There was significant improvement of the overall and specific knowledge in all topics of RO ($p<0.001$). Virtual electives also significantly increased interest in the field among all respondents ($p<0.05$) with majority stating it was valuable for future practice and were likely or most likely to recommend it to others. Course directors spent an additional 5-10 hours per week with students and were all satisfied with the content and delivery of the virtual electives. 83%(n=6) indicated they would utilize the material for future rotations.

Discussion: Implementation of virtual RO clerkships increased the student's knowledge and interest in the field. The virtual format allowed students to attend away electives at multiple different institutions during the pandemic. Course directors were interested in using the material for future.

Conclusion: Multi-institutional implementation of virtual RO electives was successful at improving knowledge for medical students, even those that had exposure previously. Resources in the virtual rotation platform can be integrated into traditional educational paradigms to improve exposure in RO.

Keywords: Multi-institutional clerkship, virtual electives, medical student education

Improving Medical Student Education in Radiation Oncology: Evaluating and Integrating an Experiential Interdisciplinary Workshop into the Medical Student Curriculum

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Purpose: To evaluate a novel interactive educational workshop designed to improve medical student knowledge and awareness of radiation oncology (RO).

Methods and Materials: A 2.5 hour pilot workshop in RO was introduced in 2018 for one cohort of post-graduate University of Sydney medical students as a voluntary learning session. The workshop was modified from a national GP education program developed within the Targeting Cancer campaign and comprised an introductory lecture and quiz around the value of radiation therapy (RT) in cancer care and RO principles. Students participated in an interactive program of learning 'stations' situated in the RO department. Each station was facilitated by at least one radiation oncologist, radiation therapist and/or physicist and introduced students to practical aspects of RO planning, delivery and patient care. Students were surveyed before and immediately after the workshop to assess their perceptions of its educational value and the impact on RO knowledge and awareness.

Results: 44 students (out of the cohort of 51) attended the workshop and completed the pre-survey. 23/44 (52%) reported receiving prior RO education, where 69.5% had received between 30-120 mins of teaching. Before the workshop, 35% of students were not aware of the location of the RO department in their teaching hospital. Only 4/44 (9%) felt confident in their knowledge of RO. Following the workshop, 22/38 (57.8%) felt their knowledge now met expectations for their level of training. Regardless of prior RO experience, pre-workshop, few students scored correctly on objective RO knowledge regarding optimal use of RT (25%) and bone pain response (47%). Post-workshop, correct responses improved to 100% and 86%, respectively. Overall feedback around workshop value was highly positive with regard to enjoyment (97%), interactive design including linear accelerator demonstrations (36.8%), and high likelihood of recommendation to peers (94%). Students commented on the enthusiasm and multidisciplinary of teachers. Students suggested linkages to patient experience and specific clinical cases would enhance learning.

Discussion: There remain large gaps in medical student knowledge and confidence in RO and intervention is necessary to address these discrepancies. A novel interactive RO workshop for medical students has demonstrated improved awareness and knowledge with high levels of self-reported learner satisfaction.

Significance: Integration of this model as a mandatory component of a new University of Sydney oncology curriculum across all teaching campuses will help address known gaps in RO education. This workshop might be readily replicated across other Australian and New Zealand universities.

Keywords: Medical Education. Intervention

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Teaching Mentoring: Utilizing a Resident-Student Peer Mentorship Program as a Tool to Educate Residents About the Core Components of Mentoring

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Purpose: Mentorship plays a critical role in the career development of trainees in medicine. Previous formalized radiation oncology (RO) mentorship programs have led to increased satisfaction in mentor-mentee experiences and earlier development of preceptor skills in the mentee, such as higher promotion and grant acquisition rates (1). However, there is an observed lack of clinical mentorship in RO and limited formal education to teach residents how to become effective mentors (2, 3). Common reasons for dissatisfaction in mentorship experiences among RO residents includes difficulty identifying a mentor, time commitment of a mentor, and inexperience of selected mentors (3). We hypothesize that a formalized resident-medical student mentorship program would improve residents' mentorship skills, expectations, and confidence while further developing a mentorship culture in RO residency.

Approach/Methods: We investigated a multi-institutional formalized mentorship program between RO resident mentors and medical student mentees undergoing a RO clinical sub-internship over a 2-4 week rotation. We compiled a list of best practices on mentoring from participating residents, supplemented with validated mentoring resources from primary literature, to prepare residents to be mentors (3, 4, 5). The formal mentorship program involves three components: 1. Instruction on the principles of RO via two 30-minute didactic sessions 2. Coaching students in the development of a capstone presentation (with focus on primary literature interpretation and presentation skills) 3. Career counseling via two 30-minute advising sessions that include 1, 3, and 6 month follow up via email. Residents and students will complete questionnaires before and after the mentorship program. The resident questionnaire includes questions related to their personal assessment in mentoring, time management, confidence, and perceived impact in the relationships with their own mentors.

Results/Outcomes: We plan to investigate the overall impact of this program on the development of mentorship skills in residents. Furthermore, we plan to investigate the program's impact on resident experiences with their own faculty mentors (including types of mentors residents may seek in the future), and alterations in resident's overall career plans.

Discussion/Significance: Many institutions have a resident-student mentorship model, but limited curricula exist for teaching residents or early career faculty how to mentor. A formal program that utilizes aspects of successful mentorship models between residents and medical students has the potential to empower RO trainees to feel more confident seeking future mentors and feel a greater sense of purpose in their careers.

Keywords: Medical student, Career Development, Peer Mentorship

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ORAL SESSION 3:

REDEFINING THE FIELD: SEEING RADIATION ONCOLOGY AS MORE THAN THE CLINIC

Moderators: Paris Ann Ingledeew and Anna Laucis



IMRT 2.0: Refining an IMRT-focused Telehealth Curriculum for Existing Radiation Oncology Centers in Latin America

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Purpose: As more Latin American radiotherapy centers adopt intensity modulated radiotherapy (IMRT), there is a growing need for training. Building upon previous work, we hypothesized that an augmented "IMRT 2.0" curriculum for medical physicists (MPs), radiation oncologists (ROs), therapists (RTTs), and residents could support additional centers undergoing the transition from 3D-conformal radiotherapy to IMRT.

Approach/Methods: Rayos Contra Cancer (RCC) is a non-profit organization that connects radiotherapy clinics globally to a community of radiation oncology professionals with topic expertise. We developed a longitudinal 28-session telehealth curriculum in Spanish with interactive didactics and a cloud-based platform for case-based learning. The program included 1-1.5 hour live video conferencing sessions held 1-2 times weekly for 4 months. Our educator team included 10 MPs and 3 ROs from 11 institutions. Standardized electronic assessments measured confidence on a 5-point Likert scale for 18 foundational IMRT domains, as well as a 48-item multiple choice pre and post-examination. Pre-curriculum data was collected from all participants prior to course initiation.

Results/Outcomes: We invited 15 centers in 11 Latin American countries and had 206 enrolled participants (59 ROs, 47 MPs, 36 RTTs, 29 residents, 16 medical students, 8 dosimetrists, and 13 other). Median experience in radiation oncology was 5 years. 190 (92.2%) participants had prior training that included informal support of colleagues (n= 96), IMRT in residency training (n= 61), informal support with online resources (n= 54), and in-person conferences (n= 44). Mean confidence levels among different IMRT domains ranged from 2.38 ± 1.13 to 3.43 ± 1.05 . Mean exam score was 21.3/48 ($44.3\% \pm 15.2\%$) with a range of 7-42. At this time, 26 of 28 sessions have been completed with an average attendance of 90 - 110 regular participants. Additional offline mentorship for contouring and treatment plan review has occurred between clinics and virtual volunteer educators. Clinics have reported high satisfaction to our education team liaisons throughout the course. Post-curriculum data will be collected after course completion.

Discussion: Our pre-curriculum data corroborates literature suggesting a need for greater educational support as Latin American centers transition from 3D EBRT to IMRT. Near completion of the course with multiple recruited centers suggests feasibility of a collaborative longitudinal videoconferencing curriculum. Post-curriculum data will enable further analysis of efficacy.

Significance: Adoption of culturally targeted videoconferencing curricula may decrease disparities in global cancer care and contribute to professional development for both educators and participants.

Keywords: Education, global health

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Contouring Collaborative for Consensus in Radiation Oncology (C3RO): An International Crowdsourcing Challenge to Improve Radiotherapy Contour Delineation

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Purpose: Contour variation has been correlated with inferior disease control and increased toxicity (1). While automated algorithms could decrease variability and improve quality, development has been limited by the availability of large multi-segmented datasets (2). This project aims to conduct a crowdsourced challenge informed by behavioral economics to engage radiation oncologists worldwide in cloud-based contouring. We hypothesize that recruitment strategies and incentives will vary by practice setting. We hypothesize that, among physicians, high volume and specialization will be associated with greater similarity to the consensus contour.

Approach/Methods: This online crowdsourced challenge will recruit participants from eContour's userbase (22,889 radiation oncology professionals from 146 countries, including 12,650 physicians, who collectively access >1,000 cases per weekday) (3) via email, website, and Twitter announcements. Participants will complete a survey regarding their profession, practice setting, years of experience, patient volume and specialization (physicians only), how they learned about the challenge, and motivation for participating. They will be invited to contour one case per month (up to once every week) for 12 months, and be entered into a weekly raffle for each complete contour submission. Participant performance will be scored in comparison to the overall participant consensus contour (using a combination of similarity and surface distance metrics) and displayed on an interactive leaderboard. Each month, first place on the leaderboard will receive a gift card, and all participants will gain exclusive access to 1) a video podcast hosted by 2-3 experts reviewing contouring variation/errors, and 2) all study contour file data.

Results/Outcomes: The primary endpoint is to assess the feasibility of a crowdsourced contour challenge informed by behavioral economic principles, with success defined as ³30 submitted contours per case. We will use descriptive statistics and χ^2 tests to determine unadjusted proportions and associations of participant characteristics with method of recruitment. We will assess variables associated with financial vs. non-financial incentives using logistic regression. We will analyze associations between physician characteristics and similarity to the consensus contour using linear regression.

Discussion: This study aims to identify a novel solution to curating multi-segmented contour datasets from both novices and experts. This will improve our understanding of how targeted behavioral strategies can promote engagement with interactive online platforms for education, quality improvement, and research.

Significance: If successful, we will generate a large dataset of multi-segmented cases that can be used to 1) improve auto-segmentation algorithms and 2) facilitate development of a simulation-based training tool.

Keywords: auto-segmentation, crowdsourcing, contouring, collaboration

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Social Media for Knowledge Sharing and Translation on Justice, Equity, Diversity, and Inclusion - Implementation and Assessment of our First Campaign

Presenter: Ian Pereira

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Purpose: Social media (SoMe) has enabled more collaboration, participation, and reach of JEDI (Justice, Equity, Diversity, and Inclusion) initiatives globally. For Radiation Oncologists (ROs), SoMe has an established role in collaborative learning beyond traditional borders. By measuring publicly available data from a JEDI SoMe initiative, we aimed to gauge impact and tailor future SoMe endeavors for better knowledge sharing and translation within Radiation Oncology (RO) and our broader community.

Approach/Methods: A month-long SoMe campaign, highlighting the work of Black ROs, was undertaken in February 2021 by the Association of Residents in Radiation Oncology (ARRO) Equity and Inclusion Subcommittee (EISC), led largely by trainees underrepresented in medicine (UIM). Content was created through a brief literature review including input from the featured ROs and their colleagues when available. Following the campaign, a cross-sectional analysis of public tweets from February 1 to February 28 2021, using #DEInRO, #EISC, or #BHM and #RadOnc, was done via Octoparse, a publicly available SoMe analytics package. This included a transcript, basic demographics, and engagement metrics.

Results/Outcomes: Eighty-four unique tweets used the campaign hashtags from 16 participants. Tweets were primarily by RO residents 87% (73/84), faculty 8% (7/84), ARRO 4% (3/84), and one non-RO participant 1% (1/84). Engagement included 81 comments, 275 retweets, and 1175 likes. Online activity was highest on the day of the original post.

Discussion: We report our experience implementing and assessing a JEDI SoMe campaign highlighting the contributions of Black ROs. Limitations include (1) missing engagement data from a lack of hashtag use (including personal anecdotes and participation from medical students), (2) views of tweets without subsequent engagement, and (3) potential reach outside Twitter, including collaborations formed across institutions and with attending ROs for content development. Moreover, by focusing efforts solely on Twitter, English language, and North American time zones, we restricted the overall reach of our initiative. Further work is needed to improve and expand sharing and learning capabilities on SoMe, including the development and availability of alternative metrics and social analytics tools.

Significance: By using SoMe as a vehicle for knowledge sharing and translation, particularly on complex JEDI topics, we hope to further develop and validate systems to measure the impact of initiatives and generate new knowledge for continuous quality improvement of our online learning. Through this work we also aim to provide a space for current and future RO trainees to feel seen, valued, represented, and empowered within the field.

Keywords: Equity, Social Media, Outreach

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Intensity-Modulated Radiation Therapy (IMRT) Course for Radiation Therapists (RTTs) in Latin American Countries

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Purpose: With the expansion of radiation oncology technology globally, many clinics are transitioning to Intensity-Modulated Radiation Therapy (IMRT)[1]. However, resources for training radiation therapists (RTTs) in topics fundamental to IMRT are lacking in low-and-middle-income countries (LMICs)[2,3], including for RTTs in Latin America. A remote curriculum for RTTs may help close this gap and create accessible, sustainable, and high-quality education for clinics across Latin America.

Approach/Methods: In 2020, the nonprofit organization Rayos Contra Cancer (RCC) established a peer-to-peer education network between U.S.-based radiation therapy volunteer educators and RTTs from clinics throughout Latin America. Participants from cancer treatment centers across six countries in Central and South America were invited for free enrollment in the RCC Tecnólogos Médicos IMRT Course. The curriculum was developed by a team of multidisciplinary English and Spanish-speaking radiation oncology educators and was conducted over four months through fifteen weekly live Zoom® sessions. Topics included radiobiology, equipment, safety, patient charting, treatment set-ups, imaging and anatomy review, the state of radiotherapy in Latin American countries, and case-based learning scenarios with real-time educator feedback. Baseline characteristics and confidence were assessed via a pre-program survey. Additionally, knowledge-based, multiple-choice exams were administered electronically at the midpoint and conclusion of the course. Attendance above 70% and completion of the exams were considered for course completion certificates.

Results/Outcome: 75 participants (72 RTTs, 2 medical physicists, and 1 administrator) from 22 centers enrolled in the course. The pre-program survey found that, using a Likert scale out of 5, 34.9% of participants had no (1) to little (2) understanding of the clinical implications of IMRT (n = 63, $\mu = 2.8$, SD 1.0) and 49.2% felt no (1) to minimal (2) confidence in implementing an IMRT program from start to finish (n = 63, $\mu = 2.4$, SD 1.1). The average attendance per session was 33%, and 29 (39%) participants attended 70% or more of the sessions. Mean scores for the midterm and final exams were 80.6% (n = 32, SD 11.9%) and 93.5% (n = 34, SD 8.8%), respectively.

Discussion: These findings suggest that this low-cost, virtual IMRT curriculum is a promising vehicle for advancing RTT education and improving cancer treatment globally.

Significance: Future directions include running an updated, region-specific curriculum for cancer centers in Eastern and Western Africa, as well as developing more advanced curriculums focused on IMRT simulation and treatment techniques for RTTs.

Keywords: Intensity-Modulated Radiation Therapy (IMRT), Radiation therapist (RTT), Education

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Readability of a Radiotherapy Graphic Narrative Patient Education Guide Series in English and Spanish

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Purpose: Communicating the External Beam Radiotherapy Experience (CEBRE) and Communicating the Gynecologic Brachytherapy Experience (CoGBE) are novel graphic narrative patient education guides developed to facilitate doctor-patient communication during radiotherapy consultations.[1] The guides were developed by designers and physicians with the goal of creating accessible, readable, and patient-centered tools for a range of disease sites and practice settings. Given the need for improved radiotherapy education resources for Spanish-speaking patients in the United States, we sought to develop versions of CEBRE and CoGBE in Spanish.[2] Here we outline how existing patient education tools can be translated and adapted into Spanish while meeting national readability standards.

Methods: Seven guides were translated into Spanish by a certified medical translator and then reviewed by a second translator for quality assessment. The translations were then reviewed and revised by a multilingual team of designers and clinicians to integrate the text into the guides. To assess readability, the core text from each guide was extracted and analyzed using previously validated indices that provide grade level equivalents. Readability analysis in English was conducted using Degrees of Reading Power (DRP), Flesch-Kincaid (FK), Ford-Caylor-Stitch index (FORCAST), Fry score, Gunning Fog (GF), Läsbarhetsindex (Lix), Rate Index (Rix), Raygor estimate, Simple Measure of Gobbledygook (SMOG). Analysis in Spanish was conducted using Gilliam-Peña-Mountain (GPM), Lix, Rix, and Spanish Simple Measure of Gobbledygook (SOL).

Results: Preliminary analysis for the CEBRE generic (non-site-specific) guide demonstrated a mean readability of 6.8 (DRP, FK, FORCAST, Fry, GF, Lix, Rix, Raygor, SMOG; 6.3, 5.7, failed, 7.8, 6, 6, failed, 8.8). The Fry and Raygor tests failed due to excessive high syllable and 6+ letter words, respectively. The analysis of the Spanish translation demonstrated a mean readability of 6.8 (GPM, Lix, Rix, SOL; 5, 8, 7, 7.2).

Discussion: While mean readability was the same for English and Spanish versions, Lix and Rix which are multilingual indices, demonstrate higher grade levels for the Spanish translation. Importantly, the Spanish translation meets the National Institutes of Health's 8th grade standard. Through iterative revisions, readability can be improved to meet the American Medical Association's 6th grade recommendation. Beyond readability, accessible design, use of graphic narrative, language access, and cultural relevancy are all important facets incorporated in developing the CEBRE and CoGBE series and their translations.

Significance: Professional translation of existing patient education tools can maintain readability levels while helping improve health literacy for an increasingly linguistically and culturally diverse United States population.

Keywords: Patient education, graphic medicine, health literacy

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Needs Assessment for an Introductory Radiation Oncology Curriculum for Advanced Practice Providers

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Purpose: Advanced practice providers (APPs) are increasingly integral in clinical care models¹. Limited didactic or clinical experience exists for APPs in radiation oncology (RO)^{1,2}. Despite 80% of their role dedicated to patient care^{1,2}, there is currently no dedicated curriculum for RO APPs. Training has followed an "on the job" model that relies on the established team (physicians, APPs, and nurses) to educate new APPs, resulting in increased times for APPs to achieve clinical independence^{3,4}. Training also varies in content and quality and may inadequately cover foundational RO topics. Without a dedicated focus on core RO principles, APPs may lack a deep understanding of treatments and be unable to communicate clearly and effectively with colleagues and patients. We sought to address these concerns by performing a needs assessment to guide APP curricular development. This study aimed to measure current post-graduate RO training provided to practicing APPs across the United States via an anonymous survey.

Methods: Following IRB approval, APPs actively working in RO at practices associated with ROECSG were invited to participate in an anonymous needs assessment survey via the Research Electronic Data Capture (REDCap) program. Data collected from the survey included 3 sections; demographics, perceived preparedness for employment, and preferred curriculum content. Descriptive statistics were used.

Results: We identified 145 APPs practicing in radiation oncology. Our survey response rate was 57.2% (83/145). Among the 83 respondents, most (95.2%, 79/83) reported practicing at an academic institution. Following training and initiation of independent clinical practice, 44.6% reported not feeling confident in their knowledge and clinical skills and 59% reported unclear goals and expectations during onboarding. An introductory program of lectures, workshops, and dedicated didactic training were offered for only 16.9% of participants. Encouragingly 86.1% indicated an online introductory RO curriculum for APPs would be quite/extremely useful.

Discussion: Most APPs currently working in RO feel there is a gap in foundational knowledge and training when entering RO and would find an online training program beneficial. The results of this survey highlight the need for additional APP curricular development focusing on radiation oncology foundational knowledge.

Significance: The results of this national APP survey highlight the importance for a foundational onboarding curriculum by APPs in RO. Our future work aims to develop an online didactic training program that can be utilized in conjunction with experiential learning opportunities during RO APP's early training.

Keywords: Advanced Practice Provider, Radiation Oncology, Medical Education

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ASYNCHRONOUS ORAL PRESENTATIONS



Are They Ready? The Current Status of Canadian and US Radiation Oncology and Radiation Therapy Training Programs in Preparing Trainees for On-Call Emergencies and Interdisciplinary Teamwork

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Purpose: The aim of this study is to evaluate the current practices regarding radiation oncology emergencies training for radiation oncology residents and radiation therapy students and the presence of interdisciplinary curricula across Canadian and US training programs prior to putting trainees on-call. We also aim to evaluate the most significant needs in radiation oncology residency programs and radiation therapy training programs in regard to radiation oncology emergencies training in order to guide curriculum development.

Approach/Methods: This is a mixed methods needs assessment study. First, we will send a survey to all current radiation oncology and radiation therapy program directors in Canada and the US. The aim of the survey is to evaluate the current landscape of radiation oncology emergencies training for radiation oncology residents and radiation therapy students and interdisciplinary team work. In addition, the authors will conduct focus group sessions consisting of the senior residents at the University of Alberta radiation oncology program to explore their reflections on what they have learned on the management of radiation oncology emergencies and their thoughts on what they should have learned during the early years of training.

Results/Outcomes: The questions of the survey are divided into quantitative and qualitative ones. For the quantitative questions, a Likert scale is used. Data will be analyzed using descriptive statistics and will be summarized using SPSS. For qualitative data, content analysis will be employed.

Discussion: The results will enable us to understand the current practices in terms of teaching radiation oncology residents and radiation therapy students about radiation oncology emergencies prior to putting them oncall. In addition, this study will provide us with valuable insights from senior trainees regarding what they have learned and what they think they should have learned during their formative years of residency.

Significance: The results of this study will hopefully guide curriculum development for radiation oncology residencies and radiation therapy training programs both locally and elsewhere in the topics of radiation oncology emergencies management and interdisciplinary team work.

Keywords: Radiation oncology emergencies, interdisciplinary teamwork

1ONC: A Comprehensive Mobile and Web Application to Improve Access to Clinical Resources for Practicing Radiation Oncologists

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Purpose: Demand exists for a convenient, user-friendly mobile platform integrating updated, clinically relevant information for busy radiation oncology residents and practitioners. We developed 1ONC as a free, comprehensive and easily accessible mobile and web-based app (application) to address this unmet need. The primary objective for our project is improve the design and functionality of 1ONC by analyzing user engagement and feedback.

Methods: 1ONC was created utilizing modern software development technologies, primarily Dart, Python, and JavaScript. 1ONC aims to incorporate all relevant disease site-specific clinical information, including but not limited to: (1) Recent protocol-based radiotherapy contouring guidelines, recommended doses, and organs-at-risk dose constraints; (2) easy-to-access links to major resources, such as RadOncReview, QuadShot, Oral Board Review Sheets, ASTRO published treatment guidelines, and patient resources; and (3) links to PUBMED abstracts for recent practice-changing trials. After release, Google analytics will provide data on the absolute number of users and frequency of app use. Post-installation surveys from individual users will provide data on purpose of app use, satisfaction with app ease, feedback for improvement, and impact on efficiency of accessing relevant information.

Results: The free pilot version of 1ONC has been created and represents a first-in-category comprehensive mobile radiation oncology app. It addresses the need for access to up-to-date, evidence-based information at the point of care. Widespread release is imminent and will coincide with rigorous prospective collection of user feedback and analytics.

Discussion: Our novel radiation oncology app has successfully moved from concept to usable product. Future study results will quantify the magnitude of impact and be used to refine the app, maximizing its utility.

Significance: 1ONC provides a user-friendly, one-of-kind alternative to traditionally dispersed resources for radiation oncologists.

Keywords: mobile application, communication, efficiency, resources

Clinical Oncology Module for the ESTRO Core Curriculum

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Purpose: Clinical oncologists are physicians with the competencies to manage cancer patients through the entire disease pathway combining the competencies of radiation and medical oncologists. The 4th edition of the European Society for Radiotherapy and Oncology Core Curriculum for Radiation Oncology/Radiotherapy (ESTRO curriculum) has received wide support by the clinical oncology community. The aim was to develop a clinical oncology module that could be combined with the ESTRO curriculum to enable clinical oncology trainees to follow a single curriculum.

Methods: A range of stakeholders including National Society representatives, an oncologist from a low- middleincome country, and a recently appointed specialist, developed and commented on iterations of the curriculum. Further modifications were made by the ESTRO Education Council.

Results: The module is based on the CanMEDS 2015 framework and identifies 20 enabling competencies in the Medical Expert role that are required in addition to the ESTRO curriculum for the training of clinical oncologists. Recommendations are made for the levels of Entrustable Professional Activities (EPAs) to be attained by the end of training.

Discussion: The Clinical Oncology module, when combined with the ESTRO curriculum, covers the entire cancer pathway rather than being modality specific. It is hoped it will aid in the development of comparable standards of training in clinical oncology across Europe and may also have utility in low- and middleincome countries as well as providing a single curriculum for trainees.

Significance: Conjoining the functions of radiation and medical oncologists and encompassing the innovative and demonstrably effective educational concept of EPAs, the total of ESTRO's CC and CO core curriculum is tailored as a comprehensive training program to generate superbly trained Oncologists able to provide cancer care to the patient in general.

Keywords: CanMEDS, Specialist education and training, Radiation Oncology education and training

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RadOnc Tables: An Online Resource for Commentary and Summaries of Key Clinical Trials

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Purpose: The RadOnc Tables key studies sheet and App aim to be a rapid online reference for key clinical trials in radiation oncology for a wide range of users, adapting features that are not possible in a physical book: continually up-to-date, updated in realtime, with fast usability, and crowd-sourcing of knowledge.

Approach/Methods: A Excel sheet of key studies summaries and commentaries hosted on Wordpress was shared for public distribution, which later transitioned to Google Sheets and to iOS and Android apps. In-press articles, publications in major journals, and abstract presentations from major conferences are reviewed for key studies to add to the sheet. Upon breaking news of important trials, Twitter user comments and peer-reviewed commentaries are reviewed for integration into the tables commentaries. Updates to the sheet on Google Sheets and the App are visible instantly to users. Hits and downloads are recorded. The time to access a clinical trial using the resource was tested.

Results/Outcomes: 3817 users have downloaded the iOS and Android apps. The RadOnc Tables key studies sheet now contains summaries 771 studies across 13 disease sites. Using the search feature or touch navigation on the app, the time from picking up a smart phone to locating a trial is as low as 10-15 seconds. Using Google Sheets, the time to locate a trial is similar using the CTRL+F feature or by scrolling. 76 comments from Google users have been received and 22 from Wordpress users. 11960 hits and 24 countries have registered to the bit.ly link to the Google Sheet (as of April 30, 2019 - present), and 24434 hits and 89 countries have registered to the Wordpress page that hosted the previous excel version (Sept 2017 - present). A limitation to the number of link hits is that an indeterminate degree of internet traffic is composed of bots.

Discussion: RadOnc Tables has become a cross platform service that provides fast access to clinical trial summaries and critiques to a wide user base in a number of countries.

Significance: The tables will continue to expand, adding key studies as they are released, and integrating feedback and contributions from users to aid in radiation oncology reference for decision-making, patient counseling, and education.

Keywords: RadOnc Tables, App, online

Increasing Brachytherapy Mentorship and Representation Through #NextGenBrachy

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Purpose: Despite the critical role of brachytherapy in cancer treatment, recent trends show a decline in utilization. Additionally, women providers have been shown to be underrepresented. A resident survey identified high interest in on-the-job training. To address these challenges, a national mentorship program was developed with the aim of improving representation and on-the-job mentorship, with the long-term goal of increasing brachytherapy utilization.

Approach/Methods: #NextGenBrachy, a national brachytherapy mentorship program, was prospectively developed. Goals, mentee and mentor expectations, and format were determined through in-person and virtual discussions over nine months. Prospective mentees were invited to apply online. Other than membership in the American Brachytherapy Society (ABS), there were no costs or compensation for participating. Applications were evaluated based on active need, focusing on those practicing, and/or without mentors, and with a goal of increasing representation of women and those underrepresented in medicine (UIM). To improve the program, an anonymous REDCap survey was sent to mentees. A Linkert-type 5-point scale was used to measure initial brachytherapy comfort, confidence, and knowledge. Descriptive statistical analysis was conducted, with post-program surveys planned.

Results/Outcomes: Due to the number of qualified applicants, capacity was increased from a planned cohort of 10 mentees, to 17, each paired with 1-2 mentors. The initial welcome event was virtual due to COVID-19. Mentees were 24% UIM, 82% female, with varying amounts of years in practice. 100% reported currently practicing; 47% without current brachytherapy mentors. Survey response rate was 76%. 23% and 31% felt very knowledgeable regarding requirements for starting a brachytherapy practice, and the potential treatment issues that could arise during delivery of brachytherapy, respectively. 76% reported feeling minimally connected to the brachytherapy community.

Discussion: A national brachytherapy mentorship program was successfully developed and piloted. Mentees represented a range of years in practice, interests, and were majority women. Gaps identified in the survey can serve to inform future directions. Additional work is needed to evaluate the impact of the program on mentee practice. Benefits include a low cost, national reach, and ability to adapt to COVID-19 with virtual meetings.

Significance: Mentorship for early career brachytherapists from all backgrounds is critical for providing standard of care brachytherapy treatment to all patients. #NextGenBrachy provides opportunities to improve brachytherapy practice, career growth, and networking, through individualized mentorship. Future work should focus on program growth to reach more mentees, serving as a catalyst to advance workforce diversity and improve brachytherapy utilization.

Keywords: Brachytherapy; Mentorship; Workforce Diversity

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Impact of the COVID-19 Pandemic on Postgraduate Training in Radiation Oncology

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Purpose: To report the degree to which post-graduate trainees in radiation oncology perceive their education has been impacted by COVID-19.

Methods: A cross-sectional online survey was administered in June 2020 to trainee members of Canadian Association of Radiation Oncology (CARO). The 82-item survey was adapted from a similar survey administered during SARS and included the Stanford Acute Stress Reaction and Ways of Coping Questionnaires. The survey was developed using best practices including expert review and cognitive pre-testing. Frequency statistics are reported.

Results: Thirty-four trainees (10 fellows, 24 residents) responded. Nearly half of participants indicated that the overall impact of COVID-19 on training was negative/very negative (n=15; 46%) or neutral (n=15; 46%) with a small number indicating a positive/very positive (n=3; 9%). Majority of trainees agreed/strongly agreed with the following statements: "I had difficulty concentrating on tasks because of concerns about COVID-19" (n=17; 52%), "I had fears about contracting COVID-19" (n=17; 52%), "I had fears of family/loved ones contracting COVID-19" (n= 29; 88%), "I felt socially isolated from friends and family because of COVID-19" (n=23; 70%), "I felt safe from COVID-19 in the hospital during my clinical duties" (n=15; 46%), and "I was concerned that my personal safety was at risk if/when I was redeployed from my planned clinical duties" (n=20; 61%). The changes that had a negative/very negative impact on learning included "the impact of limited patient contact" (n=19; 58%), "the impact of virtual patient contact" (n= 11; 33%), and "limitations to travel and networking" (n=31; 91%). Most reported reduced teaching from staff (n=22; 66%). Two-thirds of trainees (n=22, 67%) reported severe (>50%) reduction in ambulatory clinical activities, 16 (49%) reported a moderate (<50%) reduction in new patient consultations, while virtual follow-ups (n=25; 76%) and in-patient clinical care activities (n=12; 36%) increased. Nearly half of respondents reported no impact on contouring (n=16; 49%), on-treatment management (n=17; 52%) and tumor boards (n=14; 42%) with the majority of other respondents reporting a decrease in these activities. Electives were cancelled in province (n=10/20; 50%), out-of-province (n=16/20; 80%) and internationally (n=15/18; 83%).

Conclusions: Significant changes to radiation oncology training were wrought by the COVID-19 pandemic and roughly half of trainees perceive that these changes had a negative impact on their training. Safety concerns for self and family were significant and strategies to mitigate these concerns should be a priority.

Significance: We report specific areas of impact on training due to COVID-19 which might be addressed by adaptations in program design and delivery. We also identify the significant concerns of safety, for self and family, which must be addressed.

Keywords: COVID-19 curriculum learning

COVID-era Medical Student Education: Creation and Implementation of an Informal Virtual Elective in Radiation Oncology

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Purpose: Most medical student (MS) away electives were cancelled during 2020 due to COVID19. This hindered MS's ability to explore sub-specialties such as radiation oncology (RO) and evaluate potential residency programs. Credit-granting virtual electives(1) were not available at our institution. To address this deficiency, we created an informal virtual elective (IVE) to replace the educational and career development aspects of an onsite elective.

Methods: We identified the following key components: clinical education, research exploration, mentorship, and networking.(2) We designed activities to recreate these opportunities virtually. Students interested in our onsite elective were invited. As credit was not possible, all components were optional.

Results: We designed a weekly lecture series led by RO faculty. Topics included disease site-based educational lectures, research presentations, and research methods instruction. We paired students with resident and faculty mentors (based on clinical and/or research interests) for guidance through the upcoming interview season. IVE students were invited to four resident didactic sessions; these were also recorded for independent viewing. MSs were offered the opportunity to give a 15-minute presentation to our department. Additionally, MSs were invited to informal informational sessions with the residents (3), general faculty (1), educational program leadership (1), and division leadership (1). We invited 27 students to participate in the IVE, held from July to October 2020. A median of 11 students (range 7-18) attended the weekly lectures and informational sessions. Themes from post-program qualitative feedback included appreciation for the educational opportunities and introduction to our RO program and faculty. Suggestions for improvement included offering formal credit and scheduling activities outside of clinic hours.

Discussion/Significance: IVEs can be successfully implemented to provide exposure to a sub-specialty and institution. Students participated, despite conflicting responsibilities and lack of credit. This IVE format could widen exposure to subspecialties such as RO, even when onsite electives return.

Keywords: Virtual education, medical student, radiation oncology

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Development and Implementation of a Solid Tumor Oncologic Emergency Lecture for Internal Medicine and Emergency Medicine Residency Programs

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Purpose: Residents outside of radiation oncology have knowledge gaps with regards to general awareness of radiotherapy and its role in the management of oncologic emergencies.(1) We therefore developed and piloted a case-based solid tumor oncologic emergency lecture tailored to internal medicine (IM) and emergency medicine (EM) residents.

Approach/Methods: An interactive in-person lecture with small-group breakout sessions was planned for IM/EM residency programs at a single institution. Due to the COVID-19 pandemic, the lecture was transitioned to a virtual format. The material was adapted from Seminar 3 of the Radiation Oncology Education Collaborative Study Group Medical Student Introduction to Radiation Oncology curriculum(2), with a greater focus on the initial management algorithm and the implementation of a case-based format. The EM session was evaluated with a pre- and post-survey to assess learner reaction and knowledge.

Results/Outcomes: In the 2020-21 academic year, 64 residents (N=30 IM, N=34 EM) attended one of three virtual lectures. 19/34 (56%) EM residents responded to all three pre-lecture poll questions and 8/34 (24%) completed the post-test. On the pre-lecture poll, 57% (12/21) reported never having had a radiation oncology lecture, 74% (14/19) were "not at all" or "slightly" likely to consult radiation oncology for an oncologic emergency, and 71% (15/21) were "not at all" or "slightly" confident regarding the initial algorithm for oncologic emergencies. On the post-test, 25% (2/8) of respondents were "not at all" or "slightly" likely to consult radiation oncology (both had not attended the lecture) and 37.5% (3/8) of respondents were "not at all" or "slightly" confident regarding the initial algorithm (2/3 had not attended the lecture). Regarding the post-survey knowledge-domain questions, the median score of the six respondents who attended the lecture was statistically higher than that of the two respondents who had not (89% vs 44%, Wilcoxon rank sum test p=0.018).

Discussion: Within the limitations of a small sample size, non-randomized design, and low post-test response rate (which is expected to increase with longer follow-up), this pilot project suggests that a single virtual lecture by a radiation oncologist may increase IM/EM resident awareness of radiation oncology's role in solid tumor oncologic emergencies and confidence regarding the initial management algorithm. Further study is needed.

Significance: A single lecture on solid tumor oncologic emergencies by a radiation oncologist delivered to IM/EM residents may increase their confidence in patient management and their likelihood to consult radiation oncology in the emergency setting.

Keywords: interdisciplinary education, survey study, oncologic emergency

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Correlation Between Research Productivity During Medical School and Radiation Oncology Residency

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Purpose: The purpose of this analysis is to investigate whether research productivity during medical school predicts future research productivity during radiation oncology residency.

Approach/Methods: At our institution, there have been 20 medical students who graduated between 2005 and 2015 and subsequently completed their residency training in radiation oncology. We built a database of all PubMed-indexed publications in which these former students were first author. They were each categorized as having 0, 1, or ≥ 2 publications during medical school and residency. Mean rates of publication with 95% confidence intervals (95% CI) were computed. A paired t-test was used to look at the mean difference in first-author publications between the medical school and residency periods. Fisher's exact test was also used to evaluate whether publications during medical school were associated with publications during residency. An ordinal logistic regression model was employed to measure the odds ratio (OR) of publishing during residency versus publishing during medical school. A Spearman correlation coefficient was calculated for the relationship between the number of publications during medical school compared to the number during residency.

Results/Outcomes: A total of 14 and 60 first-author publications were identified for 20 individuals during medical school and residency, respectively. There was an average of 0.7 (95% CI 0.17-1.23) first-author publications during medical school and 3.08 (95% CI 1.56-4.44) first-author publications during residency ($p=0.003$). Only 15% (3/20) had ≥ 2 publications during medical school, while 50% (10/20) had ≥ 2 publications during residency ($p=0.058$). Residents who had one or more medical school publications were more likely to publish at least once during residency (OR 15.15; 95% CI 1.46-156.7; $p=0.023$). The correlation between research publications before and during residency was $r=0.457$, $p=0.043$.

Discussion: Based on this retrospective analysis from our institution, research productivity during medical school, as defined by number of first-author publications, does correlate with future research productivity during radiation oncology residency.

Significance: Research productivity during medical school may serve as a useful measure for identifying future research contributions as radiation oncology residents.

Keywords: Research productivity, medical school, residency

Methodology and Efficacy of Weekly SA-CME Web-Based Radiation Oncology Educational Conference in a Large Integrated Cancer Network

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Purpose: Following completion of residency, self-directed learning is needed to ensure practicing radiation oncologists remain up to date on relevant clinical literature and changes in the field which can directly impact patient care. We created a weekly web-based radiation oncology educational conference to help facilitate learning across our large integrated cancer network with over 25 national and international radiation oncology centers.

Approach/Methods: We arranged for residents and attending physicians at both academic and community sites to present cases during a one-hour weekly session via the Microsoft Teams platform, with discussion led by a teaching faculty. Prior to each session, relevant articles were provided to all physicians, physicists, and dosimetrists across the network. During the case presentations, various aspects of the case were discussed to determine how attendees would approach treatment of the case being presented, as well as emphasize contouring guidelines and clinically relevant literature. SA-CME questions were sent out following each session to assess comprehension. A mid-year survey was sent out to assess quality of sessions and determine whether practice was changing based on newer data discussed.

Results/Outcomes: 30 out of 60 attending physicians practicing across the integrated network responded to the survey. On a scale of 1-5, with 5 being the best score, median overall rating of quality of sessions was 5 (interquartile range [IQR] 4.25-5) and median rating of post-session SA-CME questions was 5 (IQR 4-5). There was adoption of newer practices based on data discussed, with 6 physicians (20%) reporting new adoption of 5-fraction regimens for early-stage breast cancer, 12 physicians (40%) reporting changes in pelvic nodal contouring, and 12 physicians (40%) reporting new adoption of hippocampal sparing whole brain radiotherapy in appropriately selected patients.

Discussion: Response to the weekly web-based radiation oncology educational conferences was positive. There were changes across multiple domains in regular practice of radiation oncology following the first several months of sessions. The sessions allowed colleagues across the entire network to connect and learn from each other in a meaningful way.

Significance: While self-directed learning remains essential for modern practice of radiation oncology, web-based radiation oncology collaborative conferences can help further the ultimate goals of improving patient care and ensuring participants remain as up to date as possible with modern radiation therapy treatment techniques and literature.

Keywords: Web-based educational sessions

COVID Pass: A Case Study for Clinical Informatics

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Purpose: There is limited awareness and understanding of clinical informatics, which is the application of informatics, clinical knowledge, and technology to continuously improve healthcare systems, services, and outcomes. This is essential for modern healthcare and will become increasingly important in the future. Because of our relationship with imaging, planning, and treatment software and machines, and our evidence-based training and focus, radiation oncologists are well-positioned to join or work closely with clinical informaticians.

Approach/Methods: We will start with an introduction of the medical subspecialty of Clinical Informatics, including educational opportunities for Radiation Oncology residents and attendings in the field of clinical informatics. We will focus on a specific product that will help the audience understand the broad scope, potential, and significance of applied clinical informatics.

Results/Outcomes: COVID Pass(1) is a comprehensive web-based COVID-19 screening and scheduling platform at our multi-institutional academic medical center. It demonstrates several key components of Clinical Informatics: digital apps, clinical workflows, people management, electronic health records, improving quality and safety, data infrastructure, analytics, communication and collaboration among interdisciplinary teams, and leadership.

Discussion: COVID Pass was urgently developed in March 2020 to easily and efficiently screen our institution's healthcare workers (HCW) for COVID-19, track HCW working on-site, and distribute personal protective equipment (PPE). It is used by >50,000 HCW daily in 78 of our hospital or clinic sites and while working remotely, and it has improved the early testing of symptomatic HCW and helped to allocate COVID-19 tests that were scarce in early 2020. COVID Pass has also been expanded to allow HCW to self-schedule elective COVID-19 tests and vaccinations, and communicate important updates and policy changes. It is available in 4 languages through 4 modes of access, including integration into our electronic health record (EHR). This web-based app exemplifies the potential for digital applications to improve the ease, efficiency, and effectiveness of workflows in healthcare.

Significance: Technology is crucial in modern healthcare. Clinical Informatics is the growing medical subspecialty that combines physicians with diverse clinical, technical, and professional backgrounds who are uniquely qualified to help guide healthcare into a future that optimizes the applications of technology. Radiation Oncologists, in training and in practice, should become familiar with this growing field and opportunities to collaborate and learn from each other's expertise.

Keywords: Clinical informatics, COVID-19, Education

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The Development and Piloting of a Virtual Reality Patient Consultation Simulation to Improve Oncology Practitioners Communication and Counseling Skills

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Purpose: Improving clinician communication skills has direct ramifications for cancer patient care. Previous studies have shown better communication techniques reduces cancer patient's anxiety and depression levels (1, 2). However, delivering effective, evidence-based communication training for clinicians is resource intensive and often difficult to deliver at scale - issues that have been further exacerbated by the COVID pandemic. VR simulation provides a revolutionary opportunity for flexible, self-paced learning of communication skills in a safe environment. Students can be free to experiment and re-try difficult conversations until they have refined the relevant techniques.

Methods: This project builds upon prior experience within our team, where members created an immersive, Virtual Reality (VR) simulation clinic that allowed trainees to interact with radiotherapy equipment and simulated patients (3, 4). We sought to extend this by creating a new VR training module that allowed users to conduct extended conversations with two VR patients on emotive topics: 1) A new cancer diagnosis and 2) Recommendation of treatment cessation. This was supplemented by custom-made learning materials that guided students in best practice methodology on how to handle such conversations. In the VR simulation students practice conversations with qualitative and quantitative feedback, have no time limits, and the discussion may be re-conducted as many times as the student wishes -allowing them to practice and refine their communication skills in a non-threatening, self-guided environment.

Outcome: The VR simulation and training module was successfully built, with a pilot of the educational program launched in late 2020. It is delivered using a fully online platform. We plan on evaluating the program through various methods, including pathway mapping of the students' progress through the virtual consultations, to ascertain proficiency improvements over time. Trainee-reported evaluations of their confidence in dealing with such emotional scenarios post- program completion, will also be captured

Discussion: Sensitive and emotive conversations with patients are a daily part of oncological practice, for example, when delivering a new cancer diagnosis or discussing prognosis. Despite this, most specialty training programs focus on teaching and assessing so-called 'hard skills', including treatment choice and technique. 'Soft skills' such as how to best handle emotional conversations are typically taught in a more ad hoc manner. As the educational sphere evolves in a post-COVID world, VR simulated learning environments such as this provide the opportunity for a scalable, personalized solution to train oncology practitioners in evidence based, best-practice communication methodology.

Keywords: Communication skills, Virtual reality, Simulation, Medical Education, Oncology Education

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A Structured Approach for Training and Testing Staff in Radiation Therapy

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Purpose: To create a structured approach for training and testing staff in Radiation Therapy (RT) while introducing a significantly new patient procedure into the clinic (e.g., MR guided RT).

Approach/Methods: RT procedures are becoming more complex and "surgery like" with new SBRT regimens and techniques, placing new demands on staff competency. A google search for structured methods to train the RT team and test its competency resulted in no positive results. A google search for clinical competence in medicine resulted in links and references to the pyramid structure introduced by Miller (1) as a framework for assessment of clinical Skills/Competence/Performance. In this framework, the base level, "Knowledge" is defined as the collection of basic facts required for the procedure. The next level "Applied and Integrated (A&I) Knowledge" is defined as the ability to draw on the knowledge to formulate a solution for the procedure. The third level "Competence" is defined as the ability to demonstrate the A&I Knowledge in a controlled setting. The apex of the pyramid "Performance" is the execution of competency in the real world setting on actual patients.

Results/Outcomes: An example of applying this framework to the implementation of MRgRT in the clinic might look as follows. Knowledge would include a detailed curriculum on basic MRI concepts, operational and safety knowledge of MR systems and MR Linac specific MRI and Linac knowledge. Test instrument would be written quizzes. A&I Knowledge would evaluate a thorough understanding of theory and institutional policies related to simulation of patient in CT and MR Linac, treatment planning, and delivering (adaptive) treatments. Test instrument would be long form questions and oral exams. Competence can be demonstrated through execution of A&I knowledge on phantoms and patient volunteers. Test instrument would be preceptor rating and accuracy of radiation distributions delivered to phantoms. Performance is the application of competencies demonstrated on real patients. Test instrument would be peer review of various steps in treatment process and a quality management program.

Discussion: Miller's framework provides a structured approach to separate the components of education and testing for RT staff, with the opportunity to identify gaps in knowledge, understanding, and execution. This can serve to develop and document staff performance of various processes to ensure high quality patient treatments.

Significance: If found to be clinically relevant through focused testing, the above framework can serve as a model for standardizing meaningful continuing staff education and assessment in Radiation Therapy.

Keywords: Knowledge, Competence, Performance

References:

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Improving the MR Guided Radiotherapy Patient Experience Through Story Driven Video with 3D Animations

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Purpose: When patients start their cancer journey, there can be increased anxiety about new procedures and processes in addition to their recent diagnosis (1). One of these potential anxiety-inducing experiences is a treatment plan that includes MR-guided radiation where breath holding is necessary. Lack of optimal patient preparation for such therapy can result in delays on the treatment unit itself which can increase patient and staff dissatisfaction.

Methods: In the first year of incorporating the ViewRay MRIdian into our practice, we recognized that suboptimal patient engagement resulted in treatment delays for some SBRT patients. Discussions with radiation therapists, physicians, patients, and caregivers led to meaningful conversations about frustrations and fears surrounding the extended time on the table in an enclosed space. Once we understood these multiple issues, we teamed with these stakeholders as well as colleagues from our patient relations and media department. We created a video to improve the patient experience and collaborated with animators as well as colleagues from the Digital Caviar film production company and ViewRay. Our group hypothesized that a story driven video shown at consultation with actors portraying a patient and caregiver going through the entire treatment process could induce desensitization to treatment on MRIdian and enhance understanding of the upcoming journey, leading to less patient anxiety. We wrote the script and had multiple table-reads for team edits, paying attention to alignment with the patient experience we were trying to create.

Outcomes: Video post-production was recently completed, and the final video just became available. So far, we have been informally piloting this in the clinic for patient feedback. Uniformly, patients expressed decreased stress and improved understanding of what they would experience. The MRI staff reported that the patients who viewed the video performed better with toleration of the set-up and reproducibility of the breath hold at their first treatment.

Discussion: We think this tool may be best utilized face-to-face during the consultation. Similar patient education videos have shown to decrease anxiety and increase comfort prior to consultation (2). Our study is planned to formally assess the impact on the patient, caregiver, and radiation oncology team.

Significance: Creation of engaging, relatable, visual content may enhance understanding and compliance with treatment and highlight shared responsibility of care. Providers and staff who depend on patient preparation for workflow may also notice greater patient satisfaction due to increased engagement.

Keywords: patient experience, patient engagement, MRI Linac

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Initial Experience with a Multidisciplinary Leadership Journal Club

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Purpose: Physicians are expected to lead clinical and research teams throughout their careers but receive little postgraduate professional development skills training. In residency and fellowship, trainees focus the majority of their time within their respective medical siloes, leaving less time for interaction with their peers in other specialties. To mitigate these issues and foster cross specialty collaboration and networking, we created a multidisciplinary leadership journal club (MDLJC) and report our initial experience.

Approach/Methods: With the guidance of a faculty radiation oncologist, three senior level residents and fellows from radiation, surgical, and medical oncology served as co-directors to create the MDLJC. On a quarterly basis, leadership-oriented topics were chosen by the trainees and two structured journal articles were selected after PubMed and Google searches. A faculty physician from each specialty was invited to serve as a discussant. Two co-directors would present the articles while one co-director moderated, encouraging interactive dialogue with the faculty. Sessions were held through a hybrid in-person and virtual approach to maximize flexibility and foster attendance. All trainees from the three specialties and their respective program directors were invited to attend. Post meeting surveys were sent to trainees.

Results/Outcomes: A total of three journal clubs were held in the academic year 2020-2021 and each of the co-directors led one topic. The topics covered were "Mentorship", "Navigating the First Job Search", and "Conflict Management". Between 65-75 people were invited to each journal club and 5-10 people attended in-person and 35-42 people attended virtually. The sessions had significant engagement among the co-directors, guest panelists, and other attending-level physicians. Low numbers of anonymous questions (≤ 6) were submitted for the sessions and post-meeting surveys had a range of responses (9-27).

Discussion: To our knowledge, this is the first MDLJC held for trainees in oncology. While the co-directors felt the sessions were successful and pertinent to their training, they noted lack of participation by their fellow trainees. Barriers to participation may include the virtual format, busy schedules, non-mandatory participation, a lack of interest, and/or burnout.

Significance: Discussing leadership topics in a MDLJC setting is an effective format to build important skills for trainees and breaks down specialty siloes to promote multidisciplinary communication. Further analysis and work are needed to enhance the engagement of attendees.

Keywords: Multidisciplinary, Leadership, Journal Club

Benefits of a Tele-Education Curriculum for Radiation Oncology Centers in Low- and Middle-Income Countries Transitioning from 2D to 3D External Beam Radiation Therapy

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Purpose: As cancer centers in low and middle-income countries (LMICs) seek to transition from 2-dimensional (2D) to 3-dimensional (3D) external beam radiation therapy (EBRT), the lack of training remains a barrier to effectively do so. The nonprofit Rayos Contra Cancer offers a virtual curriculum that hopes to provide transitional support to improve the quality of radiotherapy in these countries. This study aims to evaluate the efficacy and promise of a Tele-education 2D to 3D EBRT training program.

Approach/Methods: Nine operational cancer centers in LMICs of the Middle East and Northern Africa were enrolled in a free, 14-week, 24-session curriculum designed by a volunteer team of EBRT content experts. Participants, including radiation oncologists, medical physicists, radiation therapists, and dosimetrist (n=193), were administered a Likert scale (1-5) confidence evaluation on 13 foundational domains in 3D EBRT and a 49-question knowledge-based multiple-choice examination both pre- and post- curriculum electronically. Statistical significance was evaluated via paired t-tests.

Results/Outcomes: Pre- and post-curriculum mean self-confidence scores were 2.57/5 (51.4%, n=193) and 4.28 (85.6%, n=95), respectively, among 13 domains; among respondents with pre- and post-curriculum paired responses (n=83), scores were significantly higher in 12 of 13 domains (p<0.001). Pre- and post- knowledge-based exam scores also improved among paired responses, 23.5/49 (48%) vs. 30.2/49 (62%) (n=83, p<0.05). For participants who completed paired confidence evaluations and knowledge-based exams, there was a mean score increase of 1.05/5 and 7.43/49, respectively (n=70). The relationship between self-confidence score improvement and knowledge-based exam score improvement was found to be statistically significant across all 13 domains for paired respondents (n=70, p<0.001). Preliminary analysis found session attendance had no significant effect on score improvement; however, there seems to be a relationship between radiotherapy role and self-confidence score improvement worth further exploration. End of curriculum anonymous feedback surveys, with 1-5 satisfaction scores, showed mean 4.5/5 satisfaction (n=87).

Discussion: These results suggest that Tele-education training programs on 2D to 3D EBRT hold promise in improving radiotherapy confidence and knowledge for cancer care centers in LMICs, with high satisfaction among participants.

Significance: Increasing confidence and knowledge in radiotherapy in the international setting, by aiding in the transition from 2D to 3D EBRT through educational support, may improve patient care globally. Future work would evaluate whether there is statistically significant improvement across different years of experience and/or different radiotherapy roles, such as radiation oncologists compared to radiation therapists, on specific domains, to gauge the need for more targeted education.

Keywords: tele-education, global health, 2D-EBRT

The Impact of ROESCG 2020 on Unique Site Visits to a Radiation Oncology Educational Website

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Purpose: The volume of literature in Radiation Oncology is challenging to keep up with, especially with heterogenous practice patterns across training programs. Free online resources such as QuadShotNews, eContour.org, and theMedNet.org have recently emerged to provide dynamic tools to stay abreast of the latest developments in our field. RadOncReview.org was launched in September of 2019 with the goal of providing an interactive resource to place evidence at the fingertips of busy trainees and practitioners. We hypothesized that the Radiation Oncology Educational Collaborative Study Group (ROESCG) 2020 Spring Symposium would have a significant and durable impact on the volume of unique site visits and user contributions.

Methods: RadOncReview was selected for an oral presentation at ROESCG 2020 on May 15th, 2020. Data from September 15th, 2019 to May 14th, 2020 and May 18th, 2020 to February 28th, 2021 comprised the pre-and-post-ROESCG cohorts, respectively (9 months each). The weekend of May 15-17th, 2020 defined the ROESCG cohort. Google Analytics tracked the number of unique site visitors, country of origin and device type. Manual review of commentary on Google Documents served as a gauge of audience contribution.

Results: Pre-ROESCG, there was an average number of 146 unique monthly site visitors to the RadOncReview website totaling 1,168 unique site visitors from 40 different countries. During the weekend of ROESCG, there were a total of 1,262 unique site visitors from 60 different countries. Post-ROESCG, there was an average of 792 unique monthly site visitors totaling 7,287 unique site visitors from 84 different countries. The proportion of desktop, mobile, and tablet users remained relatively constant at 64%, 34% and 2%, respectively. User contributions (e.g., spelling, content, comments, links, and errata) increased nearly three-fold between the two nine-month time periods before and after ROESCG, from 71 to 203 contributions, respectively. Since the launch time in September of 2019 to March 15, 2021, there have been 10,153 unique site visitors from 90 different countries.

Discussion: ROESCG is an excellent platform for dissemination and sustained utilization of radiation oncology education resources.

Significance: The ROESCG Spring Symposium had a significant impact on increasing user traffic and contributions to the RadOncReview educational website. We welcome input from ROESCG and the medical education community to help improve this freely available online educational resource and to encourage sustainable ongoing contributions.

Keywords: Educational Website, Rad Onc Review, ROESCG 2020

Competency-Based Medical Education in Canadian Radiation Oncology Residency Training: An Institutional Implementation Pilot Study

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Purpose: Competence by Design (CBD) is the Royal College of Physicians and Surgeons of Canada's (RCPSC) adaptation of competency-based medical education (CBME) for medical residency training (1). Canadian radiation oncology (RO) residency programs transitioned to CBD in July 2019. Prior to this, CBD was piloted in a single RO residency program to characterize assessment completion and challenges of implementation.

Methods: A mixed-methods study design was utilized. Six residents and seven staff were recruited and oriented to CBD. Four Entrustable Professional Activities (EPA) and their constituent milestones were assessed over a four-week-long block and documented using online assessment forms. Anonymized assessments were analyzed to characterize completion. Post-pilot surveys were distributed to all participants. Semi-structured post-pilot focus groups were conducted with residents, audio-recorded, and transcribed verbatim for thematic analysis.

Results: Surveys were completed by 4/6 residents and 5/7 staff; all residents participated in focus groups. Assessments were requested and documented on a weekly basis. Narrative comments were found in 68.1% of assessments, of which 26.7% described specific examples of observed competence or recommendations for improvement. The "breaking bad news" EPA was not assessed and 3/4 residents reported not receiving feedback on 8/14 communication milestones. Three of five staff believed that assessments have a negative impact on clinical workflow. Three themes were identified: 1) direct observation is the most challenging aspect of CBD to implement, 2) feedback content can be improved, and 3) staff attitude, clinical workflow, and inaccessibility of assessment forms are the primary barriers to completing assessments.

Discussion: CBD assessments were completed regularly during a block-long pilot. The need to improve the quantity and specificity of documented narrative feedback has been noted in analogous CBME implementation studies (2). Staff apprehension towards CBD and concerns about its negative impact on clinical workflow are consistent with experiences in other disciplines (3, 4). The time-intensiveness of direct observation and the paucity of clinical activities with a normalized culture of direct observation may contribute to the challenge of conducting frequent direct observation (5).

Significance: The challenge of integrating increased direct observation into clinical workflow may result in discordance between the feedback expected by the RCPSC and that which is delivered, particularly for communication milestones. Documentation of specific and actionable narrative feedback on all EPAs may facilitate resident learning and lead to the identification of training gaps and subsequently curriculum change. Additional faculty development initiatives and incorporation of mobile-accessible online assessment tools may be needed to facilitate the transition to CBD.

Keywords: CBME, implementation, feedback

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Feedback Delivery in an Academic Cancer Centre: Reflections from an R2C2-Based Microlearning Course

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Purpose: Feedback delivery and training have not been characterized in the context of academic cancer centres. R2C2 (Relationship, Reaction, Content, Coaching) is an evidence-based reflective model for providing assessment feedback (1). The purpose of this study was to assess the feasibility and utility of a microlearning course based on the R2C2 feedback model and to characterize multidisciplinary staff perspectives on existing feedback practices in an academic cancer centre.

Methods: A prospective longitudinal qualitative design was utilized. Five staff (two radiation oncologists, one medical oncologist, and two allied health professionals) with supervisory roles were selected by purposive sampling. The course, consisting of a web-based multimedia module, was completed by each participant. Semi-structured one-on-one interviews were conducted with each participant at four time points: pre- and immediately post-course, and at one- and three-months post course. Interviews were audiotaped and transcribed verbatim. An abductive approach informed by the R2C2 model was used to code transcripts and generate themes.

Results: All participants found the course to be time feasible and completed it in 10-20 minutes. The course was deemed useful by participants and fulfilled their perceived needs for feedback training and normalization of feedback culture in the cancer centre. Learning retention of the R2C2 model was present in four of five participants at three-months post course. Three relationship-oriented themes were identified regarding perceptions of existing feedback practices: 1) hierarchical and interdisciplinary relationships modulate feedback delivery, 2) interest in feedback delivery varies by duration of the supervisory relationship, and 3) the transactionality of supervisor-trainee relationships influences feedback delivery.

Discussion: An R2C2-based microlearning course is time feasible and offers a structured approach to real-time feedback delivery in an academic cancer centre. These findings complement recent work suggesting that R2C2 can be adapted for in-the-moment feedback delivery (2). The perceived impact of hierarchical, interdisciplinary, time-dependent, and transactional dynamics on existing feedback practices is in keeping with published findings in other contexts (3,4), supporting the suggested need for an institutional culture conducive to feedback.

Significance: Faculty development using a digital microlearning approach may be time feasible and useful for busy healthcare providers in academic cancer centres, facilitating adoption of a shared conceptual model and reflection on existing practices. While development of feedback competencies may contribute to normalization of feedback, the need for cultural expectations around feedback and existence of cultural barriers to its delivery may suggest the need for an explicit organizational commitment to culture change.

Keywords: feedback, microlearning, R2C2

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Using the Dosimetric Radiation Plan as a Teaching Tool for Early Trainees to Understand Radiation Toxicity

Presenter: Anurag Saraf

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Purpose: Radiation therapy (RT) has drastically advanced in the past several decades, leading to highly complex and personalized dosimetric treatment plans. Despite the importance of radiation treatment planning, medical students and residents/fellows in medical or surgical oncology-related fields have limited exposure to radiation therapy management and the role of radiation oncology in cancer care (1). Education literature suggests adult learners comprehend new topics in the context of prior experience. For many medical students and oncology-affiliated trainees, prior experiences with RT have involved clinical care for acute and late-term side effects of RT. Dosimetric RT plans are an accessible visual representation of an individualized treatment and may be a novel method to educate trainees about RT toxicity. We hypothesize that utilizing an RT plan module may improve understanding of acute and late RT toxicity and increased knowledge of radiation oncology decision-making in cancer care among medical students and oncology-affiliated early trainees.

Approach/Methods: We designed a two-part educational module to review dosimetric RT plans with early trainees. In part one, a didactic component reviews the general principles of radiation biology and physics to educate trainees about the acute and late toxicity of RT, followed by 3 examples of RT plans for common disease sites. Each example plan will contain target volumes, organs at risk (OARs), as well as high and intermediate isodose lines to visualize how RT is distributed over the patient's anatomy. In part two, trainees will scroll through an example case with overlaid target volumes and OARs, as well as isodose lines of high and intermediate radiation dose before answering a few questions related to the potential acute and late normal tissue toxicities anticipated with each plan. We will utilize pre- and post-surveys to measure learning, and compare to a control group of trainees without the education module.

Results/Outcomes: We will determine if there is an association between understanding radiation plan and dose distribution and ability to predict acute and late-term radiation toxicity among trainees. We will also investigate if understanding the radiation plan leads to greater understanding regarding use of radiation therapy in both a definitive and adjuvant setting.

Discussion/Significance: This study will investigate if the dosimetric RT plan is an effective teaching tool for early trainees regarding prediction of acute and late effects of radiation from dosimetric RT plans, and increasing knowledge about radiation oncologist decision-making.

Keywords: Plan Review, Radiation Toxicity, Medical Student

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1ONCstudent: Development of Open Access Radiation Oncology Medical Education App for Medical Students

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Purpose: Undergraduate medical education in radiation oncology is highly variable and largely underrepresented across different medical schools and curriculum (1). Advancements in technology have led to accessibility of information across multiple platforms. Mobile phone apps can serve as novel e-Learning resources for medical students. Limited experiences have shown the feasibility of apps for medical student education across different specialties and countries (2). However, to date, there is no educational mobile phone app for medical students rotating in radiation oncology. We have developed a medical education app called 1ONCstudent, which aggregates and curates radiation oncology resources for medical students. We hypothesize that 1ONCstudent may improve medical student clerkship experiences and overall impression of radiation oncology.

Approach/Methods: 1ONCstudent = is a mobile application (app) utilizing modern software development technologies, primarily Dart, Python, and JavaScript. 1ONCstudent aims to incorporate all radiation oncology resources relevant to medical students. Educational components of the app include pictorial and video components of staging, primary literature, anticipated acute/late toxicities of radiation, physical exam findings, normal anatomy (pictorial and radiographic), among others. We designed a two-phase study to investigate the utility of a radiation oncology medical education app for medical students. The first phase will be a feasibility study for medical students completing a radiation oncology sub-internship. We will invite medical students to give live and end-of-rotation feedback during the rotation for usability issues, most utilized resources, and other resources that can be added. We then plan to initiate a Phase 2 study assessing the educational effectiveness of 1ONCstudent. We will characterize educational outcomes with pre-rotation and end-of-rotation questionnaires assessing change in substantive knowledge as well as overall experience during the rotation. We will compare with control group of medical students who have not utilized 1ONCstudent.

Results/Outcomes: We aim to develop a mobile phone app that can support and enhance medical student learning during their radiation oncology sub-internship rotations. We will investigate what resources are most utilized on the mobile app platform, and how the learning experience can be enhanced with the additional resource.

Discussion/Significance: This platform may have the potential to be useful to other audiences, including pre-clinical medical students.

Keywords: Mobile App, Medical Student, Learning Tools

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Integrating Leadership Competencies in Clinical Didactic Curricula: The Mock Tumor Board

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Purpose: Developing leadership competencies has been identified as an essential part of graduate medical education¹ that has oft been neglected with minimal dedicated didactic programs. A few ad hoc programs have been created at individual residency programs,^{2, 3} but the current limits on extra didactic time in many curricula preclude robust implementation of dedicated leadership didactics. As attending radiation oncologists, we are expected to advocate for our patients at multi-disciplinary tumor boards in which we are almost certainly in the minority. Trainees receive little to no training or opportunities to practice these skills prior to independent practice.

Approach/Methods: We sought to create an interactive simulation for residents to practically apply conflict management and other leadership competencies while simultaneously applying clinical data in a mock tumor board as an improvement over traditional journal club formats. We organized two simulations, one discussing stereotactic body radiation therapy (SBRT) for pancreatic cancer cases and the second discussing rectal cancer. Prior to each simulation, journal articles were provided to the residents for preparation, but the cases were not. During each simulation, the radiation oncology residents played the role of the treating radiation oncologist and we had a surgical oncologist, medical oncologist, and radiologist. All faculty were coached to be intentionally confrontational and challenge the decision making of the residents.

Results/Outcomes: No formal evaluations of these sessions were completed this year but we plan next year to evaluate the effectiveness of these sessions with pre- and post-surveys. Additionally, debriefing sessions and structured interviews of the participants, both residents and faculty, will be used to further elucidate the effects of these sessions.

Discussion: Conflict management and influence are foundational elements of the emotional intelligence model to help create more effective leaders within radiation oncology.⁴ We expect both increased resonance with the clinical material, as well as increased facility with negotiating skills, leading to increased resilience navigating these situations.

Significance: Leadership competencies are integral components of medical education.⁵ A lack of dedicated time for formal didactics in many cases. We present a more interactive session to apply both conflict management skills, as well as clinical data that is more engaging and has the potential to increase retention of material without needing additional didactic time. These sessions will help trainees master critical skills to optimally advocate for their patients while maintaining relationships with other specialists.

Keywords: Conflict Management, Multi-Disciplinary, Leadership

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A Mixed-Methods Analysis of a Single-Institution Radiation Oncology Virtual Medical Student Rotation

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Purpose: The COVID-19 pandemic prompted the widespread development of virtual rotations, replacing traditional in-person experiences.^{1,2} These rotations introduce the role of radiation in cancer care and recruit students to residency programs. The Department of Radiation Oncology at the University of California, San Francisco developed a comprehensive 2-week virtual rotation that aimed to maintain broad clinical exposure for medical students. However, effective strategies for incorporating students into clinical interactions, modeling interdisciplinary practice, assessing students' growth, and facilitating interpersonal interactions between students, residents, and faculty using the virtual platform remain unclear.

Methods: We initiated a mixed-method study using a sequential exploratory study design for the medical student virtual rotation in the Department of Radiation Oncology at the UCSF between May 2020 and February 2021.³ Using an investigator and a methodological triangulation approach, this study invites all participating medical students, residents, and faculty to complete surveys assessing their experiences with the virtual rotation platform and provides the option to engage in a semi-structured interview.⁴ We will generate descriptive statistics of survey results and use qualitative thematic content analysis of interview responses to identify features of virtual platforms that enhance or impede students' learning and working environments. The survey is open during the month of March 2021 following Match rank list certification.

Results: Sixteen medical students, 12 resident physicians, and 18 attending physicians were invited to participate in the study. We hypothesize that the virtual setting provided an opportunity for medical students to learn more about radiation oncology programs that they may not otherwise have had the option to explore. However, we expect that a proportion of students perceived that the virtual format limited their ability to take an active role in patient care and networking with attending physicians. For residents and faculty, we hypothesize that the virtual format limited residents' and attendings' ability to assess, convey valuable information to, and form connections with medical students. We anticipate that the interviews will provide novel approaches for remedying these limitations.

Discussion: Emerging virtual rotations are an important modality for providing accessible options for students' exposure to radiation oncology. As such, identifying existing features of rotations that facilitate an effective learning environment for patients, medical students, residents, and faculty, and defining additional strategies to remedy the limitations of virtual platforms will be critical.

Significance: This multistakeholder assessment of our curriculum will serve as a framework for an iterative process for developing best practices for virtual rotations.

Keywords: virtual curriculum; medical students

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The Chief Medical Officer's (CMO) Office Elective for Senior Residents: A New Opportunity for Tomorrow's Physician Leaders

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Purpose: The Chief Medical Officer's (CMO) office at the University of Mississippi Medical Center initiated an elective for interested residents to rotate through various departments associated with CMO's office. This rotation intends to provide insight into the workings of a healthcare center, enhance understanding of medical practice in the 21st century, and supply practical information to transition from resident to an attending physician.

Methods: Here, we describe the arrangement of the elective, including the details of the resident experience.

Results: The four-week course is arranged to offer a comprehensive experience in the first three weeks. The last week is allocated to re-explore and learn about the resident physician's particular area of interest. A pre-rotation meeting is mandated with the resident physician and the physician in charge of the rotation (core faculty) to design the block and to provide an individualized schedule. On the first day of the rotation, the resident meets with the core faculty and takes a pre-rotation assessment. The core faculty goes over the individualized schedule for the resident and expectations from the rotation. One day is allocated with the chief medical officer, who meets with the resident, goes over onboarding, pay for performance programs, details of quarterly CMO meetings, and leadership meetings of the institution. The resident spends one day with the Chief Quality Officer (CQO). They learn about high reliability, teamwork in medicine, standardization of practice, quality board, leadership rounds, and team safety training. Then the resident spends time with the risk management team and learns about I-CARE (I report at-risk events) system, root cause analysis, disclosures, allegations, sentinel events, workplace violence, safety culture, and safety huddle. The resident learns about professionalism, credentialing, peer review, and licensing at the Chief of staff office. Resident spends time with the legal team at the university and familiarize himself or herself with practice tips to decrease liability. The resident is exposed to the depositions and risk committee and given an in-person experience to participate in these committees. On the day the resident spends with infection prevention, they go on rounds with the infection prevention team. Details about antibiotic stewardship, isolation precautions, personal protective equipment (PPE), and hand hygiene training are reinforced during this time. The resident spends three days with the performance improvement (PI) team where they learn about the different PI tools, including PDSA (Plan, Do, study, act), FMEA (failure mode analysis). The resident should participate in PI team meetings and learn about building a high-reliability organization. The resident learns about processes associated with managing complaints and grievances through the office of patient experience (OPE). The resident spends some time with the CMO office's regulatory section to learn about the requirements of the Joint Commission (TJC), CMS, and the department of health. Resident spends some time with population health experts and learns about performance metrics, physicians for prevention (PFP) programs that impact wellness and reimbursement. There is a post-rotation assessment which is shared with the residency program. A feedback system has been put in place to improve the CMO's office elective rotation.

Discussion: The CMO's office elective for senior residents gives a unique opportunity for a resident physician to learn about a healthcare system's workings in the 21st century. This experience helps to mold the physician leaders of tomorrow.

Significance: The CMO's office elective is one of its kind to provide an in-depth learning opportunity for the senior residents about the day-to-day workings of a large hospital system. There are no published reports about such an experience. We believe that a training opportunity like this will help to mold the physician leaders of tomorrow, which is an urgent need of healthcare in the United States.

Keywords: CMO elective, physician leadership, resident elective, medical education

Evaluation of an Inter-Disciplinary Simulation-based Learning Module in Improving Learners' Comfort Level in Managing Neoplastic Spinal Cord Compression

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Purpose: Our study aims to establish the effectiveness of an interdisciplinary SBME module in improving learners' comfort level in managing neoplastic spinal cord compression which is a common radiation oncology emergency.

Approach/Methods: This is a prospective cohort study. Participants will include radiation oncology residents, medical physics residents and radiation therapy students at the University of Alberta. The study participants will be recruited from the radiation oncology residency program, medical physics residency program and the radiation therapy program at the University of Alberta. The learners will undergo a simulation module designed by radiation oncology, medical physics and radiation therapy faculty members. The module will consist of a 1-hour didactic lecture and a hands-on practical session on spinal cord compression. The lecture will address the specific scenarios and the indications of radiation therapy. The hands-on practical session will address practical aspects of delivering treatment. This includes the process of CT simulation, treatment prescription, and troubleshooting of issues that might arise during the process. This is followed by a simulated scenario using a dummy linear accelerator and mannequins. Each scenario will involve a surrogate patient, a radiation oncology resident and a radiation therapy student.

Results/Outcomes: Each participant will complete pre- and post-course surveys to assess the effectiveness of the simulation session in improving comfort levels of the radiation oncology residents, medical physics residents and radiotherapy students. Each group will have a different survey to address their specific roles in the scenario. The responses are rated on a Likert scale. Continuous data will be compared using paired t test. Analysis of variance will be used to compare residents and students at different levels of training.

Discussion: This study will enable us to evaluate the effectiveness of a pilot simulation module to improve comfort and competence of an interdisciplinary team consisting of radiation oncology residents, physics students and radiation therapy students in handling a case of neoplastic spinal cord compression using a dummy linear accelerator and mannequins.

Significance: The primary scientific benefit of the study is that it will demonstrate how the specific SBME module developed for this study can have an impact on the competence and comfort of the multidisciplinary team involved in the study. Additionally, it may open the door for further research in SBME in radiation oncology.

Keywords: SBME, interdisciplinary teamwork, radiation oncology emergencies

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