ORIGINAL ARTICLE

# Educational Impact of a Structured Radiation Oncology Clerkship Curriculum: An Interinstitutional Comparison

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## Abstract

**Purpose:** Many medical school clerkships have structured curricula; however, most radiation oncology clerkships do not. The Radiation Oncology Education Collaborative Study Group (ROECSG) implemented a curriculum for fourth-year radiation oncology clerkships at 14 institutions. We hypothesized that students completing clerkships with the curriculum would report greater subjective knowledge and comfort to function as a radiation oncology resident compared with students completing clerkships without the curriculum.

**Methods:** The ROECSG curriculum included three 1-hour lectures and a 1-hour hands-on radiation treatment planning workshop. Applicants to a single radiation oncology residency program in the 2014-2015 academic year were sent an anonymous, validated clerkship experience survey. Students indicated if clerkships were completed at a curriculum site. Likert-type data (1 = not at all, 5 = extremely) are reported as median (interquartile range).

**Results:** Respondents described 276 clerkship experiences, of which 64 (23.2%) were completed at a curriculum site. Students whose first clerkship was at a curriculum site perceived greater postclerkship confidence in knowledge of radiation biology (3 [3-4] versus 2 [2-3], $P < .01$), treatment setup/positioning (3 [2-3] versus 2 [2-3], $P < .05$), treatment planning (3 [2-3] versus 2 [2-3], $P < .01$), and ability to integrate evidence-based medicine into treatment (4 [2-4] versus 3 [2-4], $P < .05$). Students who completed any clerkship with the curriculum had greater postclerkship confidence to function as a radiation oncology resident (3 [3-4] versus 3 [2-3], $P < .05$).

**Conclusions:** These results support the curriculum's ability to increase student knowledge in radiation oncology, especially in the students' first clerkship. Further, these findings suggest that expanded implementation of such curricula may ensure a rewarding educational experience during radiation oncology clerkships.

**Key Words:** Undergraduate medical education, curriculum evaluation, radiation oncology

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## INTRODUCTION

Medical student clinical rotations such as internal medicine [1], surgery [2], emergency medicine [3], dermatology [4], urology [5], and palliative medicine [6] have structured didactic curricula to complement the clinical experience, but data suggest radiation oncology does not [7]. Despite medical students completing a median of three clerkships at multiple institutions before applying to residency, a national survey of students applying to radiation oncology in 2012 and 2013 revealed that most clerkships lacked a structured didactic curriculum [7,8].

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In a subspecialty such as radiation oncology, the yearly sample size of trainees at any single institution is too small to acquire meaningful objective results on the impact of the curriculum [9]. To overcome the small number of medical students at a single institution, the multi-institutional collaborative group research model was adapted. The collaborative group model has demonstrated effectiveness in other settings, such as treatment of rare diseases by pooling patients from multiple institutions treated in a given timeframe [10]. Initially piloted at two institutions in 2012 [11], the curriculum was expanded to 11 institutions in 2013 [12] and to 14 institutions in 2014, thus forming the Radiation Oncology Education Collaborative Study Group (ROECSG; https://roecsg.uchicago.edu/). Students anonymously evaluated the curriculum upon completion of each clerkship. Although the evaluations were favorable, there was no comparison of student clerkship experiences and curriculum outcomes to a control group.

In a parallel project, a survey on radiation oncology externship experiences was sent to all fourth-year medical students (MS4s) who applied to a radiation oncology residency at one institution annually since 2013 [7]. For each clerkship completed, students reported on curriculum experiences and self-assessed their postclerkship knowledge and confidence in various facets of radiation oncology. The survey results demonstrated a high degree of variability in clerkship educational experiences. However, students who completed clerkships with formal didactic components reported greater preparedness to function as a radiation oncology resident [8].

We hypothesized that MS4s who participated in a clerkship at curriculum sites would report a more functional educational experience and increased confidence in various clinical topics in radiation oncology, in comparison with those who did not participate in a clerkship at a curriculum site. To test this hypothesis, the 2015 iteration of the clerkship survey contained an identifying question as to whether or not the clerkship was completed at an institution participating in the curriculum. Utilizing survey results, clerkship experiences that included the curriculum are compared with those clerkship experiences without it. Students' perception of the educational experience and associated changes in confidence and knowledge are analyzed.

## METHODS

### Curriculum

The development of the curriculum has been described previously [11]. Kern et al's six-step approach to medical education curriculum development was used as a conceptual framework to develop the radiation oncology clerkship curriculum to meet the needs outlined in a targeted needs assessment [9]. The curriculum includes three 1-hour lectures given by residents or faculty members [13]. The lecture topics include the following: (1) an overview of radiation oncology history, treatments, and clinic flow; (2) fundamentals of radiation biology and physics; and (3) radiation treatment simulation, planning, and emergencies. All students are required to attend one session per week, although scheduling is left to the discretion of each institution. Lectures are open format, with students encouraged to ask questions. One institution uses online lectures. To teach students the fundamentals of radiation treatment planning, residents or faculty lead a 1-hour hands-on radiation treatment planning workshop [14]. The students use a treatment planning workstation while following a step-by-step guide to achieving an optimal plan. The workshop is available for download through MedEdPORTAL at https://www.mededportal.org/publication/9297. Each institution is encouraged to adapt the lectures according to specific institutional practices, but the core curricular elements (lectures and planning session) are preserved across sites. Students anonymously evaluate the curriculum upon its completion at each institution using an online Research Electronic Data Capture (REDCap) [15].

### Clerkship Experience Survey

An anonymous, internet-based clerkship experience survey was developed, validated, and used previously with data collected using REDCap [7,8]. These electronic data capture tools are hosted at the University of Chicago [15]. REDCap is a secure, web-based application designed to support data capture for research studies, and provides the following: (1) an intuitive interface for validated data entry; (2) audit trails for tracking data manipulation and export procedures; (3) automated export procedures for seamless data downloads to common statistical packages; and (4) procedures for importing data from external sources.

The first section of the survey contained questions regarding respondent demographics in addition to experiences and confidence before beginning radiation oncology clerkships. The second section contained a set of questions for each clerkship completed by the student, allowing for information on up to four clerkship experiences. These questions characterized each department's demographics, curricular components, and the respondent's confidence in clinical competency at the end