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Clinician-Educator Pathway for Radiology Residents

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Abstract

Faculty clinician-educator tracks have become increasingly common at US academic medical centers. Though many radiology faculty members belong to such tracks, there is little training in radiology residencies to prepare residents to take on these roles. The authors present a summary of a novel radiology residency Clinician-Educator Pathway (CEP) developed and piloted at our institution. The key components of the pathway include protected time to work on a substantive education project and a small number of high-quality didactic lectures. Publication/presentation in some form is expected. The pathway includes regular mentorship from highly-regarded clinician-educators, as well as didactic training in education techniques and skills. A formal application process was established, as were methods of evaluation during and after the experience.

Keywords

Clinician-Educator; residents; pathway; teaching

The Rise of Clinician-Educators

Academic medical centers are commonly perceived as the home of “triple threat” physicians - those who excel at patient care, research, and education equally. However, there has been a trend in many academic institutions towards developing faculty tracks that permit emphasis on education rather than on research as a pathway to career advancement. Many trainees have expressed a desire to remain in the academic environment as nationally recognized clinician-educators but may not wish to be involved in pure bench or clinical research.

In 2005, over 100 academic medical centers offered these tracks, intended for those specializing in clinical work and the education of medical students, residents, and fellows (1). The role of such tracks in academic departments have been extensively described in the literature, including in such disparate fields as palliative medicine, rheumatology, pediatrics, dermatology, and general and subspecialty internal medicine (2–6). Various articles in the radiology literature have also discussed the increasing importance of clinician-educators tracks to academic radiology and to the future of the specialty (7–9).

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The Current State of Radiology Residencies

Radiology residencies provide exceptional clinical exposure, though often are lacking in preparing residents for academic careers. Exposure to research, specifically with the intent of preparing residents for research-focused academic careers, has been extensively discussed in the literature, at national meetings, and within individual radiology departments (10,11). As a result, many departments offer protected research time, a dedicated research pathway (12), or even a combined PhD/residency option (13). Of note, the latest version of the ACGME program requirements calls for at least one scholarly project (14).

To our knowledge, no pathway has been developed specifically to prepare radiology residents for clinician-educator faculty positions. A limited number of such pathways have been developed and reported in the internal medicine and psychiatry literature, though none in radiology (15,16).

The authors outline the objectives of a radiology residency Clinician-Educator Pathway (CEP). We describe the implementation of such a pathway at our institution and our initial experience. While creating such a pathway can be daunting, such efforts could dovetail with the residency restructuring required by the new radiology board examination (17).

Clinician-Educator Pathway Objectives

The aim of a residency Clinician-Educator Pathway should be to prepare residents for clinician-educator faculty positions. Specifically, we sought to

- Teach residents how to teach
- Provide an opportunity to create and give didactic lectures
- Provide an opportunity to produce a substantive educational product or complete an education-related research project

Clinician-Educator faculty members often engage in one of two types of scholarly pursuits related to education (7). One is the creation of and delivery of educational content (i.e. *Educating*). The second is performing education-related research, including evaluating educational outcomes (i.e. *Educational scholarship*). Within our Clinician-Educator Pathway, both types of activities were welcomed.

Developing a Clinician-Educator Pathway

Protected Time

Much like for clinician-educator faculty, dedicated academic time is crucial for a successful residency CEP. During such protected time, the trainee can gain the required skills and create their academic products, publications, and lectures. Unfortunately, radiology departments face a number of challenges in providing protected academic time.

We modeled our CEP protected time after the protected time given to those engaged in clinical and basic science research. Our department allows between one and twelve months of research over the course of a residency; didactic training, mentorship, and publication are expected. Call responsibilities remain during these months. Given the similarities between our research electives requirements and activities and our CEP requirements and activities, we simply treated CEP months as research months, i.e. the same systems for resident salary funding (usually department funds), reporting of resident time, and resident scheduling were employed thereby avoiding many of the hurdles that would have otherwise been prohibitive.

Our inaugural CEP allowed residents to take 1–3 months to work on CEP activities, all scheduled within a single academic year. These months could be taken contiguously or spaced out, depending upon scheduling availability and the needs of the project. We expect the upper limit for months of protected time may increase in future years. Additionally, we expect the program may expand to involve multiple academic years, potentially the entire four year residency. The ultimate form of this pathway is likely to be significantly affected by the upcoming radiology residency changes (17), though the details have yet to be worked out.

Course Work

When resident (and attending) physicians are asked to teach, it is often without any formal training. This disserves both the resident educator and the student. Didactic training has been extensively documented to dramatically improve teaching success (18–20). A wide variety of didactic course work could be relevant for a resident CEP, including but not limited to:

- Classroom-based teaching skills
- Clinical setting teaching skills (i.e. teaching at the PACS station)
- Instruction on the creation of high-impact teaching materials
- Career planning and academic advancement

For those interested in education scholarship (research focused on educational methods or outcomes), additional course work could be relevant:

- Clinical research skills, including literature review and assessment, study design, data collection, data analysis, statistical analysis, manuscript writing, and presentation
- Sociology/psychology research methods, including surveys, assessing and measuring communication effectiveness, measurements of satisfaction
- Grant writing

Creating such course work de novo would be daunting, particularly for the relatively small number of residents likely to participate in a CEP. We elected to enroll residents in courses already available at our institution or at national conferences. Examples are listed in the Appendix.

For simplicity, we required that one teaching-related course be taken, selected by the resident based on their schedule and interests. In future years, a core course may be selected, and/or core reading lists/texts may be employed.

Mentorship

Just as mentorship is needed for residents engaged in clinical or basic science research, mentorship is essential for those in a CEP. A mentor can guide the resident in the development of education products and publications, as well as in the development and delivery of high quality lectures. Further, the mentor serves as a role model providing exposure and facilitating the development of a network of collegial contacts.

A pre-selected list of mentors was chosen by the senior members of the CEP committee. Generally, senior faculty with well-regarded teaching skills, national recognition as a speaker, and an established record of publishing and mentorship were chosen.

Education-Related Project(s)

A substantive education-focused project was expected from each participant. The time allowed for the CEP was primarily dependent upon the size and scope of the main project. At least one publication or presentation was expected. Abstracts, presentations, and papers were all encouraged, though a particular emphasis was placed on publication.

Examples of educationally focused projects were provided to CEP participants and included:

- Online educational modules, examples:
 - Iodinated contrast reactions and treatments, with a focus on preparation for call and mastering the level of detail required by the American Board of Radiology.
 - MR safety and the safe administration of gadolinium
- Procedure/technique instructional programs:
 - Fluoroscopy
 - Interventional procedures
- Studies related to residency education.
 - Methods to prepare and evaluate residents on call
 - Effectiveness of various “read out” styles.
 - Studies regarding giving feedback and its effectiveness
- Teaching and assessing ACGME core competences
 - Methods to improve communication skills
 - Assessment and teaching of professionalism

The education-focused project to be undertaken was chosen and developed by the trainee with the help of their mentor. The proposed project and estimated time required was part of the application submitted to the CEP committee.

Lecture Development and Teaching

One resident-level, hour-long didactic lecture was expected from each Clinical Educator Pathway resident for each month of protected time granted. According to an accomplished, senior faculty member in our department, the creation of a high-quality didactic lecture can take up to 40 or more hours. This lecture requirement could therefore be expected to take up to one quarter of each month granted, leaving the other three quarters for work on the main education project.

Targeting the lecture to the resident level was elected for a number of reasons. The standard for completeness, usefulness, and rigor are higher when an audience shares a basic understanding of the material. Also, an audience more keenly motivated to master the material provides for a more satisfying educational setting. Clinician-educator faculty often lecture to fellow attendings (usually community-based peers), an experience that resident-to-resident lecturing can mimic.

The lecture topics were chosen and developed with the aid of the residents’ CEP mentors. The lectures were presented to the residency during regular conference times. The date was selected to ensure the CEP committee chair (the residency program director) and the mentor could attend, with the inclusion of other CEP committee members when possible.

A key component to lecture development and delivery is refinement of the presentation immediately after the talk. Each lecture created by CEP participants was therefore presented at different sites such that a lecture was given at least twice during a 12 month period, with refinements and improvements expected in between.

Participation in medical student teaching was also expected, though the creation of medical student-focused product was not a goal of the pathway. In many cases, residents gave pre-made lectures or participated in laboratories, allowing for teaching without the burden of creating additional lectures.

Evaluation

A formal written evaluation was completed for each trainee in the CEP. In this era of training documentation and learning portfolios (21), proper documentation is essential. All lectures and academic projects were evaluated, both in real-time (allowing for modification of lectures, etc) and at the conclusion of the pathway. Comments from the CEP mentor and the CEP committee for each component were provided. Additional forms of evaluation were also included, for example, scores and comments from our lecture feedback system. Though confidential comments were allowed, the majority of the feedback was compiled in a comprehensive evaluation made available to the resident and uploaded as part of the resident's learning portfolio. A final CEP interview was performed, often in conjunction with the semi-annual meetings with the program director.

The criteria upon which materials were evaluated included:

- Content/scientific value
- Critical thinking
- Evidence based practice
- Organization of material
- Quality of presentation

Written feedback from the CEP residents was collected by the committee. A self assessment was included in the learning portfolio, and comments about the pathway from the participants were used for program improvement. As the first few years of participants graduate and enter their careers, their career choices will be tracked, and participants will be surveyed on the impact of the program.

Implementation

Creating a novel Clinician-Educator Pathway for radiology residents was a highly collaborative effort. The primary components of the pathway were selected by a core working group comprised of the department's vice-chair of academic affairs, the residency program director, the residency associate program director, and a chief resident. Additional input was provided by other well-regarded educators in the department. The inclusion of departmental leaders early in the process facilitated program acceptance by the department and the approval of the program by the Department Chairman.

A formal CEP committee was established. The residency program director was selected as the committee chair, and a single chief resident participant was selected to be the program coordinator (charged with assisting in the application process, scheduling, and collecting feedback). The chief resident selected was the one responsible for the residency rotation schedule, which facilitated the scheduling of academic time. Two faculty members selected by the Department Chairman and CEP Committee Chair also joined the committee.

Details of the program were disseminated by email, posted on the residency website, and discussed at residency wide meetings. The application included a letter of intent, a current CV, and a detailed description of the proposed project and requested academic time. A letter of support from the proposed mentor was required. Acceptance of candidate was achieved by consensus, with the ultimate responsibility remaining with the residency program director/CEP chair given her responsibility to oversee the education of each resident. The strength of the project proposal and the program director's assessment of the clinical standing of the resident were among the criteria for acceptance.

Initial Experience

Two candidates applied for the 2009–2010 CEP, both rising third year residents, and both were accepted. By way of comparison, 17 residents (out of a total of 52 residents in our program) were granted research months. The first candidate elected to take 2 (out of a maximum of 3) months to work on his projects and lectures. He created two resident-level, hour-long lectures, one regarding cardiac embryology and one regarding fat-containing lesions. These were well received with an average score 4.8 out of 5 on the resident conference feedback system (80th percentile of all lectures given to the residents, mostly by faculty). Select comments include: "This is one of the best didactic lectures I have ever heard," and "He made a complex topic quite clear." He completed three projects in his two months (only 1 was required), one involving the development of a pilot online 3-D library for orthopedic hardware, a second involving the development of an online radiology examination for medical students and residents, and a third involving a cost analysis of anatomy education using cadavers versus computers. One of the three was presented at the 2010 Association of University Radiologists meeting, and the others are in the final stages of manuscript completion. He logged twenty hours of voluntary medical student teaching. Overall, mentor and CEP committee feedback was positive, particularly regarding the high quality lectures.

The second candidate took 3 out of 3 possible months. His lectures received an average score 4.7 out of 5 on the conference feedback system (68th percentile of all lectures given to residents). Select comments include "Great lecture - clear slides and delivery, beautiful images" and "Superb lecture". The first of his two projects involved the creation of a structured template for the reporting of head and neck imaging, and his second project was a CHR/IRB approved study determining if structured reporting of head and neck neoplasm dictations produced higher quality reports than free-text dictation. He completed 15 hours medical student teaching. Overall, mentor and CEP committee feedback was positive, particularly regarding the strength of his projects.

Both residents intend to enter academic medicine.

For 2010–2011, 4 residents applied to the pathway and 3 were accepted. The maximum number of available months remained at 3, of which candidates selected 2, 2, and 1 month(s) respectively.

Planned projects include:

- Development of an interactive teaching module for radiographic contrast reactions
- Developing joint specific MSK teaching modules
- Developing structured reporting templates by clinical indication for gastrointestinal and genitourinary imaging

Summary

As clinician-educators play an increasingly important role in academic radiology, radiology residencies can consider providing dedicated training and experiences to prepare residents to take on these roles. The authors outline the development of a novel Clinician-Educator Pathway for residents, offered to those most interested in clinician-educator faculty appointments in the future.

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Appendix

Examples of courses available at our institution or at national conferences which were appropriate for CEP residents:

Teaching Skills and Methods

- “Teaching Skills for Chief Residents: Tricks of the Trade for Optimizing Your Impact” (open to chief residents in the CEP, and well as to other senior residents with approval of the instructor) offered by the Graduate Medical Education office
- “Teaching Skills Workshop for Residents and Fellows” offered by the Graduate Medical Education office
- “Certificate Teaching Program” offered at the 2010 Association of University Radiologist meeting, sponsored by the Association of Program Directors in Radiology (APDR) and American Association of Academic Chief Residents in Radiology (A3CR2)

Research methods relevant to educational scholarship:

- “Building a Career in Clinical Research”, “Designing Clinical research for Residents and Students” and “Responsible conduct of research,” courses offered as part of a summer Clinical Research Workshop offered by the Department of Epidemiology and Biostatistics.
- “Advanced Training in Clinical Research” certificate courses, offered by the Department of Epidemiology and Biostatistics.
- “Scientific Writing” conducted by a scientific writing expert and designed specifically for trainees and junior faculty, offered by the Department of Radiology and Biomedical Imaging
- Numerous grant writing courses including those offered at the Radiological Society of North America (RSNA) meeting, at our institution, and elsewhere.