Radiology Resident Journal Club: Enhancements Add Educational Value

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Rationale and Objectives: Resident journal clubs are essential to develop skills to critically appraise existing literature. However, most reports of journal clubs focus on logistics of the activity and less on established roles of those involved. Our objective is to report on an innovative journal club from the perspective of key participants.

Materials and Methods: Journal club schedule, assignments, evaluations, and analysis are proffered from our institution. The journal club goals were formulated as: (1) improving resident understanding of research (biostatistical and epidemiologic) methods and statistical concepts, (2) teaching critical appraisal skills, and (3) promoting the use of evidence-based medicine. Each session’s format is interactive, consisting of a 10 minute lecture with radiology examples of a research or statistical concept, followed by a journal club style discussion. Crucial to the success of this curriculum has been input and engagement of multiple parties: radiology residents, epidemiologist directors, and subspecialty clerkship faculty members.

Conclusion: A well-thought out and well-run resident journal club offers numerous solutions to radiology residencies. To residency program leadership and to each individual resident annually, resident journal club offers cutting edge medical knowledge, interactive conferences in the formal didactic curriculum, resident training in critical thinking skills and research design, resident training in interpersonal and communication skills, opportunity for residents to be teachers, and expanded resident interprofessional education. It meets Accreditation Council for Graduate Medical Education common program, Residency Review Committee diagnostic radiology program, and American Board of Radiology Milestones requirements.

Key Words: Biostatistics; Formal didactic curriculum; Interprofessional education; Journal club; Milestones education; Resident education.

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INTRODUCTION

Radiology residency curriculum at most institutions is largely dominated by case-based and didactic education in a conference format. Pathology, pattern, and repetition are key foundational components to residency education; however, it is essential to ensure the training of future radiologists includes the tenants of self-learning from evidence-based literature. One avenue for addressing this potential gap in resident education is a well run and organized journal club (1).

Benefits to the resident are multifold, many of which are not otherwise addressed in the traditional didactic or case-based setting. First, journal club affords both the presenter and attendees the opportunity to practice critically reading and analyzing the literature. This also allows for direct feedback and open forum discussion in the presence of experts in the field. Moreover, while developing these critical analytic skills, residents are also venturing out of the textbook and into the educational space of cutting edge medicine (1).

Although there is substantive literature regarding residency journal clubs, there is little up to date literature specific to radiology resident journal clubs. The majority of journal club articles focused on logistical and practical components of establishing and running a journal club (1–5). In our review of the literature, it was generally accepted that a successful journal club has several components: resident-led critical discussion of predetermined and relevant/stimulating article(s), formatted curriculum in which expectations are understood for all those involved, dedicated space and time, faculty guidance, and a brief discussion on statistical analysis or epidemiology (2,3). This was the format we initially followed, which
varied in quality of the resident presentation as well as the faculty “guidance” from month to month.

In addition to limited reports on journal clubs in the radiology education and teaching literature, there was limited published data on the specific roles and perspectives of those individuals involved or the relevance of an on site expert in the biostatistical or epidemiologic space (1–5). We report 4 years of experience with radiology resident journal club, highlighting its innovative work from the perspective of residents, epidemiologists, clinician educators, and program directors.

METHODS

Resident Journal Club Structure

Radiology resident journal club was developed in 2012 to meet the American Board of Radiology’s (ABR) mandate that all radiology residents be educated in basic research principles, epidemiology, and statistics. The journal club goals have remained consistent: (1) improving resident understanding of research (biostatistical and epidemiologic) methods and statistical concepts, (2) teaching critical appraisal skills, and (3) promoting the use of evidence-based medicine. Radiology resident journal club has been revised over time in response to resident feedback.

Now, as then, the journal club session basic format is interactive and consists of a 10-minute lecture by the epidemiologist with radiology examples of a research or statistical concept, followed by a journal club style discussion. Attendance by all residents is required, and attendance by all faculty is encouraged. Crucial to the success of this curriculum has been input and engagement of multiple parties: radiology residents, epidemiologists, and subspecialist clinician educator faculty members (Fig 1).

The identification of existing resources from national organizations is also an important key to success. The Association of University Radiologists has proffered resources guides on clinical trials, health sciences research, prospective reader studies, research ethics, and test performance basic stats (6–8). Additionally, the ABR publishes a Noninterpretative Skills Domain Specification and Resource Guide, with the 2012 version particularly detailed in the need for resident detailed knowledge in research and screening topics (9). At our institution, the addition of an epidemiologist to the journal club allows for a unique review of basic statistical analysis and epidemiologic concepts, and highlights collaborative interprofessional education.

Figure 2 details a schedule of activities followed to plan the journal clubs. The frequency of the journal clubs has evolved over time. Initially monthly and with volunteer resident presenter participation, the quality of the journal clubs was lacking. By restructuring the journal club format, we found six times per annum is an ideal schedule. At the beginning of the academic year, a schedule is made, assigning paired lower level and upper level residents to present. Held at the same location and time as other resident noon conferences, journal club dates selected by the epidemiologist director are placed on the resident formal didactic calendar.

For each journal club, an upper level and a lower level resident are chosen based on the resident annual block calendar.
The lower level and upper level resident presenters select a timely journal article from a major radiology journal and select an advisory subspecialist clinician educator faculty member with related expertise. To promote self-regulated learning, having the residents select the article they want to present reflects not only what they feel is a need but also may be a need of their peers. The residents review the article with the epidemiologist and the subspecialist advisor 1–2 weeks prior to the journal club presentation. This prejournal club review session is designed to help the residents with any unclear concepts, to better understand the statistical analyses used, and to put the findings into context of current practice standards from the subspecialist’s perspective.

An email reminder with the upcoming journal article attached is sent 1–2 weeks prior to the journal club date. Residents are expected to review the article prior to the conference. Each journal club begins with a 10-minute discussion of basic statistical methods and/or epidemiologic concepts, presented by the epidemiologist. Examples of statistical methodology presented include Mann-Whitney U test, Wilcoxon Signed Rank test, chi-square and Fisher Exact test, as well as discussions of research design methodologies. Following the statistics explanation, the lower and upper level residents lead the ensuing 45 minutes with presentations and discussion reviewing the article’s major findings, strengths, weaknesses, and contributions to the literature. The respective roles of the lower and upper level residents during the presentation are determined by each dyad prior to the presentation. The junior and upper level presenters often pose questions to the other residents in attendance during the presentation to encourage an open forum discussion.

Evaluations and Analysis

Within a day of the journal club, an email with link to an anonymous evaluation employing the institutional feedback platform was sent to all residents to rate the presentation using a 5-point Likert scale (1 = strongly disagree to 5 = strongly agree) and provide narrative feedback. This data was analyzed using descriptive statistics and thematic analysis. The qualitative analysis of resident feedback resulted in 40 codes of the over 190 narrative comments. Two authors discussed the codes and how to classify their meaning, coming to agreement on six overarching themes.

The study was deemed exempt by the Institutional Review Board of the authors' institution.

RESULTS

Table 1 presents a breakdown by participant in the journal clubs over the past 4 years. The different subspecialty topics presented during the journal club sessions is summarized. Of note, there was a preponderance of presentations on abdominal imaging.

From the Residents’ Perspective

Narrative comments from the residents’ evaluations of the journal club were used to gain their perspective of the sessions. Emergent themes included praise, content, presentation, presenter, faculty participation, and discussion. Figure 2 displays the themes and codes supporting their development (Fig 3).

We did not want to discount the large number of comments made in the evaluations involving reinforcing feedback, comments such as “great job” or “enjoyed this journal club”, which were classified as “praise”. Specific comments related to the journal club faculty and resident presentations focused on content (“helpful summary of important statistical concepts”), presentation (“does a good job of making the material as interesting as possible”), and presenters (“residents were thorough and did a great job analyzing the study”). Additionally, faculty participation was identified as “helpful in the discussion.” The discussion after the presentation was thought to be essential, noting that it was “…relevant topic with actual potential to be applied.”
In addition to narrative comments, residents score the journal club sessions. As can be seen in Table 2, evaluation data from 2015 to 2017 are positively rated.

**From the Epidemiologists’ Perspective**

Medical practice requires that physicians understand and be able to appropriately apply findings from the latest research studies to improve their approach to treating patients (10).

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<tr>
<td>Lectures</td>
<td>This faculty member communicates ideas and concepts clearly.</td>
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<tr>
<td>Lectures: didactic component</td>
<td>This faculty member provides an appropriate amount of didactic content.</td>
</tr>
<tr>
<td>Availability</td>
<td>This faculty member is readily available and willing to answer my questions.</td>
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<tr>
<td>Methodologic knowledge</td>
<td>This faculty member demonstrates a thorough grasp of the course material.</td>
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<tr>
<td>Methodologic knowledge</td>
<td>This faculty member presents topics that are helpful to helping me understand and critically assess the current radiology literature.</td>
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<tr>
<td>Promotes active learning</td>
<td>This faculty member encourages participation in class, provides reference material, and allows a sufficient amount of time for concept discussions.</td>
</tr>
<tr>
<td>Professionalism: interaction with faculty and staff</td>
<td>This faculty member interacts with other faculty and staff in a helpful and respectful manner.</td>
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This is a necessary skill, regardless of whether they intend to become private practitioners, hospitalists, physician-scientists, or policy-makers. Accordingly, accrediting organizations such as the Accreditation Council for Graduate Medical Education (ACGME) require that residents are educated in “…basic principles of scientific inquiry, including how research is designed, conducted, [and] evaluated…” (11).

Through the radiology resident journal club, we have the opportunity to ensure that our program’s residents have the knowledge needed to master these basic principles. To achieve these goals, we developed a curriculum of short lectures that cover topics that we consider the basic foundation of understanding how the scientific method should be applied to understand the health research literature. By ensuring that residents have a firm grasp on basic statistics and concepts of validity, bias, accuracy, precision, study design, and statistical significance, we can make sure that at the end of their training our residents are prepared to make clinical choices based on sound evidence, rather than trends, technology, or maintaining the status quo.

A formal journal club offers advantages beyond the education of the residents. The bimonthly sessions provide a space where nonclinical faculty interact with clinical members of the department. As residents have the responsibility of selecting the articles, it is interesting to learn residents’ interests and contemporary-controversial issues in clinical radiology. Postpresentation discussions of how the journal club article’s findings relate to current practice can be illuminating and are a welcome reality-check on the potential impact of a given study. Finally, as for the residents, the sessions provide opportunity to improve teaching and communication skills. Multidisciplinary collaboration is the foundation of successful health research. Thus, the journal club group underscores the tenets of interprofessional education as colleagues with varying scientific backgrounds relay perspective and offer educational pearls to colleagues with a different scientific background.

**From the Clinician Educators’ Perspective**

The knowledge, skills, and experience needed to interpret the medical scientific literature and transfer research findings into clinical practice are among the most complex and difficult skills physicians attempt to learn. Most radiology trainees come to residency with prior knowledge of basic statistical concepts learned in college or medical school. Many of them, however, are not able to read a scientific paper and identify key elements, such as the study design, sampling methods, and inclusion criteria. The journal club model we developed, of pairing a focused research methods discussion with the typical journal article review and critique, allows for thoughtfully guided practice of this complex skill. Like all clinical skills, mastery requires repetition and focused feedback. The direct involvement of our epidemiologist colleagues during the preparation and the presentation phases of our journal club makes this feedback timely and expert.
From the Program Directors’ Perspective

A well-thought out and well-run resident journal club offers numerous solutions to radiology residencies, as it meets ACGME common program requirements, residency review committee (RRC) diagnostic radiology program requirements and ABR Milestones level requirements (11–13). To residency program leadership and to each individual resident annually, resident journal club offers cutting edge medical knowledge, interactive conferences in the formal didactic curriculum, resident training in critical thinking skills and research design, resident training in interpersonal and communication skills, opportunity for residents to be teachers, and expanded resident interprofessional education. Resident journal club aids in required reporting to the ACGME on individual residents, specifically biannual Milestones practice-based Learning and Improvement PBL13 reporting and annual ADS resident scholarly activity reporting (for residents who give presentation of at least 30 minute duration) (13).

DISCUSSION

The ‘change up’ in formal didactics via journal club affords can be an engaging way to teach and an enduring way to learn.

Journal club’s rigorous and reproducible methodology lends itself readily to inclusion in objective assessment of resident performance, faculty development, and program quality parameters in ACGME self-study. Radiology residencies are now entering self-study prior to scheduled 10-year accreditation site visits (14). The ACGME self-study requires a detailed, comprehensive process of self-scrutiny that assesses resident performance, faculty development, and program quality (15). Adding a recurring resident journal club achieves this accreditation expectation.

LIMITATIONS

This report is limited in that it is from a single institution. Additionally, it may be challenging for some programs to regularly involve an epidemiologist in preparing the journal club presentations. However, our structure was modified with a schedule that is less cumbersome for all parties involved, which may be a way to attract epidemiologists to commit to helping.

Based on the residents’ self-report in the evaluations, they found the journal club format extremely educational. A future study will consider how to objectively assess their self-reported learning.

CONCLUSIONS

A well-thought out and well-run resident journal club offers numerous solutions to radiology residencies. To residency program leadership and to individual residents, resident journal club offers the opportunity to critically appraise cutting edge medical knowledge. The inclusion of an epidemiologist allows the residents to learn from an expert outside their field. It meets ACGME common program, RRC diagnostic radiology program and ABR Milestones requirements.

REFERENCES