

Interpretive Versus Noninterpretive Content in Top-Selling Radiology Textbooks:

What Are We Teaching Medical Students?

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Rationale and Objectives: There are little data as to whether appropriate, cost effective, and safe ordering of imaging examinations are adequately taught in US medical school curricula. We sought to determine the proportion of noninterpretive content (such as appropriate ordering) versus interpretive content (such as reading a chest x-ray) in the top-selling medical student radiology textbooks.

Materials and Methods: We performed an online search to identify a ranked list of the six top-selling general radiology textbooks for medical students. Each textbook was reviewed including content in the text, tables, images, figures, appendices, practice questions, question explanations, and glossaries. Individual pages of text and individual images were semiquantitatively scored on a six-level scale as to the percentage of material that was interpretive versus noninterpretive. The predominant imaging modality addressed in each was also recorded. Descriptive statistical analysis was performed.

Results: All six books had more interpretive content. On average, 1.4 pages of text focused on interpretation for every one page focused on noninterpretive content. Seventeen images/figures were dedicated to interpretive skills for every one focused on noninterpretive skills. In all books, the largest proportion of text and image content was dedicated to plain films (51.2%), with computed tomography (CT) a distant second (16%). The content on radiographs (3.1:1) and CT (1.6:1) was more interpretive than not.

Conclusions: The current six top-selling medical student radiology textbooks contain a preponderance of material teaching image interpretation compared to material teaching noninterpretive skills, such as appropriate imaging examination selection, rational utilization, and patient safety.

Key Words: Medical student; radiology textbooks; interpretive content; noninterpretive content; appropriate utilization.

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There is a growing emphasis in medical practice on the safe, cost effective, and appropriate ordering of radiology studies. Although this trend will reduce health care costs, it more importantly will improve patient care.

The efforts made toward improving ordering practices have largely been directed toward those already ordering imaging studies, namely practicing medical providers. Educational initiatives including the “Choosing Wisely” (1) and “Image Gently” (2) campaigns direct referring physicians to imaging options that are safer, involve lower radiation, and highlight clinical scenarios where imaging may be unnecessary.

Additionally, the American College of Radiology (ACR) “Appropriateness Criteria” is available as a free, evidence-based, online resource designed to help ordering physicians choose the best imaging examination (3). These resources add transparency and are highly educational but are underused by students. One recent single-institution study that found the vast majority of senior medical students (96%) were not previously aware of the ACR Appropriateness Criteria; however, once introduced, almost all students found the resource useful (94%) and planned to use it in clinical practice (89%) (4). Undergraduate medical educators have also been quick to point out that teaching good imaging practices early on is far more effective than correcting ordering habits after they have formed (5).

Unfortunately, there are several obstacles that limit our ability to teach medical students about appropriate imaging examination utilization. First, there is very limited formal radiology content built into US medical school curricula (5). For example, the Liaison Committee on Medical Education states that “Educational opportunities must be available ... in the disciplines that support general medical practice

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(eg, diagnostic imaging ...)” (6). Additionally, many medical student radiology courses across the country focus more on interpretive skills than on appropriate utilization and safety. One of the most common formats for “educational opportunities” in radiology are the fourth-year elective clerkships in the reading room where students may spend most of the day observing case interpretation (5,7).

The vast majority of medical students will go into fields other than radiology (8) and will not be interpreting imaging examinations on their own. To train the next generation of referring providers, undergraduate medical curricula must not only include “sufficient” imaging educational content but must also include the “right” educational content. That educational content should emphasize the appropriate, safe, rational, and cost-effective ordering of imaging studies as part of the overall diagnostic workup of patients (5,9,10).

Surveys regarding the amount of radiology content offered in modern curricula have already been published (5). Published data on the proportions of interpretive versus utilization-focused (or “noninterpretive”) material, however, are lacking. Although quantitatively evaluating the full 4-year curricula at all US medical schools would prove quite challenging, popular textbooks offer us a window into the educational content currently being offered. Textbooks are often the backbone of radiology courses, and in some cases, act as supplements voluntarily selected by the students themselves. We, therefore, sought to rigorously evaluate and quantify the proportion of interpretive versus noninterpretive content in the top-selling medical student radiology textbooks. Our hypothesis was that a large majority of textbook content would be focused on interpretive skills.

MATERIALS AND METHODS

Textbook Selection

To identify the most popular general radiology textbooks currently offered for medical student use, we performed an online search at the single largest book retailer in the United States, Amazon.com (11,12). The search was conducted in the medical books category, using the terms “medical student, radiology.” Both hardcopy and digital books were included. Of the titles generated, only the following were included: 1) general radiology textbooks (subspecialty specific texts on topics such as “chest radiology” and anatomy atlases were excluded), 2) books published after 2000 (most recent edition), and 3) books described as being appropriate for medical student use in the online description.

The books identified by the aforementioned search and inclusion/exclusion criteria were sorted by sales rank. Amazon.com sales ranks update hourly, and there are no published summary or cumulative sales ranks for individual book titles available to the public through Amazon or any other nonindustry source (13). To determine the constancy of these rankings, the hourly sales ranks were tracked twice a day for a 2-week period in January 2014.

We identified a ranked list of top-selling general radiology textbooks using the aforementioned criteria. We intended to review between five and 10 textbooks at the study onset, depending on the results of the rank list. Over the 2-week period of sales tracking, none of the top six books dropped out of the top six sales ranking spots, although there was some movement within the top six spots. Books ranked seventh and below did not maintain a consistent sales rank position over the 2-week period. Therefore, the top-selling six books were selected for this analysis. To focus on content offered by radiology resources as a whole (rather than critique-specific textbooks), the titles will remain blinded in this article.

Data Extraction

All textbooks were reviewed by a single author (—). All text, tables, images, figures, appendices, practice questions, question explanations, and glossaries were analyzed. Table of contents, indexes, prefaces, bibliographies, and suggested reading lists were not analyzed. Text and image content were evaluated separately. Four textbooks were evaluated in hardcopy format, and two were evaluated as e-books (a popular and less-expensive format available through our university library).

Interpretive Versus Noninterpretive Text

“Text content” was defined as any material in the main text, tables, appendices, practice questions, review questions, question answers, and glossaries.

We initially considered evaluating the text content in each book on a per-page basis. However, there was tremendous variability of text density among the different pages in any individual book and between the different hardcopy books; also, there was no universal formatting for page breaks in the digital books. Therefore, before beginning the analysis, we determined that the average hardcopy textbook page in our cohort contained four paragraphs of text; so, we therefore evaluated all paper and electronic textbook text in four paragraph blocks, which we referred to as “pages” for the sake of simplicity and convention. Twelve lines of material in tables were counted as one paragraph, as did one review question with its answer choices (conversions that were determined by comparing the length of tables, questions, and paragraphs in our hardcopy textbooks).

Individual “pages” of text were semiquantitatively scored as to the percentage of the material that was interpretive versus noninterpretive. Each page was scored on the following scale:

- 1) <5% or less discussion of interpretive skills
- 2) 5%–24%
- 3) 25%–49%
- 4) 50%–74%
- 5) 75%–94%
- 6) 95%–100% discussion of interpretive skills.

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