ORIGINAL ARTICLE

# The State of Radiologic Teaching Practice in Preclinical Medical Education: Survey of American Medical, Osteopathic, and Podiatric Schools

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## Abstract

**Purpose:** This study describes the state of preclinical radiology curricula in North American allopathic, osteopathic, and podiatric medical schools.

**Methods:** An online survey of teaching methods, radiology topics, and future plans was developed. The Associations of American Medical Colleges, Colleges of Osteopathic Medicine, and Colleges of Podiatric Medicine listing for all US, Canadian, and Puerto Rican schools was used for contact information for directors of anatomy and/or radiology courses. Letters were sent via e-mail to 198 schools, with a link to the anonymous survey.

**Results:** Of 198 schools, 98 completed the survey (48%). Radiology curricula were integrated with other topics (91%), and taught by anatomists (42%) and radiologists (43%). The majority of time was spent on the topic of anatomy correlation (35%). Time spent teaching general radiology topics in the curriculum, such as physics (3%), modality differences (6%), radiation safety (2%), and contrast use (2%) was limited. Most schools had plans to implement an innovative teaching method in the near future (62%). The major challenges included limits on: time in the curriculum (73%); resources (32%); and radiology faculty participation (30%). A total of 82% reported that their curriculum did not model the suggestions made by the Alliance of Medical Student Educators in Radiology.

**Conclusions:** This survey describes the current state of preclinical radiology teaching: curricula were nonstandard, integrated into other courses, and predominantly used for anatomy correlation. Other important contextual principles of the practice of radiology were seldom taught.

**Key Words:** Radiology, preclinical, medical education

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## INTRODUCTION

Medical student radiology education is a vital component of medical school training. Several publications address preclinical medical imaging correlation as an adjunct to anatomy education; as national trends indicate that less time is spent in the dissection room, imaging certainly can perform a vital role in anatomy education [1-6]. However, as others have suggested, medical students, as future physicians, would benefit from exposure to a more integrated and contextual understanding of the role of radiology in everyday clinical practice, because medical imaging is not only an indubitable part of patient care but also a common denominator for every medical specialty [7,8]. The manner in which imaging functions in clinical care is best taught by radiologists, and this unique role provides opportunities to illustrate how radiology incorporates a wide array of fundamental concepts, from medical reasoning to communication skills [2,7,9]. We sought to determine if the current role of imaging in preclinical medical education has blossomed beyond the anatomy classroom.

The preclinical medical curriculum is an ideal place to incorporate early exposure, as radiologic concepts can be included in almost any anatomic or case study. As described in a recent publication, even dedicated clinical clerkships may fail to deliver essential integrative information [8]. The findings revealed that, regardless of participation in a radiology clerkship, fourth-year medical students had a poor understanding of general radiologic principles, including radiation safety, risks associated with MRI, and the cost of various imaging studies.

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The purpose of the current study was to obtain an overview of the role of imaging in preclinical medical education across North American allopathic, osteopathic, and podiatric medical schools, including how it is being taught and by whom. Establishing the educational landscape will help educators make more-informed decisions regarding educational reform.

## METHODS

An online survey was developed to gather information on the general design of the school's radiology curriculum, including the following areas: topics, type of instructors, time allotted, method of evaluation, and challenges (Fig. 1, available online). Development, administration, and analysis were performed using Qualtrics online survey software (Qualtrics Company, Provo, Utah) [10] and Excel (Microsoft, Redmond, Washington State). The survey included 12 questions and was designed to be brief, and possible to complete within 5 to 10 minutes. Wherever possible, the survey included answer choices that allowed qualitative feedback, which was reviewed for trends.

The American Association of Medical Colleges, American Association of Colleges of Osteopathic Medicine, and American Association of Colleges of Podiatric Medicine listing of websites for all US, Canadian, and Puerto Rican schools was accessed in April 2013, to find contact information for people directly involved in preclinical radiology education. These educators included deans of education, directors of anatomy courses, and if applicable, directors of radiology courses [11-13]. Osteopathic and podiatric medical schools were included in the current study because they follow a similar curricular framework, but we could not compare these schools because the sample sizes varied widely. Letters were sent via e-mail to a total of 198 schools with an attached link to the survey. In addition, the letter allowed recipients to forward the message to a person better suited to answer the survey, if necessary. All responses were kept anonymous; however, receipt information was tracked. Bi-weekly e-mail reminders and telephone calls were placed to schools that did not respond, until a response rate close to 50% was achieved, which took 5 months.

## RESULTS

In fall of 2013, a total of 95 medical schools from the United States, Canada, and Puerto Rico completed the survey, for a response rate of 48%: 76 of 156 (49%) allopathic schools, 14 of 33 (42%) osteopathic schools, and 5 of 9 (56%) podiatric schools. Most radiology courses were directed or codirected by radiologists (43%) or anatomists (42%). Among the course directors were 4 (3%) surgeons, 3 (3%) anthropologists, 2 (2%) podiatrists, and 2 other medical professionals. In addition, the course directors included a cell or molecular biologist, an emergency room physician, an internist, a neuroscientist, a pathologist, and a few retired physicians. One (1%) school reported having no formal preclinical radiology curriculum, and therefore no course director.

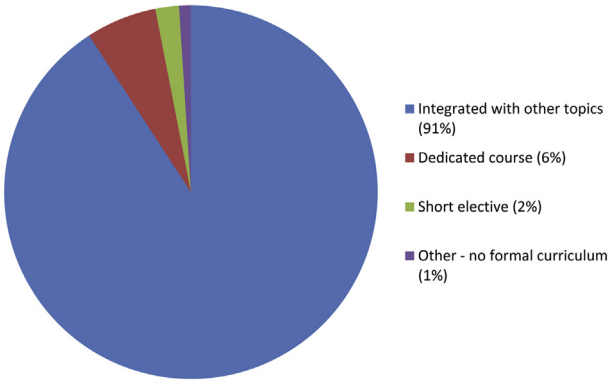


Fig 2. Design of the preclinical radiology curriculum.

The majority of schools (91%) administer preclinical radiology as an integrated course with other topics (Fig. 2). Of the 6 (6%) schools that offer a dedicated course, 3 are allopathic and 3 are podiatric. Two (2%) schools offer a short elective course. Seventy-six schools (82%) reported that they do not aim to follow the suggested curriculum outlined by the Alliance of Medical Student Educators in Radiology (AMSER).

Preclinical radiology courses deal mainly with anatomy correlation (Fig. 3). In fact, 5 schools reported that they spend 100% of their time in radiology courses teaching anatomy correlation. Other topics commonly covered include pathologies associated with musculoskeletal imaging, chest imaging, abdominal imaging, neuroradiology, and imaging-modality differences. Topics that are rarely covered include physics concepts, contrast uses and safety, imaging during pregnancy, and radiation safety. Other topics (4%) reported by medical schools included: head and neck, pelvic, ultrasound, interventional radiology, mammography, nuclear, renal, and

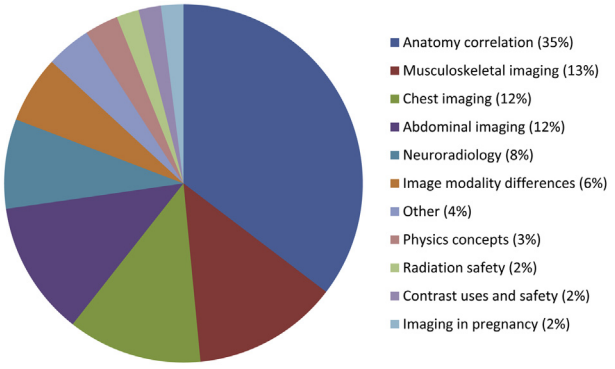


Fig 3. The relative time spent on each topic included in the curriculum.