Global Health Imaging Curriculum in Radiology Residency Programs: The Fundamentals

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Recent advances in imaging technology have created new opportunities for medical imaging to improve health care in resource-restricted countries around the world. Radiology residents are increasingly interested in global health and imaging outreach, yet infrastructure and opportunities for international outreach are limited. With the recent change in the ABR exam schedule, residents now have more flexibility in the fourth year of training to pursue elective interests, including participation in global health projects. Creating a formalized global health imaging curriculum will improve the quality, quantity, and overall impact of initiatives undertaken by residents and their training programs. A curriculum is proposed that provides content, opportunities for global health project development, and established metrics for effective evaluation and assessment. Four components considered integral to a global health imaging curriculum are described: (1) global and public health education; (2) targeted travel medicine education; (3) basic imaging proficiency; and (4) practice attitudes and accountability. Methods are presented of differentiating curricula to increase applicability across the spectrum of training programs that vary in available resources. A blueprint is presented for formalizing a global health curriculum or elective rotation within a program, as well as a resource for residents, radiologists, and organizations to make a meaningful impact on global health.

Key Words: International, global health, elective, curriculum, radiology residency

J Am Coll Radiol 2014;■:■-■.

INTRODUCTION

Many medical specialties have had a tremendous impact on improving the provision of health care in developing countries [1-3]. The field of radiology, however, has lagged in terms of organized and consistent contributions [1,4-7]. The World Health Organization reports that two-thirds of the world population has no access to radiology services, specifically because of severe shortages of imaging equipment, personnel, and qualified radiologic interpretation. US organizations and institutions annually conduct approximately 6,000 international short-term health care missions in resource-poor countries, with a total cost of ~$250 million. Only a minority of these efforts, however, focus on imaging [1,5-7].

The arena of global health imaging provides an opportunity to influence the quality and safety of health care delivery in regions that are underserved, particularly in population screening with mammography, prenatal complication triage with ultrasound, and infectious disease diagnosis (such as tuberculosis and AIDS) with radiography. Advances in technology have diminished many of the geographic and equipment portability barriers that once precluded meaningful global outreach and education in radiology. Available tools now include portable ultrasound, cellular phone data transfer, and web-based communication [1,5-7].

Successfully incorporating imaging services into resource-poor countries requires a multifactorial model, taking into consideration a population's culture, disease patterns, political environment, and health care system. Moreover, compared to many other medical specialties, the modern radiology enterprise consists of a wide range of skilled professionals with diverse expertise, including radiologists, nurses, technologists, medical physicists, engineers, IT specialists, and administrators [1,5-7]. Health care professionals benefit from specialized knowledge and skills developed and shared by each of

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1546-1440/14/$36.00 • http://dx.doi.org/10.1016/j.jacr.2014.04.007

these complementary groups. Collaborative outreach must integrate these unique perspectives to ensure sustainable, comprehensive project development [1,5-7].

Over the past few years, trainee interest in international outreach has grown significantly. Participation by US medical graduates in international health initiatives has risen from 5.9% in 1978 to 22.3% in 2004. Nearly all of these students consider the experience to be enriching and, in many cases, the best part of their medical education [8]. To date, however, motivated radiology residents and fellows have primarily developed meaningful projects on an independent basis [2,9]. Very few (less than a dozen) well-established, current institutional opportunities exist that pair structured global health and radiologic specialty training. In addition to implementation and reproducibility considerations, there are very few established funding opportunities, such as the ACR Goldberg-Reeder Resident Travel Grant, for pioneering trainees [2,9].

Both current and prospective radiology residents acknowledge the importance and value of international outreach as part of their training. Recently, Lungren et al reported that although the majority of surveyed trainee radiologists plan to pursue future international medical aid work, they are poorly prepared [10]. The overwhelming majority of trainees asserted that an organized global health imaging curriculum would improve understanding of basic disease processes and cost-conscious care, allow development of interpretative skills in basic radiology modalities, and prepare residents for life-long involvement in global health (Table 1).

The recent change in the ABR exam schedule affords new elective and selective opportunities during the fourth year of radiology residency. The opportunity for fourth-year programming was addressed in the Association of Program Directors in Radiology (APDR) Residency Restructuring Committee Report published by Deitte et al [11] and will have a dedicated section in the ACGME Milestone Project. Accordingly, the ACGME recently established Guidelines for International Rotations in Diagnostic Radiology that outline basic requirements for brief international clinical and/or research electives in the fourth year of radiology training [12]. Thus, a global health curriculum for radiology residents now needs to be established to provide a pathway for imaging-related trainees to develop, implement, and participate in effective and sustainable global radiology projects.

Table 1. Radiology resident perspectives on global health training

Less than 10% of surveyed residents reported developing-world opportunities at their residency programs, the lowest of the surveyed specialties (pediatrics was the highest with 74%; the second-lowest was orthopedics with 19%).
Approximately 30% of surveyed residents performed prior work in the developing world, with prior international outreach rendering these residents more likely to support its importance during training.
60% of radiology residents would likely/very likely participate in international rotations if offered.
60% of radiology residents believe that international rotations are important for resident curriculum.

Note: Table data are from Reference 11: Lungren MP, Horvath JJ, Welling RD, et al. Global health training in radiology residency programs. Acad Radiol 2011;18:782-91.

The ACR Resident and Fellow Section International Outreach Subcommittee's aim is to present a reproducible outline for the implementation of a global health imaging curriculum in radiology training programs. We hope these guidelines will allow the flexibility required to apply to varied educational environments, engender a unique desire for scholarship and service, advance the standard of global health care, and train future international leaders.

GLOBAL HEALTH IMAGING CURRICULUM

Many necessary components should be considered for effective curriculum development that is applicable at both the individual and institutional levels. Table 2

Table 2. Global health curriculum scope

Curriculum Components	Specific Proposed Components
A. Curriculum content	1. Global and public health education 2. Targeted travel medicine education 3. Practical radiographic and sonographic experience with potential for concentration in specific skill sets 4. Demonstration of appropriate practice attitudes and accountability
B. Global health project development	1. Needs assessment and project development accounting for regional culture, political environment, disease prevalence, health care system, and resources 2. Necessary approval from local and international training programs and organizations, including as applicable the Institutional Review Board and Ministry of Health 3. Logistical considerations including funding/industry partnerships, scheduling, and travel planning 4. Language proficiency +/- arranged translation 5. Interpersonal communication and relationship building 6. Adaptability to necessary change and challenges
C. Evaluation and assessment	1. Engagement in personal assessment and reflection 2. Solicitation of supervisor and peer feedback 3. Results measurement and reporting 4. Discussion of outcome implications 5. Formal presentation at local, regional, national, or international meeting(s) 6. Published material in a peer-reviewed journal