



EDITORIAL

Global Radiology: The Case for a New Subspecialty

Matthew P. Lungren^{1*}, Sarwat Hussain²

¹ Department of Radiology, Stanford University Medical Center, Stanford, CA, USA

² Department of Radiology, University of Massachusetts Medical School, Worcester, MA, USA

* Corresponding author. Current address: 300 Pasteur Drive, Stanford, CA 94305-5105; mlungren@stanford.edu.

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Abstract

In high- and medium-income countries, the use of radiology has grown substantially in the last several decades. But in the developing world, access to medical imaging remains a critical problem. Unlike more structured efforts in the field of global health, interventions in global radiology have been largely unplanned, fragmented and sometimes irrelevant to the needs of the recipient society, and have not resulted in any significant progress. Access to medical imaging around the world remains dismal. There is therefore a clear and urgent need for the radiology community to develop a vision for global radiology, beginning with defining the scope of the subject and establishing measurable goals. Agreement must be reached to declare global radiology as a bona fide subspecialty of radiology. This should soon be followed by the establishment of divisions of Global Radiology in academic radiology departments. Resident and medical students should be taught how physicians in low-income countries practice medicine without access to adequate radiology. As part of training and electives, residents and medical students should accompany global health teams to countries where the need for radiology services is great. Global scholar exchange and sabbatical opportunities should be offered to staff radiologists. Successful implementation of a unified vision of global radiology has the potential to improve access to medical imaging on a large scale. Radiology journals dedicated to the promotion of global radiology can play an important role in providing forums of discussion, analyses and sharing of field experiences. In this discussion we have attempted to make a case for assigning global radiology a subspecialty status.

Introduction

THE developed world has long mobilized healthcare resources and aid in response to natural disasters and epidemics in developing countries. During these urgent conditions, teams of experts have typically directed all resources and attention to the most immediate danger. Once the conditions were de-escalated, they would leave, only returning when the next disaster struck. However, in the second half of the last century, the approach to international health has evolved. What started as community medicine evolved first into public health, then into international health, and it has most recently matured into the current model of global health, now a bona fide subspecialty of medicine (1,2). In 2007, the Consortium of Universities for Global Health (CUGH), a body of over 100 universities around the world, developed a consensus document of 10 resolutions. The resolutions encouraged work for the creation of sustainable change through advocacy, capacity-building and customization, and called for an enabling environment for sustainable healthcare

change in low-income countries. After much deliberation, the following definition of global health has emerged (3):

Global health is an area of study, research, and practice that places a priority on improving health and achieving equity in health for all people worldwide. Global health emphasizes transnational health issues, determinants, and solutions; involves many disciplines within and beyond the health sciences and promotes interdisciplinary collaboration; and is a synthesis of population-based prevention with individual-level clinical care.

In high- and medium-income countries, the use of radiology in medical practice has grown substantially in the last several decades. Yet access to medical imaging in the developing world remains a critical issue. According to a World Health Organization (WHO) report published in the 1980s, two-thirds of the world's population lacked access to basic imaging technology (4, 5, 6). The same report later emphasized the importance of diagnostic imaging in all

spheres of health care, from health screening and primary care to advanced hospital healthcare. In the thirty years following the WHO report, many interventions aimed at improving access to radiology have been established. However, this has occurred in an unplanned and non-collaborative fashion. Well-intentioned individuals, governmental and non-governmental organizations (NGOs), professional societies, academic institutions and philanthropic groups have sought to expand accessibility through endeavors such as skill enhancement and equipment donation (4-6). In 2010, the WHO reported that, despite these efforts, two-thirds of the world's population continued to lack access to imaging technology. In addition, they discovered that the vast majority of the donated imaging equipment sat idle, broken or unused, and the number and skill level of the healthcare work force had not improved (1,4). Upon investigation, both donor and recipient factors were found to have contributed to this overall stagnation.

At the recipient level, there was a wide range of problems, including but not limited to: unreliable power supply, scarcity of money for capital equipment, lack of private investment, limited technical know-how, prevailing unconventional medical traditions, inadequate planning, inattention to health policy and absence of role models. The largest problem from the donor level was an oversimplification of implementation strategies, which reflected the developed world's naiveté to the challenges of the developing world. Interventions generally consisted of short training courses with periodic and interrupted on-site presence. Trainings incorrectly focused on the diagnosis and management of diseases prevalent in the developed world and often utilized inaccessible tools or techniques. The donated equipment was often obsolete, and sometimes beyond repair. Importantly, local biomedical engineering support was frequently unavailable and international contracts were too expensive to maintain. This gap in support left the donated equipment useless when technical problems were encountered.

In the developed world, radiology is an enterprise, not just a clinical discipline. For diagnostic images to be ready for interpretation, a great deal of ancillary support must happen seamlessly, including technical know-how, planning, training, expense and regulatory approvals. Coordination of the aforementioned is the key to successful implementation. Equipment maintenance and periodic replacement is required for a quality operation to stay functional. Radiologists in the developed world generally are not involved in the ancillary work done by architects, builders, installers, calibration engineers, accepting testing and regulatory inspectors. Availability of uninterrupted power supply and skilled workforce is never an issue.

In developing countries, on the other hand, radiologists are expected to manage the entire process from the concept to patient services, all while in severely resource-constrained environments. Needless to say, the practice of radiology in the developing world differs substantially from that in the developed world. Without education and discussions at the global level, it may not be possible for donors to imagine or understand the plethora of issues encountered by radiology operations in the developing communities. Therefore, it is important for the global radiology community to arrive at a uniform understanding of the scope of the issues facing accessible medical imaging in the developing world, and begin to create cohesive solutions. The implementation of a unified mission has the potential to revolutionize medical imaging for the developing world. To start the dialogue, we would like to propose the following definition of global radiology:

The study of diagnostic radiology and related medical and non-medical sciences that impact the delivery of medical imaging services, education and research. The goal of global radiology is to

assure medical imaging access for the underserved worldwide.

Consensus on a definition will lead to organized, sustained, and systematic interventions where everyone pulls in the same direction. Establishing global radiology as a subspecialty is one practical solution that evokes a systematic approach. Streamlined education, training and intervention will prepare subsequent generations of radiologists with the necessary attitudes and skills to address the medical imaging access crisis. To achieve this, academic departments should have the choice to make global radiology a subspecialty within radiology. The Department of Radiology at the University of Massachusetts (UMass) has already established such a division of Global Radiology. The UMass Global Radiology program is on par with other subspecialties, such as thoracic radiology and vascular interventional radiology. As leaders of the field, the department at UMass also launched an open-access, online Journal of Global Radiology (www.jglorad.org) in 2015.

The Global Radiology program at UMass strives to educate staff and residents on the current status of radiology in the developing world and to understand the challenges of establishing radiology services in low-resource settings. The program teaches successful strategies for working in developing countries and has developed a training module to prepare residents for electives or rotating fellowships. As academic institutions begin to organize global radiology subspecialties, successful global health initiatives in other clinical disciplines can serve as models to emulate. Programs should consider implementing international department and scholar twinning exchange programs for radiology personnel and consultation programs.

In return, the staff and residents of developed countries will have opportunities for innovative research, enhancement of curriculum vitae, guest speaking and travel. Participants will also gain a deeper understanding for the partner country's culture, customs and attitude toward healthcare. Organizations such as the WHO, CUGH, Imaging the World (ITW), World Federation of Pediatric Imaging (WFPI) and RAD-AID – to name a few – have created opportunities for resource development in the developing world. These opportunities invite the creation of uniform metrics for implementation, evaluation, and assessment. General agreement on a curriculum at several levels is necessary. Standardized educational contents and methods of delivery, both in the developed and developing world, would help to bridge the chasm between the two. Many academic leaders have proposed the need to develop a universally accepted global radiology curriculum. The curriculum would have enough flexibility so that it may be customized to fit the needs of a particular society or country. Such a curriculum will improve the quality, quantity, and overall impact of initiatives undertaken by donor entities. Suggested content of the curriculum have included teaching pertinent diagnostic skills for diagnosing common local diseases, basic imaging proficiency and performance, attitudes and accountability training, and simulation training for interventional radiology, where applicable.

Employing current technology, the syllabus would be remotely delivered through a combination of webinars, free access to educational websites, journal clubs, case discussion and clinic radiological conferences. Clinicians and paramedical personnel would have the opportunity to develop and implement radiology curriculum for their own subspecialties. Such curriculums would help bridge the huge gap between the supply and the need of skilled radiologists. With paramedical staff, training midwives in the basics of obstetrics ultrasound can improve perinatal mortality. Senior residents or fellows in the developed world stand to gain excellent teaching experience in educating non-radiologists.

This is especially important, as there are only a few structured radiology residency programs in the developing world.

Hands-on training for interventional procedures are best delivered in a realistic or simulated environment prior to performing procedures on live patients. For visiting radiologists from the developing world, simulated training would obviate the need for licenses, malpractice coverage and HIPPA requirements.

Cultural, social, religious and economic education about recipient societies is important for successful collaboration and sustained relationships. Development of special modules to educate hospital administrators, politicians and other opinion leaders would shape attitudes toward health services funding and improve international health policy.

Global radiology and an educational curriculum

Curricula for residents and fellows in the developed world have been proposed in the literature (12).

Global radiology education provides awareness of many aspects of the developing world. Such knowledge is not only useful in the delivery of radiology education and service, but also helps make elective rotations in global radiology more personally fulfilling. Additional benefits include research opportunities, enhancement of social awareness, experience implementing radiology programs in resource-strapped environments, and understanding of the effect of health policy on operations. The curriculum can include a large number of topics, both medical and non-medical.

Personal safety and security during travel and stay abroad is the first order of business. Prescriptions of travel clinics and any government advisories must be followed. While abroad, it is important to register with the embassy of the traveler's nation, and use common sense for personal safety. In order to influence and educate recipient society, it is essential to be sensitive to the local political, cultural and religious imperatives. Knowledge of local disease prevalence, especially parasitic and infectious conditions, their pathophysiology and imaging presentations, will give a head start to any visitor. In absence of advanced equipment, the global radiologist must brush up on their plain film radiology before a visit. Imaging-guided biopsy and fluid drainage may be introduced by training in a simulated environment, such as a turkey breast with embedded olives.

Current efforts

Never before have there been more ongoing efforts to increase global access to radiology. For instance, the United Nations (UN) and the WHO held two recent hearings on this topic, and they have committed to publishing and updating imaging education and outreach materials for partner countries (4,7-9). The Radiological Society of North America (RSNA), American College of Radiology (ACR), the Royal College of Radiologists, UK (RCR) and the European Society of Radiology (ESR) also have international programs, which provide travel grants for staff and trainee radiologists to serve in the developing world. Collaborations have been successfully implemented in Rwanda and Haiti (5,8,9). The International Society of Pediatric Radiology (ISPR) has also announced expanded international programs for pediatric radiology (5,9). The American Society of Radiology Technologists (ASRT) has made travel grants available to radiology technologists to provide outreach and education (5,9). Many NGOs, individuals, and other small groups have contributed to radiology education, services, and equipment donations. Notable among these are: RAD-AID (rad-aid.org), Imaging the World (ITW.org), Jefferson University Research and Education Institute (jefferson.edu/jurei) and Diagnostic Imaging and Medical Informatics Support Team (DIMIST.

org). With Internet services becoming ubiquitous and inexpensive, academic departments in the developed world are establishing video conferencing programs with their counterparts in the developing world.

RSNA, ACR, and ARRS have all hosted several refresher courses and many committee meetings on the topic of global radiology. But a consensus has yet to emerge on a unified mission to educate leaders in global radiology in developed countries and instill commitment to services abroad.

Moving forward

Radiology is following in the footsteps of other global health specialties such as internal medicine, pediatrics and surgery. These specialties have already developed global health career tracks, dedicated training opportunities (ACGME-accredited), faculty positions, and high visibility in international governing bodies and both governmental and non-governmental organizations. In fact, primary care and medical subspecialty physicians populate – and often dominate – institutions of global health research, aid and governance, as well as decision-making positions in state departments and ministries of health (10). Concerns have been raised that the prevalence of traditionally trained doctors in policy-making can lead to an inappropriate medicalization of policy, inadequate solutions to imaging needs, and a neglect of specialty involvement in improving global health disparities (11). This re-emphasizes the need for training and recognition of global radiology practitioners and leaders. In fact, radiologists have an opportunity to leverage the outcomes of current and ongoing global radiology efforts to demonstrate the value of radiology involvement in global health policy at both the governmental and national level. Significant opportunities exist at the societal level to interact with large international health organizations responsible for directing health care resource allocation and public policy, and for delivering effective quality health care and education. Radiology leadership has an obligation to contribute to expertise in the development of policies that have global implications.

Now that there are formal (albeit not ACGME-accredited) opportunities for radiology and a high level of interest among faculty and trainees (12,13), an organized approach must naturally follow if we are to begin to truly address disparities or have input into radiology implementation as part of global health outreach efforts. We must focus on training global radiology leaders – to prepare them for service work and education, and to help formulate policy in large societies and NGOs.

Global radiology certificate

One way to crystallize global health radiology training is to offer a formal certificate or “mini-fellowship” from national radiology societies. Radiologists, technologists, nurses, and others would participate in a standardized curriculum. A certificate program would define the role of medical imaging in global health outreach. Many global health careers fall under one of three categories: global health practice and program delivery, global health research, and global health policy (14). These three areas serve as a starting point to consider the scope of competencies and capabilities necessary for radiologists to lead global health efforts.

RAD-AID now offers a six-month interactive online course to provide formal training to radiology professionals, including physicians, technologists, nurses, administrators and educators. The course includes text-based learning, as well as supervision and mentorship in planning and implementing an international health project. Successful participants in this program receive a Certificate of Proficiency in Global Health Radiology from RAD-AID, and “an essential understanding

of issues affecting radiology in the world, a strong basis for using public health methods, skills in radiology project planning, and experience in carrying out a global health radiology initiative” (15).

Medical students

Global radiology provides for exciting elective rotations and/or research opportunities for medical students. As a part of the educational curriculum, medical schools offer widespread opportunities which typically result in a six- to ten-week exposure to medicine in another country. In the United Kingdom, approximately 40% of medical students visit a developing country during their elective period (16). In both the United States and Canada, about one third of students participate in a global health rotation. And in Germany, 36% of medical students travel to developing countries as part of their course work (16). These experiences give medical students the opportunity to write research papers, as one UMass Medical student did after a short rotation to a country in the Far East (17).

RAD-AID recently announced a partnership with the Columbia University College of Physicians and Surgeons in New York to offer an accredited elective course on global health radiology, in which lectures and case-based instruction from Columbia faculty are integrated and synchronized with a RAD-AID-supervised project abroad (18).

Department and scholar twinning

Important research conducted by radiologists and scholars in the developing world may not reach or be accepted by international journals. The theses may be pertinent and useful, but difficulty with English language or data analysis may be a hindrance to publication. Through scholar twinning, collaboration is forged between international radiology researchers and faculty radiologists in an academic department in North America or the United Kingdom. These collaborations can bring important research and discussions to publication. New insight into regional pathologies, socio-economic issues and health policy can be brought to light. On the same footings, study protocols, reporting templates, quality management, educational and research agenda can be advanced through transnational collaboration between the leadership of radiology departments.

Residents and fellows

Following the global health example, elective international rotations for residents and fellows would be easy to implement. ACGME-approved global radiology fellows can usually be employed as “attending” radiologists in developing countries, and assist in running radiology services and teaching radiologists, technologists and the clinicians.

Staff radiologists

As stated above, funded travel opportunities to serve 2-26 weeks or more in developing countries are available. Staff radiologists have been availing these through various programs. For a global radiology curriculum to be effective, the faculty also needs to learn the status, the issues and the spectrum of solutions for radiology access for the developing world. Recently, Partners in Health (PIH) has initiated a welcome trend to sponsor attending radiologists spending sabbatical time serving developing communities. This opportunity provides for a mutually enriching opportunity for both the donor and recipient departments. Through such interactions, decision makers can be educated to formulate better health policies, and visiting radiologists can help in planning radiology services.

Journal of Global Radiology

Until recently, there was no journal that catalogued the activities and achievements of individual radiologists and institutions working to solve access issues in the developing world. The publication of articles, announcements, available funding, programs, and other topics of global radiology were scattered in the literature. They were generally printed as “international radiology,” “radiology outreach,” or “undifferentiated papers.” The *Journal of Global Radiology* (JGR) was launched in 2015 as a single site reference to address the burgeoning field of global radiology (19). The journal attempts to catalogue philosophical and scientific work that falls within the above definition of global radiology. Through publications in JGR, readers will be able to learn from the experiences of others.

Since little is known about the internal workings of many countries, new information will be critical in project initiation and management. JGR will likely be a rich source of information and motivation for the radiology leadership and potential donor organizations unfamiliar with the current efforts in global radiology. The donor pool and institutional funding may increase as a result. The journal will also act as a catalyst for collaboration. Donors and recipients’ knowledge, service, business, and more will be facilitated at a global level. Policy makers and hospital administrators will have one source of information and motivation to pay due attention to radiological funding. Manufacturers will have the impetus to develop low-cost equipment and consumables once the size of the global market is better known. JGR will also offer readers one place to learn about global radiology work, ongoing projects, funding, business opportunities, and education. Additionally, JGR will help to connect job seekers and employees, planners and contractors, educators and students, and like-minded scholars at a global level.

Summary

We have attempted to discuss why it is important to separate global radiology as a subspecialty of diagnostic radiology in academic departments of radiology. All prior attempts to address the critical issue of access to medical imaging in developing countries have not been met with much success. We have reviewed the current curricula of global radiology and contributed to it. We have identified support programs to address complex issues related to access at the global level. We highlighted the need for research in order to continue ongoing dialogues and support interventional programs at individual, departmental and government levels. We offer no panacea, but encourage all to continue the dialogue and implement what is suggested above.

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