

# International pediatric radiology education: who should be trained, and how?

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**Abstract** Education is a key component in international outreach. In light of the growing importance of diagnostic imaging in both developed and developing countries, we need to embrace the goals of standardizing training, establishing international standards, and promoting innovations and advances in pediatric radiology internationally. The World Federation of Pediatric Imaging hopes to promote this work through education, improving diagnostic imaging and therapy access to children worldwide.

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When considering international outreach regarding pediatric radiology, education is a key component. With a majority of pediatric imaging studies performed and interpreted by non-specialty trained radiologists, even in developed countries such as the United States, an important goal of pediatric radiologists is to work toward proper diagnostic imaging training involving all clinicians caring for children worldwide.

Radiology expertise is particularly lacking in developing countries. Although the ratio of radiologist-to-population is 1:50,000 in the United States and Europe, many African countries have ratios of 1:1 million or worse. Fourteen African countries have no radiologists and most have fewer than 30.

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The number of pediatric radiologists is even lower in these developing countries [1].

Africa and Southeast Asia combined have more than half of the world's disease burden, measured in disease-adjusted life years, largely because of the morbidity and mortality among children younger than 15 years [2]. In 2008, 46% of all deaths in Africa were children younger than 15 years compared to just 1% in high-income countries [2]. Seven out of ten child deaths worldwide are in Africa and Southeast Asia. The most common causes of mortality for those younger than 5 years include acute respiratory infections (pneumonia), prematurity/birth asphyxia, and trauma, which are three of the top five [2, 3], health issues in which diagnostic imaging plays an important role in improving outcomes.

One way to address these issues is to provide specialty education to radiologists in these countries. However, studies show that many radiologists are concentrated in urban areas. For instance, in Malawi 87% of the people live in rural areas and yet 97% of physicians live and work in urban areas. In Uganda 30 of the 38 radiologists are in Kampala alone, with the rest in major towns and none in rural regions [4]. Another challenge is that many academic radiologists in developing countries are moving to private practice, leaving public government hospitals to serve the majority of citizens with fewer trained radiologists [5]. This environment makes education for radiology residents and continuing medical education for radiologists difficult, a problem exacerbated by low health care budgets [5, 6]. This begs the question: Who should be the target for radiology education and training in order to reach the majority of a country's citizens? Studies have shown that radiographers, sonographers, local physicians and community health workers are key groups that can meet the needs of many who cannot access or afford private hospital health care in urban areas [1, 4, 7–11].

With that target group in mind, it is important to discuss examples of educational outreach. Imaging the World (ITW), for example, trains health care workers and midwives on the

ultrasound (US) technique for imaging a fetus. The focus is on using body landmarks as a guide to capture the correct images. After proper image compression, the images are sent via Internet to US professionals in Kampala and Uganda and to ITW radiologists for interpretation [12]. This technique may be useful to evaluate pediatric pathology in rural regions as well.

Radiography has an expanding role in Médecins Sans Frontières (MSF, or Doctors Without Borders). Utilizing teleradiology in Liberia with digital radiography, pediatric patients with tuberculosis were managed at a hospital in Monrovia. After installation of a fully digital X-ray unit, Médecins Sans Frontières hired two young men with no medical training and taught them to serve as radiographers. A survey of local physicians showed that a teleradiology consultation strengthened their clinical diagnosis and often significantly changed treatment plans. Another Médecins Sans Frontières project focuses on teaching image interpretation. Carried out in South Africa, it involves a pediatric radiologist teaching clinicians and radiographers who work in HIV (human immunodeficiency virus) clinics how to diagnose tuberculosis on chest radiography. It is important to note that more than 90% of children with tuberculosis live in developing countries, with South Africa having the highest rate in the world [1]. Part of the training involves teaching participants how to fill out tick-sheet reporting cards for pediatric chest radiography. One advantage of these cards is it standardizes interpretation [1]. Although it is too early to predict outcomes for the reporting cards, this example and the others above show the importance of being creative in approaching educational outreach.

So what are the principles for providing international pediatric radiology education? Of most importance is the fact that education must occur in the right context to the right people [1, 2, 4, 7, 9]. Providing specialty pediatric imaging training for radiologists and radiology residents is one important option, but various challenges make this an ineffective solution to reach many children in underdeveloped countries. In these situations, focusing on community health workers, physicians and radiographers may be more successful. Health workers trained in a specific skill set, when combined with teleradiology, can provide effective health care to a community. Assisting the learning of health workers in order to address their real workplace needs becomes more important than simply teaching what the expert (teacher) knows [9]. The South African project focusing on diagnosing primary tuberculosis in children rather than the whole variety of pulmonary pathology is a good example of meeting the needs of a community with limited resources. As Morgan and Deutschmann [9] explain, it is possible to integrate growth into systems by allowing health care workers to gain further training and re-certification, which, when linked to promotion and pay, can improve health care workers' knowledge and program impact [9]. Although any potential location has

unique challenges, these lessons offer a template from which to develop radiology education outreach.

With these concerns in mind, the World Federation of Pediatric Imaging education committee has developed four objectives:

- (1) To promote pediatric radiology educational needs globally for non-radiologists, radiologists and pediatric radiologists.
- (2) To support and promote educational efforts by pediatric radiology groups at regional and national levels.
- (3) To collate materials and tools via the WFPI website, providing easy access to pediatric radiology education for targeted audiences worldwide.
- (4) To promote and develop international education opportunities.

The World Federation of Pediatric Imaging Web site ([www.wfpweb.org](http://www.wfpweb.org)) is core to the group's education outreach. There are links for pediatric radiologists, radiologists and non-radiologists (pediatricians, sonographers, technologists). The WFPI educational site attempts to raise awareness of already established regional initiatives and promote the creation of initiatives specific to international outreach. The goal is to provide easily accessible and searchable databases for each level of training. Content that is deemed needed but not yet available will be produced. For example, a tuberculosis corner (<http://pedrad.org/associations/5364/wfpi/Outreach/TBCorner.aspx>) is being developed with resources for all three levels of training that includes PowerPoint presentations and video clips for basic and advanced interpretive skills.

Because the WFPI Web site is a growing online library for pediatric radiology education, one goal is to develop short video clips for basic training of pediatric radiology procedures and interpretive skills. Another goal is to encourage free access to journals and books that have pediatric radiology educational materials. International courses and meetings of interest to WFPI members will be flagged. Educational grants and awards will be tracked to increase applications.

Because Internet access remains limited in regions around the world, direct educational outreach is also an important mission. Sustainable educational initiatives, however, need to be carefully addressed with the goal of teaching in the right context to the right people. Teaming with larger and already well-funded organizations with international outreach is an effective solution. Numerous outreach programs have already been developed by the American College of Radiology (ACR), the Radiological Society of North America (RSNA), the International Society of Radiology (ISR) and the European Society of Radiology (ESR). Recognition of WFPI by these larger societies will encourage more programs to include pediatric initiatives. WFPI has already been successful in promoting several projects, including the ACR Haiti initiative

(<http://pedrad.org/associations/5364/wfpi/Education/WFPIEducationalInitiatives/Haiti.aspx>), which includes pediatric radiologists.

In light of the growing importance of diagnostic imaging in both developed and developing countries, we need to embrace the standardization of training, the establishment of international standards and the promotion of innovations and advances in pediatric radiology internationally. These are exciting times for pediatric radiologists. The World Federation of Pediatric Imaging allows us to promote our important work through education, improving children's access to diagnostic imaging and therapy worldwide.

**Conflicts of interest** None

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