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## Pediatric radiology requires wide skill set

Peter A. Rinck



One radiological subspecialty does not deal with a single organ or organ system. Nor does it concentrate on a single imaging modality. On the contrary, it evaluates and takes care of the entire body, reflecting on how it and its metabolism work and how they change with age and physical development.

This might sound like an occupation for sophisticated people. Indeed, some professionals performing this subspecialty claim that they are the last disciples of the haute école of radiology, the art of radiology. If you give it a second look, you see their point.

■ The profession we speak of is pediatric radiology. Its practitioners must have a complete command of anatomy, physiology, pathophysiology, metabolism, and disease for human beings weighing between 250 g and 60 kg, from birth (or even preterm) to near adulthood. Children (0 to 14 years) and adolescents (15 to 18 years) make up 19% to 25% of the general population in European countries [1]. They also account for 15% to 20% of medical patients.

Yet doctors practicing pediatric radiology are a marginal group in the medical imaging community. In Germany, there are approximately 50 radiologists per million adults but only five pediatric radiologists for every million children and adolescents [2]. Neuroradiology appears to be the most stable radiological subspecialty, and interventional radiology will most likely develop further as a bone of contention between medical disciplines. Meanwhile, pediatric radiology, a marginal stepchild, will continue life in the back room.

Pediatric radiologists are easy to distinguish from their patients. You rarely find the sophisticated gentleman; more often a sophisticated lady. She is most likely to be the benevolent-looking person with gray hair, close to 60 years of age. Her position will not be filled after she retires.

There are, apparently, some pediatric radiologists in private practice, though I do not know any of them personally. Survival must be very difficult, given that pediatric radiology examinations show little profit.

Examinations involving children, particularly young children, are time-consuming and consequently expensive. Dealing with crying infants is not a terribly sexy job. Performing heart transplants, brain surgery, or even interventional procedures is cooler.

### Not just all small adults

Hardly anybody outside the world of pediatric radiology realizes the difficulties of imaging studies involving children. Hospital managers or health politicians have other things on their minds. Losing money is not one of them. I still remember the friendly remark made by a local politician on the board of our university department. We were discussing the budget for the following year.

"Why don't you close down one MRI machine? It will cut costs," she said.

Why not get rid of all schoolteachers who become politicians? They won't get sick any more. It will cut costs.

Permanent quarrels about turf reach deep into pediatric radiology. There are the pediatricians who want to do ultrasound on children, claiming that pediatric radiologists are not needed for these examinations. "We can handle this ourselves" is a statement that pediatric radiologists have to live with. Then there are the general radiologists who say, "Children or adults, I take care of everything."

Pediatric radiologists cannot be blamed when they accuse their "adult" colleagues of arrogance and presumptuousness. The notion that a general radiologist—usually a subspecialist—can cover everything in medical imaging from ultrasound to nuclear medicine, from interventional procedures to pediatric radiology, is bizarre and mistaken.

Yet some people believe that they know the discipline without proper training. They argue, "We have to do these examinations on children because there are not enough pediatric radiologists." Insecurity and lack of knowledge are covered up.

Arguments using analogies to adults don't count: They might be easily wrong. Knowledge about special characteristics in healthy and diseased children, of differing ages, is fundamental for the choice of imaging technique and image interpretation.

Children needing x-rays are usually examined in the general radiology section. How I remember that. Everybody hated it. Crying and fighting little brats block the examination rooms, putting technologists and radiologists in a bad mood. The mother complains. The father threatens. There was no separate waiting room for children, but such a place is necessary if you want the youngsters to relax. You need special furniture, toys, books – and a bar for the accompanying parents.

Whose demands do pediatric radiologists cater to? Their little patients? Most of them do not know that radiologists exist and would never ask to be helped by one. Or are pediatric radiologists focusing on the needs of parents, referring physicians, or health administrators?

The most powerful lobby for pediatric radiology would be the parents of sick children. This is a volatile, difficult-to-reach group, however. Here today, gone tomorrow. Most parents also follow the common trend of believing in high technology rather than the people using their brains and knowledge. They equate having a bigger scanner with a better service, never mind who is operating it or reporting the results.

## Radiation protection

Imaging examinations of children are usually performed by radiologists who most often examine adults. "Children are not just small adults" is a phrase often repeated by pediatricians. Children are defenseless and need protection. When it comes to examinations involving ionizing radiation, children are especially vulnerable.

There are clear recommendations on the technologies that should be used for imaging studies in children. CT studies should be performed only when searching for pulmonary changes and after accidents to diagnose or rule out multiple or craniocerebral injuries. This should also hold for pediatric oncology patients, many of whom will survive their childhood cancer but then develop another cancer later in life. Extensive CT examinations may be part of the cause.

The first choice of imaging modality for children and adolescents is ultrasound, with MRI next in line. Both of these modalities are readily available across Europe. X-ray should be considered only when nothing else is available [3]. Radiation protection is of utmost concern and must have a high priority. If there are no dedicated machines for pediatric imaging, practitioners should have flexible access to the adults' top-notch equipment.

Clinical practices vary markedly in different countries. Ultrasound is performed by technologists in the U.S., for example, while in Canada it is carried out by radiologists. Pediatric radiology is not included in the board training of radiologists in Germany, whereas in Switzerland it is part of the curriculum.

## Ongoing dilemma

France is a model within Europe for pediatric radiology. Training is supported, and a pool of qualified pediatric radiologists has been built up. Generally, however, this subspecialty faces a staffing crisis, and the number of pediatric radiologists is decreasing rapidly [4-7].

Who is responsible? Looking for culprits and rounding up the usual suspects does not reveal too much. Minorities are usually blamed, but here, it is the pediatric radiologists themselves who are the minority. They cannot be responsible for their own imminent demise.

What happens if there are no more pediatric radiologists? Somebody else has to perform these studies. Perhaps a general radiologist, a pediatrician, a physician from another specialty, or a technologist. Pediatric radiologists have tried attracting medical students or young radiologists into their subspecialty for some time. Their public relations endeavors have included lectures, weekly image reading sessions for pediatricians and other referring physicians, and excellent continuing education courses on a European level.

Could physicians working in pediatrics move straight into radiology, as has been suggested? It has been argued that these practitioners would not need to learn much "adult" radiology because many features of general radiology are irrelevant to pediatric imaging. This is an unpalatable solution for established pediatric radiologists and a solution that would be impossible in many European countries. Why not raise

awareness within the radiology community that pediatric radiology is a worthwhile specialty that demands special knowledge and skills and that should remain in the domain of specially trained radiologists and not be released to other disciplines as an added skill?

It is quite interesting to learn the opinions of the younger U.S. American generation on this topic. They place a large emphasis on lifestyle, finances, and flexible working. Of course, there is no reason why a pediatric radiologist should earn less than a general radiologist.

The ultimate focus should be the patient. Children cannot or do not speak for themselves and do not have a strong political lobby. As one pediatric radiologist observed, "Children have the right to be treated by somebody who is properly educated." Politically minded doctors and academic radiologists should take on this issue and press for a stronger, younger pediatric radiology.

■ One final thought. A team of politicians interested in health matters traveled through a European country recently to determine which hospital departments should be sponsored and subsidized in the future. The three started their journey at a pediatric ward in a big provincial hospital, and were very impressed with what they observed. The first politician wrote a check for 100,000 Euro.

The next stop was a dermatology department at a university hospital. Again, the politicians were impressed, and the second politician wrote a check for 200,000 Euro.

Their final stop was the psychiatric ward of the country's biggest prison. Here, the last politician left a check for 5 million Euro. When asked by her fellow travelers why she was so generous, she responded:

"Do you think that we will ever be hospitalized in a pediatric ward?"

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## Quo vadis – where is medical imaging heading?

Peter A. Rinck



**T**he German psychiatrist Emil Kräpelin (1856-1926) is credited as being the founder of modern scientific psychiatry, as well as psychopharmacology and psychiatric genetics. His theories dominated the field of psychiatry at the beginning of the 1900s and have done so, in essence, since the end of the 20th century.

Kräpelin opposed the methods of Sigmund Freud, who regarded psychiatric disorders as if they were caused by psychological factors and treated them as such. His publications had neither the literary quality nor the paradigmatic power of Freud's. Today, however, published literature in the field of psychiatry is overwhelmingly biological and genetic in its orientation.

Kräpelin and Freud are both long dead. Will psychiatry remain a medical discipline in its own right, or will it become part of neuroscience? Wilhelm Conrad Röntgen is dead, too. A similar question could be asked about radiology. Will it remain as a discipline in its own right? Is it a discipline of its own?

■ What is radiology? According to the U.K. Royal College of Radiologists, the term is defined as “the branch of medicine originating from the use of x-rays for diagnosis”. The RCR notes that this is now called “clinical radiology,” and it is performed by clinical radiologists.

The key word here is “clinical”. We are not nuclear physicians, radiation physicists, radiation biologists, radiation chemists, radiotherapists, sonographers, molecular engineers, computer technicians, archivists, secretaries, or hospital administrators. Pediatricians deal with children. We deal with images. Pediatricians do not generally have the knowledge to develop medicines for children, investigate molecular genetics, or develop computer programs. A similar approach holds for radiologists.

The job of a clinical radiologist is to make a diagnosis based on images created by a medical imaging modality. It is not the equipment that makes the diagnosis but your knowledge in interpreting the images.

Knowledge is not created by computers. Computers organize and manipulate information. You cannot delegate thinking to a computer.

When people talk about the future of radiology, they usually talk about machines. Patients are regarded as objects to be studied. The focus is on “innovation”, using complex equipment and complicated techniques. The future has to be more complicated than the past. Nobody, however, gives you the proof that this approach works.

■ We are forever being told that we live in the age of information and the age of knowledge. Yes, we have more information now than we did previously. But what about knowledge? If knowledge is processed information, then this is something that we don't necessarily have. We have, instead, undigested information that can create fear: fear of the future, fear of pain, fear of diseases, fear of not being able to find a diagnosis from our pictures.

We are also told that we need higher spatial resolution, faster imaging, more slices, a different contrast agent. We live in fear that if we don't use the latest development, we may overlook a patient's disease. But nobody proves that all this results in a positive outcome for the patient. We have simply done whatever was technologically possible.

Knowledge is our main asset. Not information obtained from the internet or data stored in a laptop. But knowledge alone is not sufficient. It is equally important that we use this knowledge critically.

■ In spring 2007, I attended a meeting on essential health technologies arranged by the World Health Organization in Geneva. A wide range of people from all over the world had been invited. When I asked the representative of an industry lobby group operating out of Brussels why companies he represented would not agree to outcome studies measuring the impact of their products, he responded:

“That's impossible. The lifespan of most products is only two years.”

These very same products would increase productivity, one of the central themes favored by commercial salespeople and hospital managers. "We have to take image management to the next level of performance," they say. But do we? Or is this just another empty cliché and a completely wrong approach to radiology?

People who are able to use the tools and interpret the results bring with them the solution. Wherever you have weak leaders and dependents who are lacking in knowledge, then people from the outside (in this case, industry representatives and health administrators) will become more influential and finally take over decision-making.

The future of radiology is not in machines or techniques that hardly anybody understands any more. It is in the brains of radiologists. If radiologists do not realize this, then it will harm them and their discipline.

It has already caused harm.

Have you ever considered the sanity of developing the kind of machines that you find in today's hospitals? Have you ever thought about calling into question the equipment that you use or are offered by companies? Are you able to program your video recorder at home? Do you understand the programs your digital camera offers? Have you ever felt like a stranger in your own world?

Remember: Radiologists are expected to be at the forefront of high-tech medicine. But if you don't understand the techniques you apply, your position in medicine has to be called into question.

■ Discussions on the future of radiological departments can attract an opinion from just about everybody; from the cleaning lady to the cardiologist, the ophthalmologist to the hospital administrator, local hospital planners, and teachers-turned-politicians.... Medicine – radiology included – has been removed from the control of the knowledgeable. It is now in the hands of lay people, amateurs, dilettantes, money-makers. An MBA or a degree in public health or architecture does not qualify you to plan radiological departments or hospitals.

We should have a logical, rational approach. Medicine, however, is not rational or logical but somewhere between science and witchcraft. It lies

somewhere between ego, money, and idealism, somewhere between stupidity and cleverness, run by doctors, nurses, politicians, managers, patients, and patients' relatives. This is the reason that a rational approach will not happen.

It's a rat race. Many people believe that they have to participate in this race, but they do not realize that they are not rats. They are mice. A rat race for mice is an unequal race. The mice will lose, whatever they do.

■ Radiological studies will, in many cases, result in an overdiagnosis that brings no benefit to the patient. The logical approach to the future of radiology should be an assessment of the state of the art, personal or general. Such an assessment would consolidate technical development.

Please understand what I am saying. I do not say that the end of radiologists is imminent. I do not want to say that you and I are idiots. I do not want to say that commercial companies are cheats per se. We need hospital administrators, we need politicians. We are administrators, we are politicians. I know how other people like to twist words after somebody has spoken.

*Quo vadis?* Where are you heading to? *Quo ibimus hinc?* Where do we go from here?

*Vade mecum.* Come with me. I will try to shape the future (not with me – with yourself.)

■ And don't forget: "There is at the bottom only one genuinely scientific treatment for all diseases, and that is to stimulate the phagocytes." [1]

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