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TRAINING IN RADIOLOGY: THE EUROPEAN PROPOSAL

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SUMMARY – Postgraduate training is of utmost importance in order to prepare professionals who have high specific knowledge in their area and who could give the best quality of care to their patients. Therefore, the training in Radiology is a very complex and difficult task, mainly due to the wide spectrum of radiological applications and the variety of imaging modalities. In 1999, the European Association of Radiology (EAR) issued the "yellow book" containing the basic elements for an European wide model of training. The attempt to reduce the broad differences existing from country to country is still in its initial phases, but EAR tries to get a general consensus on these preliminary steps.

Introduction

Postgraduate training is of utmost importance in order to prepare professionals who have high specific knowledge in their area and who could give the best quality of care to their patients. Therefore, the training in Radiology is a very complex and difficult task, mainly due to the wide spectrum of radiological applications and the variety of imaging modalities. In 1999, the European Association of Radiology (EAR) issued the "yellow book" containing the basic elements for an European wide model of training[1]. The attempt to reduce the broad differences existing from country to country is still in its initial phases, but EAR tries to get a general consensus on these preliminary steps.

The Role of Radiologist

The advance in the medical and technological facets of radiology is so rapid that only qualified radiologists can be reasonably expected to maintain the high level of proficiency required to supervise and interpret procedures, thus ensuring a maximum diagnostic yield for the benefit of the patient and the referring doctor[2]. The performance of radiological procedures by those with less training than that provided by approved radiology training programs has been shown to lead to an increase in utilization and decreased quality of care and cost efficiency, and to unjustified exposure to ionizing radiation.

Training Programs for General Radiology

A general radiologist should be conversant with all aspects of the core of knowledge for general radiology, to ensure an understanding of those radiological skills required in a general or community hospital or in general radiological practice[3].

The duration of the training in radiology should be 5 years; the first four mandatory years serving as a common trunk and the fifth year concerned with a subspecialty or an extension in general diagnostic radiology. Some subspecialties may require further extension of the training period and may also wish to identify some training components within the fourth year as being germane to their specialist program.

It is recommended that radiologists in training should be available for at least 40 h *per* week for 46 weeks in any 1 year. It is recognized that the starting date for radiological training programs will vary throughout Europe.

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The First Year Training Program (46 Weeks)

The first year of training should be spent on acquiring the necessary knowledge of the basic sciences, i.e. the physical basis of image formation, quality control, radiation physics, radiation biology, anatomy, physiology, biochemistry and techniques related to radiological procedures, the pharmacology and application of contrast media and a basic understanding of computer science, as outlined in the core of knowledge for general radiology. The opportunity to participate actively in clinical radiology should be available during the first year and should be increased during that year.

The training program should include the following elements: skull (including facial bones and teeth), skeletal system, respiratory system, abdomen-gastrointestinal tract (biliary system and urogenital system), cardiovascular system, lymphatic system, breast, brain (spinal cord and meninges), endocrine system, normal fetus, and emergency radiology.

It is not anticipated that a trainee would enter an emergency on-call rotation entailing clinical responsibility until the end of the first year of training.

It would be appropriate for trainees to rotate through various sections of the department of radiology to witness techniques first-hand and to acquire the knowledge of good radiological practice.

The following rotations are suggested as a guideline:

Conventional radiology, including film processing and archiving	18 weeks
Ultrasound	8 weeks
Computed tomography	9 weeks
Magnetic resonance imaging	9 weeks

Second, Third and Fourth Year of Training (138 Weeks)

Trained general radiologists should be fully conversant with all aspects of the core of knowledge for general radiology. This will be achieved by a mixture of didactic and practical training. Rotation in clinical radiology can only be defined on a local basis.

The following average distribution of time is suggested as a guideline:

Musculoskeletal system	17 weeks
Thorax	17 weeks
Gastrointestinal system (including parenchymal organs)	17 weeks
Central nervous system	17 weeks
Urogenital system	14 weeks
Cardiovascular system	12 weeks
Pediatrics	12 weeks
Basic interventional techniques	8 weeks
Emergency radiology	8 weeks
Head and neck	6 weeks
Breast disease	6 weeks
Maxillofacial and dental radiology	4 weeks

A period of training in approved hospitals other than in which the trainee is based in either the same country or overseas should be encouraged for a period not exceeding 12 months.

Fifth Year Training

In the fifth year, the rotation of the radiologist in training should be organized to serve the individual's needs which may be in a subspecialty or in general radiology. Wherever possible, part of the rotation in the fifth year should be carried out in a specialist hospital, even for those individuals not intending at this stage to subspecialize. For those entering a subspecialty, the total period of specialist training will vary according to the subspecialty but this fifth year will normally count as 1 year of that training.

Requirements for Training Facilities

Health system in individual European countries differ for a variety of reasons, which include administration, management, equipment, budgeting and tradition. Despite these differences, recommendations for training facilities for specialization in general radiology can be defined. The practical implementation of these recommendations must be left to respective countries.

Requirements for Fully Accredited Training Departments

The status of a training department can be specified in the following ways:

1. Quantity and distribution of radiological examinations
2. Standard of equipment
3. Availability of modalities

4. Staffing
5. Teaching program of the radiological department
6. Teaching materials
7. Research activity

Quantity and Distribution of Radiological Examinations

Patient material should be varied enough to enable the trainee to gain experience in all fields of clinical radiology. This requires a radiological department situated in a large polyvalent hospital, which also includes a department of pathology. The number of radiological examinations *per* year should be sufficient (i.e. more than 40,000 examinations *per* year) to provide a comprehensive experience of general radiology.

Standard of Equipment

Only departments with adequate medical imaging equipment and services should be approved. The equipment should fulfil radiological safety standards and be in good technical condition. Technical efficiency, security, electric control, radiation safety and control should be of adequate standard and fulfil agreed quality control criteria. Radioprotection should be organized and radiation monitored according to European standards. Down-time of the equipment for repairs should not exceed 20%.

Availability of Modalities

The modalities required for adequate radiological training will depend on local availability. The following are mandatory: conventional radiology, angiography, ultrasonography, CT, interventional radiology, magnetic resonance imaging (co-operation with other radiological training departments may be necessary). Access to nuclear medicine is desirable.

Staffing Structure

The number of qualified radiologists with teaching and supervisory functions in the department should be sufficient to cover the needs of teaching, even at time of leave or in the event of other staff shortages. The expertise of the teaching staff should be diversified and cover the main areas of activity. Ideally, teaching staff should have training in teaching methods. The head of the department should be a qualified radiologist possessing appropriate educational experience.

Teaching Program

There must be an approved and structured continuing teaching program for general radiology as well as for the main subspecialties. The teaching program should also include regular clinico-radiological meetings and other consultations with clinical departments, at least on a weekly basis. Radiological and clinico-radiological conferences, seminars and training courses outside the hospital are recommended.

Teaching Facilities

There should be appropriate meeting and demonstration rooms available in the department of radiology, sufficient to enable the teaching program to be implemented.

Teaching Materials

There should be a selection of good and modern textbooks as well as other audio-visual material in general radiology, completed by textbooks in subspecialties and modalities (e.g., neuroradiology, pediatric radiology, ultrasonography, computed tomography, MRI). Adequate textbooks in imaging physics and pertinent material concerning radiation protection should be available. A selection of high-standard radiological journals should be available on a continuing basis. There should be an active teaching film-library. Computer technology for teaching, research purpose, image processing and communication is highly desirable.

Research

The importance of radiological research for the training of radiologists cannot be overemphasized. There should be an active and ongoing research program at the training department. Trainees should be encouraged to participate in the research program.

Partition of Radiological Training in University, Teaching and Non-university Hospitals

Part of the training may be at acknowledged and accredited non-university hospitals, but a minimum of half of the training period should be carried out at university departments. The non-university component should provide training in at least basic radiology, whilst the university component could provide training in the special modalities. The composition of the patient material would have to be taken into account in selecting the hospitals concerned with teaching. All the university departments and training hospitals should be part of a co-ordinated national or federal training scheme. It is of great importance that co-operation exists between central authorities (e.g., Ministry of Health, Ministry of Education, National Radiological Societies, National Health Insurance Fund, etc.) and regional and local authorities, teaching centers and local hospital administrations, etc.

Guidelines for Training in Subspecialized Radiology

European Training in General Radiology has a duration of five years. The duration of subspecialty training is two years. If the fifth year of the general radiology training is totally devoted to one subspecialty in accordance with the recommendations given, this fifth year of general radiology training may also be accounted for as the first year of subspecialty training. For all organ subspecialties, the trainee may choose to be trained only in diagnostic imaging, or he/she may also be interested in interventional radiology within this organ area. He/she will then go to the syllabus for Interventional Radiology, where guidelines for training in all types of interventions are given (except neuro and pediatric).

Guidelines for the following subspecialty areas are available:

Cardiovascular Radiology
Gastrointestinal and Abdominal Radiology
Head and Neck Radiology
Interventional Radiology
Musculoskeletal Radiology
Pediatric Radiology
Thoracic Radiology
Urogenital Radiology

Continuing Medical Education (CME)

CME in radiology has been introduced in a number of European countries in recent years. In some countries, a proof of involvement in CME is required by employing authorities, professional licensing bodies and medical insurance companies. In others, CME has been set up voluntarily by the radiology specialty, whereas in the remainder CME programs have not yet been established[4].

It is recognized that each country will develop CME appropriate to the circumstances pertaining to its own health service. Government and consumer pressure for enhanced quality assurance in medicine will strengthen the case for mandatory CME. The EAR/UEMS Radiology Section Board will continue to promote, facilitate and organize CME on a voluntary basis at local, national and international level, so that all radiologists are prepared for the challenge of mandatory CME and/or CME based reaccreditation should this arise.

EAR member states have entirely different work practices and systems of organization of specialty training in medicine. These guidelines have been modified to allow a flexible solution to participation in CME for all European radiologists.

CME should ideally be organized by the same professional body responsible for postgraduate training as, from an organizational perspective, these areas are mutually supportive.

Prior to the development of these guidelines, an analysis of the already (1994) existing CME programs in EAR member states has been performed. The system used by the Royal College of Radiologists (RCR) of the United Kingdom, introduced as of January 1, 1994, was best suited to serve as a model for these guidelines. This system is in turn similar to that which has been in place in North America for some years.

Continuing Medical Education (CME) in Diagnostic Radiology is a program of educational activities to guarantee the maintenance and upgrading of knowledge, skills and competence following completion of postgraduate training. CME is an ethical and moral obligation for each radiologist throughout his/her professional career in order to maintain the highest possible professional standards.

EAR/UEMS Radiology Section and Board recommends CME as the most important and efficacious method for keeping abreast of the newest techniques and information in our specialty and for maintaining and enhancing competence.

EAR/UEMS Radiology Section believes that entitlement to study leave and financial support for the purpose of participation in a recognized CME Program should be contractual rather than discretionary.

For radiologists in private practice, a part of fee income should be set aside for financing of CME.

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Sažetak

USAVRŠAVANJE U RADIOLOGIJI: EUROPSKI PRIJEDLOG

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Poslijediplomsko usavršavanje veoma je važno, jer se njime stvaraju stručnjaci koji raspolažu velikim stručnim znanjem iz određenog područja i koji svojim bolesnicima mogu pružiti najkvalitetniju zdravstvenu zaštitu. Usavršavanje u radiologiji vrlo je složen i težak zadatak, uglavnom zbog postojanja mnoštva radioloških metoda i zbog različitih načina slikovnog prikazivanja. Europsko udruženje za radiologiju (EAR) izdalo je 1999. g. "žutu knjigu" u kojoj su razrađeni osnovni elementi proširenog modela usavršavanja u Europi. Pokušaji da se smanje velike razlike koje postoje među pojedinim državama još su u početnoj fazi, no EAR nastoji u tim početnim koracima postići opći konsenzus.