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COMPARATIVE STUDY OF A QUALITY CONTROL PROGRAM AT THE UNIVERSITY HOSPITAL OF ROUEN - FRANCE

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Introduction A Diagnostic Radiology Quality Control Program was made twice at Department of Pediatric Radiology - University Hospital Rouen - France, first in October 1993 and then in March 1996. Herein are presented results of both evaluations. These two evaluations were made by the Biomedical Department in four diagnostic X Ray rooms of the Department of Pediatric Radiology.
Materials and Methods The quality control program consisted in testing reproducibility, precision and linearity of four generators ; the beam alignment, collimation and filtration of seven X ray tubes ; the film/screen contact and ultra-violet testing of ninety seven Cassettes ; the safelights, temperature, humidity level, Storage of X Ray Films and light leak tests of one darkroom ; the time of films processing and the temperature of chemistry of three automatic processors ; the level of illumination provided by twenty nine viewing boxes. The NERO 6000 B (Non Invasive Evaluator Radiation Outputs) and the RMI 162 A and 161 test-objets were used to evaluate the generators and the tubes. The RMI 142 C test-objet and a 6 Watt ultra-violet lamp were used to test the Cassettes. The viewing boxes were tested by the Bioblock's digital light exposure meter (Lux).
Results In October 1993, the main problems were related to the precision of one generator, the filtration and collimation of two tubes, the film/screen contact of four 30 x 120 cassettes, the storage of films and light leaks of the darkroom's door and the level of illumination provided by 26 viewing boxes. In March 1996, the main problems concerned the precision of four generators, the collimation of one tube, artifacts from cassettes, humidity level of the darkroom, the time of films processing and the level of illumination provided by nine viewing boxes.
Conclusion The precision of generators, the collimation of tubes and the level of illumination of the viewing boxes were observed in October 1993 and in March 1996. Hence, we decided to test them once a year. We observed that the filtration of the tube, the storage of films and the light leaks of the darkroom's door were solved once for all. Therefore, we decided to test the filtration only once after the installation of the new tube and the light leaks once after building the new darkroom. Finally, because of the artifacts of the radiographic cassettes, we decided to test them every 6 months.

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A QUALITY ASSURANCE PROGRAM IN DIAGNOSTIC RADIOLOGY IN BRAZIL

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In order to optimize the performance of the Radiology Department of the Military Police Hospital in Rio de Janeiro, a Quality Assurance Program (QAP) was established aiming to improve the attendance to patients and qualification of the technicians; achievement of a work ambience based on sharing of responsabilities and full collaboration; achievement and maintenance of high degrees of quality in each step of the radiological process; improvement of the image quality; optimization of dose per examination and cost reduction. The methodology consisted in: the obtention and analysis of information concerning examination frequencies and reasons for film rejection; the collection of data concerning the radiographic technique, image quality and dose to the patient; analysis of administrative and technical procedures of radiographic examinations; training courses and comparison of images obtained before and after the implementation of image criteria. The procedure used to detect faults in the radiological process was the analysis of causes of film losses. Results show a 70% reduction in the film rejection rate; 74% of total identified faults were due to equipment, 11% to films, 10% to patients and 5% to developing. The reduction in the cost of developed film reached 75%. Comparison of images obtained before and after implantation the QAP shows the efficiency of the new technique to produce radiographies where all the reference criteria established could be detected. The implementation of this QAP was fully justified by cost and exposure reduction and improvement of radiographic images. For all the excelent results stated above, such programs should be supported by health authorities, not only due to their technical and economic needs but mostly because of their social implications. Because of that, we have started to spread this pioneer QAP in other brazilian cities with the support of our Government.

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TRAINING AND ACCREDITATION OF MEDICAL ULTRASONOGRAPHERS AS IT IS IN BRAZIL

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Introduction Ultrasound has become a fundamental tool in medical diagnosis. One of the factors that contributes to its high diffusion is the safety attributed to the method. Efforts to identify possible undesirable effects have not yet reached definitive conclusions. In the interim, basic precautions should be adopted during patient scanning. For this, its is necessary to emphasise, in ultrasonographers' training programs, basic principles of US and general information on its possible biological effects. As a growing number of physicians from all countries and different specialities perform US scanning on their own, it would be desirable to establish a standard profile for the training of this type of professional. This work presents a survey of the training and accreditation programs for ultrasonographers in Brazil and presents proposals for their improvement.
Methodology All information was obtained from three basic sources: Scientific Literature, INTERNET sites and the Brazilian College of Radiology (BCR). Related literature on US safety and dosimetry were also consulted.
Results Training is presently a major cause of concerns not only in Brazil, but also in other countries. In Brazil, only physicians are allowed to perform the scanning and make diagnoses. In other countries (USA, for example), a specialised technician (ultrasonographer) can be in charge of the US scanning, and the physician handles the analysis and diagnostic report. The traditional path for a physician to become an ultrasonographer in Brazil is through a Medical Residency Program in Radiology. In this period, physicians are trained in the main sub-areas of radiology - X-Rays, CAT, NMI and US Imaging. At the end of this program, they may voluntarily take a specific test applied by the BCR. In case of approval, they receive a certificate of qualification in medical US. Physicians who have not taken a residency program in radiology but use US, such as Obstetricians and Cardiologists - can also apply for the BCR US Certificate. In this case, the BCR requires candidates to present a document to prove that they have had one year of US experience. An interesting characteristic of the written test is that 10% of it is on basic US physics and image formation. Candidates who do not pass on these questions may reenter on this part of the test the following year.
Conclusions We believe the following points are most relevant for the Brazilian case: **(1)** More emphasis should be given in the training to basic US principles and image formation. **(2)** The training programs at present are not optimal, because they are based from the start on direct scanning of the patient, thus exposing him to unnecessary doses of radiation. A preliminary training on phantoms should be recommended. **(3)** Accreditation programs are still at an early stage, even in developed countries, but there is a tendency for these to become mandatory. **(4)** Results from biological dosimetry research and Normalisation are not yet well established, but undoubtely have to be considered when planning training programs. This observation probably can be extrapolated to most countries of the world.
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HOSPITAL ORGANIZATION PHYSICIANS AND PROTOCOL OF 2D ULTRASOUND IMAGING SYSTEMS EVALUATION

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Introduction The Diagnostic Ultrasound Imaging Systems are known as operator-dependent equipment. Good image quality is necessary to ensure reliable diagnosis. Moreover, the evaluation of a diagnostic ultrasound imaging system is necessary for purchasing procedures, for acceptance tests and mainly for routine and periodic tests. At the University Center of Rouen - France, the evaluation of the image quality of ultrasound imaging systems is organized around users groups made of physicians, clinical engineers, and/or biomedical technicians.
Materials and Methods In order to test diagnostic ultrasound imaging systems, one needs to have 2D tissue mimicking phantoms, 2D image quality evaluation protocol and organized physicians users groups. The 2D ultrasound phantom is the RMI 403 GS tissue mimicking phantom. The 2D evaluation protocol includes the following measurements : system sensitivity, uniformity, lateral and axial resolutions at various depths, caliper accuracy checks, cysts imaging at various depths, gray-scale and dead zone. There are six users groups, one in each of the following ultrasound departments : Cardiology, three Departments of General Radiology, Pediatric Radiology and Gynecology. Each users group consists of about 3 physicians, 2 technologists, 2 engineers, and/or 2 biomedical technicians. The routine test is done every 3 months by the users of the ultrasound imaging system and the periodic test every 12 to 18 months by the clinical engineers and/or the biomedical Technicians. Quality evaluation during purchase and acceptance tests is performed by the clinical engineer.
Results During the periodic test, it was observed that the first affected parameters were : system sensitivity (50 %) and Spatial Resolution (36 %). Processing systems were also responsible of poor image quality. On the other hand, it was found more than once that the error of the caliper accuracy test was equal to 0 %.
Conclusion In spite of the subjective aspect of the image quality, there was agreement between the opinion of the radiologists and the results of the image quality evaluation during the purchasing procedures. The image quality evaluation allowed better communication between the users groups, the clinical engineer and/or technician, and the technician of the provider. The hospital organization users groups is necessary to the efficiency of the Quality Evaluation Program.