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**College on Medical Physics:
Imaging and Radiation Protection**

31 August - 18 September 1992

*The Interrelationship between Radiation
Protection & Quality Assurance in
X-ray Diagnostic Radiology*

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The Interrelationship Between Radiation Protection and
Quality Assurance in X-ray Diagnostic Radiology
(A. Benini)

The population, in general, receives a considerable radiation dose from X-ray medical exposures, which could be reduced by avoiding unnecessary and repeated investigations and by improving the performance of equipment.

The concept of quality assurance is very broad and calls for a different approach to the problems in health care. Whenever quality assurance is correctly applied important results are obtained, including a substantial reduction of radiation exposure to the patient and to the worker.

It is therefore necessary, that specific approaches be adopted by the following groups involved in the process:

- the clinical teams who use the equipment and deal with the patient should be more concerned with the technical aspects,
- radiation protection officers and technical teams (physicists, engineers) who are in charge of supervision and/or operability of equipment, should follow recognized quality control programmes,
- the administrative teams, who are responsible for the budget should be concerned with cost-effectiveness and benefits of the investments.

The main points to be considered while approaching the problem are:

A) Assessment procedure.

- make an inventory of equipment and evaluate its status,
- make a replacement programme and define the acceptance tests.

B) Follow-up procedure

- decide about the measurements to be performed and their frequency related to the kind and status of equipment,
- identify the different levels of measurements: X-ray output, time, mA/mR, filtration, HVL, focal spot, repeatability etc.,
- prepare protocols and recording arrangements,
- analyse causes for rejection of films,
- make cost/benefit evaluation of internal (clinical engineering depts.) and/or external (manufacturers) maintenance,
- arrange training courses and workshops for the users/operators.

C) Radiation protection and dosimetry

- assess infrastructure inside and outside the hospital,
- evaluate the dose to patients and operators for various investigations using different equipment,
- evaluate the compromise between exposure and image quality,
- consider recording the dose delivered to the patient for every investigation,
- compare local data with the national, international ones, e.g. NEXT programme, EEC survey, etc..

All these aspects relating to diagnostic X-ray equipment must be examined to gain full benefit. The personal involvement of the different teams is essential for obtaining good results. Resources and efforts are required to establish an appropriate quality assurance programme but in the long run the cost-benefit evaluation is very encouraging.

REPORT OF COMMITTEE 3

Table 8. Reasons for repeating films; % frequency of technical errors (U4)

Reasons	%	Reasons	%
Too dark	29.2	No identification	0.
Too light	35.3	Fogged	1.
Too black and white	0.2	Poor film/screen contact	0.
Too grey	0.8	Grid problem	2.
Cone-cut	1.1	Double exposed	2.
Motion	8.8	No exposure	2.
Positioning	14.5	Processing	1.
Centering	18.9	Wrong exam/projection	0.
Technical	3.3	Miscellaneous	1.
Artefacts	3.1	Unknown reason	0.
Total retake rate 5.9%			