PRACTICAL POSSIBILITIES FOR PATIENT DOSE REDUCTION IN DIAGNOSTIC RADIOLOGY

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INTRODUCTION

According to the United Nations Scientific Committee on the Effects of Atomic Radiation (1), the radiation doses from diagnostic radiology are the largest contribution to the collective dose from all man-made sources of radiation. In Romania, for a population of 23 million inhabitants, about 660 X-ray examinations were reported in 1990 per 1,000 persons (1), a value which represents a decrease in comparison with 1970 , when more than 1,000 exams per 1,000 were performed. Unfortunately, still about 26% of the total X-ray examinations are classical fluoroscopies (without image intensifier TV set), which give high doses to both patients and radiologists.

The general standard of the old equipment in diagnostic radiology is very far from the minimum requirements, so that great financial efforts must be done in the near future, in order to improve the present situation.

METHOD

From 1991 to 1993, the Institute of Hygiene, Public Health, Health Services and Management - Bucharest participated to the co-ordinated research programme on "Radiation doses in diagnostic radiology and methods for dose reduction", jointly organized by the International Atomic Energy Agency and the Commission of the European Communities (2).

The patient entrance surface doses (ESD) including backscatter for several X-ray projections were determined, using thermoluminescent dosemeters, before and after application of corrective actions for dose reduction (QC).

RESULTS

The main results are presented in Table 1.

CONCLUSIONS

By increasing kV and reduction of mA.s values several entrance dose reductions can be obtained, particularly for chest PA radiography, but the use of high kilovoltage technique is dependent on radiological equipment available.

An important reduction of the integral dose of the patient was determined by collimation of the beam (reduction of the field size to the investigated area).

The use of appropiate screen-film combination is another practical possibility for patient dose reduction in diagnostic radiology.

Table 1. Measurements of patients entrance surface dose.

HOSPITAL	RAY ROOM	EXAMINATION	DOSE PRIOR TO QC (mGy)	DOSE AFTER QC (mGy)	DOSE REDUCTION IF ANY (%)	CORRECTIVE ACTIONS
1	1	Chest PA	0.95	0.76	20	Increase of kV and reduction of both mA.s and field size
2	2	Chest PA	0.77	0.69	10	Increase of kV and reduction of both mA.s and field size
1	4	Urinary Tract AP	17.98	9.29	48	Increase screen-film sensitivity
1	4	Urinary Tract PA	12.87	10.48	19	
1	7	Lumbar Spine AP	33.46	24.56	27	
1	7	Lumbar Spine LAT	41.75	35.66	15	

REFERENCES

1. UNITED NATIONS, Sources and Effects of Ionizing Radiation, Scientific Committee on the Effects of Atomic Radiation (UNSCEAR), UN, New York (1993).

2. INTERNATIONAL ATOMIC ENERGY AGENCY, Radiation doses in diagnostic radiology and methods for dose reduction, IAEA-TECDOC-796, Vienna (1995)