

IMPLEMENTATION OF THE QUALITY ASSURANCE PROGRAMME OF THE X RAY RADIATION IN SERBIA - YUGOSLAVIA

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Abstract : Under constant dosimetric control in Serbia there are 782 diagnostic X ray units with 969 X ray tubes. In 1990, 202 such units were subjected to the radiation dose reproducibility testings; 206 to measurement of high voltage and accuracy of exposure time. In 94.55% cases the said reproducibility amounted less than five percent and only 1.98% was higher than 10%. The exposure time was reliably determined in 78.15% X ray generators; deviations in excess of 10% were registered in 21.48%. Similar situation occurred in selection of high voltage. Of observed X ray generators in 10-12% cases deviations increased ten percent.

Introduction :

The scope of ionizing application, and particularly its medical use is controlled by the Federal laws and Regulations passed during the period from 1986 - 1989 (1.2.3.4). All ionizing irradiation sources are constantly subjected to the regular dosimetric control performed by specialized, highly qualified and adequately equipped institutions authorized by Republic i.e. Regional legal regulations. Owing to some changes in legal regulations, the dosimetric control of all ionizing irradiation sources is reestablished on the completely different base using Quality Assurance Program. The basic provisions of the Program, accepted in our country as well, (But not in all Republics) are given in revised and supplemented version of the aforementioned Legal Regulations from 1989 (3).

The results of performed testing :

In order to meet the proposed criteria related to the scanning of certain organs and the parts of the body selection of adequate high voltage (kV) values, X-ray tube current (mA) and duration of scannings is to be selected at the X-ray apparatus control panel, ranging within the permitted variation of 10%. Since these values directly influence the dose of X-ray irradiation exerted to the patient it means that it must not exceed the proposed limits. The results of irradiation doses reproducibility testing in 1990. are presented in Table 1.

Table 1 - DOSSES

The type of X-ray unit	Pcs	Measured deviations					
		< 5%		>5% and <10%		> 10%	
		Pcs	%	Pcs	%	Pcs	%
DENT	57	55	96.49	2	3.51	0	0.00
SELENOS 4	71	65	91.55	3	4.23	3	4.23
SUPERIX 800	25	24	96.00	1	4.00	0	0.00
SUPERIX 1000	39	38	97.44	0	0.00	1	2.56
SUPERIX 1250	10	9	90.00	1	10.00	0	0.00
TOTAL	202	191	94.55	7	3.47	4	1.98

According to the accepted criteria, among all tested X-ray units, irradiation doses deviation exceeding 10% was found only in 4: in 3 SELENOS 4 x-ray generators and 1 SUPERIX 1000 generator. Presented values revealed no significant difference of measured deviations in certain X-ray generators.

Following the accepted criterion that only those X-ray generators in which the accuracy and reproducibility of the exposure time range within the permitted variation of only 10% may be considered as satisfactory, it was found that a number of tested generators failed to meet the criterion. Among tested X-ray generators, 21.85% failed to meet the proposed criterion while remaining 78.15% revealed satisfactory testing results. (Table 2)

The accuracy and reproducibility of high voltage, on the basis of direct measurement of high voltage of 70kV, 80kV, 90kV and 100kV were evaluated in diagnostic X-ray units subjected to the testing. The results for 70kV are in Table 3.

Table 2 - TIME

The type of X-ray unit	Pcs	Measured deviations					
		< 5%		>5% and <10%		> 10%	
		Pcs	%	Pcs	%	Pcs	%
DENT	58	25	43.10	17	29.31	16	27.59
SELENOS 4	73	41	56.16	8	10.96	24	32.88
SUPERIX 800	25	18	72.00	5	20.00	2	8.00
SUPERIX 1000	40	33	82.50	5	12.50	2	5.00
SUPERIX 1250	10	8	80.00	1	10.00	1	10.00
TOTAL	206	125	60.68	36	17.47	45	21.85

Table 3 - HIGH VOLTAGE : 70 kV

The type of X-ray unit	Pcs	Measured deviations					
		< 5%		>5% and <10%		> 10%	
		Pcs	%	Pcs	%	Pcs	%
SELENOS 4	28	22	78.57	5	17.86	1	3.57
SUPERIX 800	24	13	54.17	9	37.50	2	8.33
SUPERIX 1000	34	16	47.06	12	35.29	6	17.65
SUPERIX 1250	7	3	42.86	3	42.86	1	14.29
TOTAL	93	54	58.07	29	31.18	10	10.75

CONCLUSION AND SUGGESTED MEASURES

The results of our initial tests, performed at X-ray units manufactured in Yugoslavia justify the necessity of diagnostic X-ray units control as a routine procedure. In spite of the fact that measured values mostly ranged within the proposed limits, we believe that more detailed and more reliable results related to the diagnostic X-ray units performances are to be obtained through further investigations.

REFERENCES :

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4. Sl list SFRJ br. 45/89
5. Quality Assurance in Diagnostic Radiology.
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