

# Dose Assessment Of Patients For Some X Ray Machines In Albania

Rustem PACI Shkelqim KUKA Ida Muraj

**Abstract:** The performance of the X-ray equipment can have a significant effect on radiation dose to the patient. The practice of monitoring performance is called Quality Control (QC). All equipment should be tested for compliance with the specifications on acceptance. The testing should cover all the basic parameters including the dose rate. QC will effect to take the right image quality, right dose to patient and staff safety of patient. Regular QA testing should also be cared out during the life of the equipment. The following measurements were performed for the selected X-ray machines: Determination of every patient's exposure parameters, including: dose and dose rate, which give an immediate impression about the risk to radiations comparing to guidance levels.

## DOSE ASSESMENT OF PATIENTS FOR SOME X RAY MACHINES IN ALBANIA

### Rustem PACI

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### Measurements in Durresti Hospital

At Durresti Hospital are four X-ray machines placed at three departments: Surgery, Pathology, and Pediatric:

**At Pathology Department:** There is one x-ray machine from Germany, model: Tur. Produced at 1960 brought at 1970 at hospital. Parameters:  $U_{max}=120kV$ ,  $I_{max}=200mA$ . There is one x-ray radiographer using the machine.

**At Pediatric Department:** There is one x-ray machine from Italy, model: Ital Ray, Europe 3ts. Produced at 1998 and brought at 1999 at hospital. Parameters:  $U_{max}=120kV$ . There are three doctors and one x-ray radiographer using the machine.

**At Surgery Department:** There are two kinds of x-ray machine at this department. One which we have chosen to make quality measurements is a x-ray machine of model: Dedalus 2000, and another one which is quite new from Siemens, but that is not included in our measurements. There are two doctors and three x-ray radiographer using the machine.

Surgery department has optimal parameters according the environment, and building structure. Our aim is to give examples how this QC for the dose measurements are done, commented and by giving the conclusion of the measurements that we have done, to show how good these equipments are according to the standards.

**The equipment used for are multi-o.meter with following ranges for each parameter we mentioned.**

**Dose RAD** Range (auto): 100  $\mu Gy$  - 9999 Gy, (10 mR - 9999 R) Energy dependence < 5 % at 2.5 mm Al, (50 - 150 kVp)

**Rate RAD** Range (auto): 0.1 mGy/s - 500 mGy/s, (700 mR/min - 3500 R/min) Energy dependence: < 5 % at 2.5 mm Al, (50 - 150 kVp)

### **Department of Surgery Consistency of Output.**

$U_{in}=80kV$ ,  $I=50mA$ ,  $T=1s$ ,  $D=70cm$

$U_{in}(kV)$	80	80	80	80
D(mGy)	1.2	0.982	0.303	0.28

Concerning the consistency of Output that system is not stable because the difference is more than 20%

### **Department of Pediatrics Consistency of Output.**

$U_{in}=80kV$  ;  $I=50mA$  ;  $T=1s$  ;  $D=70cm$

$U_{in}(kV)$	80	80	80	80
D(mG)	12	12	7.3	12

The machine is stable concerning to the consistency of output

### **Department of Pathology Consistency of Output.**

$U_{in}=80kV$  ;  $I=50mA$  ;  $T=1s$  ;  $D=70cm$

$U_{in}(kV)$	80	80	80	80
D(mG)	8.7	1.31	1.32	4.9

Concerning the consistency of the output as the values show it there is no stability in this machine.

- Rustem PACI Shkelqim KUKA Ida Muraj
- Rustem PACI Main Author Radiation Protection Office Tirana Albania

### Typical doses for adult patients

Guidance dose EGAZAMINATIONS	ENTRANCE DOSE	(mGy)
Lumbar	AP LAT LSJ	10/30/40
Abdomen	AP	10
Pelvis	AP	10
Hip joint	AP	10
Chest	PA/LAT	0.41.5
Scull	PA/LAT	53

### Conclusion

The technical x-ray parameters are very important to reduce the dose and to obtain the image with good quality. The dose reduction can be obtained by adequate changes of physical parameters without lose of image quality. The optimal radiation dose for optimal image quality can be achieved by understanding of the parameters that affect radiation dose and image quality. The dose optimization process also consists of quality control programs to test radiographic devices periodically. In this study, it was seen which parameters values were appropriate to obtain high quality image and to reduce dose, to dose optimization, during quality control tests of x-ray units. This study shows that optimization of technical factors may lead to a substantial dose reduction. If the optimized parameters are applied to X-ray equipment during quality control tests, it is possible to determine how much good image quality will be obtained with this optimized parameters and how much dose will be measured when this qualified image is developed. If we see the doses received all of them are the guidance level but the consistency of the machines is not good in terms of stability. It means for two of them for how long is missing the consistency they do not present good implementations of dose to patient

### References

- [1]. Albanian Legislations
- [2]. IAEA Basic Safety Standards
- [3]. EU Basic Safety Standards
- [4]. EU quality control measurements in Radiology