لائحة السلامة الاشعاعية للمرضى

مستشفى الملك فهد – المدينة المنورة

قسم الفيزياء الطبية

إعداد

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Introduction

It is imperative that healthcare organisations work continuously and collaboratively to accomplish the optimisation of patient protection. One of the fundamental aspects of the optimisation of patient protection are the diagnostic reference levels (DRLs) and the quality control of radiation source machines. Diagnostic reference levels have been defined as '*a level used in medical imaging to indicate whether, in routine conditions, the Dose to the patient or the quantity of Radioactive Material administered in a specified radiological procedure is unusually high or low for that procedure.* These diagnostic reference levels are specific and tailored according to patient age, organ or area on the body being examined and the clinical indication so that doses are optimised for the clinical purposes of the examination. Identification and establishment of reference levels serve as a tool to monitor the practice to ensure patient protection, further the quality control of radiation's source machines will ensure that all the radiations that produced will be optimised and accurate. These optimizations will help the ministry of health to address the differences in doses between healthcare facilities for a certain examination in a specific group of patients and promote practice improvements.

The Project

The project was led and managed by the Medical Physics Department in cooperation with the MOH. For diagnostic and therapeutic radiology as well Interventional radiology, OR, Endoscopy and Urology. Patient radiation doses that were collected in this project were for dental examinations, mammography, Interventional neuro-radiology(IR), Fluoroscopy, and computed tomography (CT). The data was obtained from King Fahd Hospital-Madinah. The data collection would be through the pictures archiving and communication system otherwise known as PACS and directly from the modalities. With the completion of the data collection phase, data will be analysed to establish the diagnostic reference levels and patients skin dose for the deterministic dose level.

Diagnostic Reference Levels (DRLs):

➤ X-Ray Examinations

X-Ray Adult diagnostic Reference Level (Ak, mGy)	
Examination	**Average**
PA chest (23cm), with grid	**0.15**
AP Abdomen (22 cm)	**3.4**
AP lumbosacral spine (22 cm)	**4.2**

➤ Fluoroscopy (FR)

Maximum Legal Entrance Exposure rate (R/min)	
Examination	**Average**
Normal Fluoroscopy	**10**
Special Activated Fluoroscopy	**20**

➤ Interventional Radiology (IR)

Patient Skin Dose (PSD, Gy)	
Examination	**Average**
Deterministic effect	**2**

➤ Computerised Tomography (CT)

CT Adult diagnostic Reference Level ($CTDI_{vol}$, mGy)	
Examination	**Average**
CT Brain	**75**
CT Brain + Contrast	**80**
CT Chest	**21**

CT Abdomen & Pelvis	25

➢ **Mammography**

Mammography diagnostic Reference Level (AGD, mGy)	
Examination	**Average**
Mammography- craniocaudal (CC) **45 mm breast thickness**	3

➢ **Dental**

- **Intra Oral** (posterior view (molar))

Dental Intra Oral diagnostic Reference Level (ESD, mGy)	
Examination	**Average**
Adult Intra Oral	0.753
Paediatric Intra Oral	0.598

- **Panoramic** (OPG)

Dental Panoramic diagnostic Reference Level (ESD, mGy)	
Examination	**Average**
Adult OPG	4.48
Paediatric OPG	2.94

Adult Nuclear Medicine Diagnostic Reference Levels (DRLs) Administered Activity, in MBq:

Adult Nuclear Medicine Diagnostic Reference Levels (DRLs) Administered Activity in MBq	
Examination	**Average**
Bone Scan	826
Myocardial Perfusion 2 day (Rest)	782
Myocardial Perfusion 2 day (Stress)	829
Thyroid	180
Lung Perfusion	184
Parathyroid Scan	666
Hepatobiliary Scan	181
Lymphoscintigraphy	42
Whole Body Scan	181
Renal Scan-Static	135
Renal Scan-Dynamic- MAG3	190
Renal Scan-Dynamic- DTPA	151
Renal Scan-Dynamic- EC	173

Action Plan to Optimizing Dose

The patients dose monitoring applying to protect the patients from the unnecessary radiation doses. In case of preventive the exceeding of radiation doses, we have to applying the pre-processing optimization plan that including the following steps:

Modality	Action	Who	when
CT	Optimizing the CT parameters (e.g mAs, ST, No.of Images … etc) to estimate the $CTDI_{vol}$ before exposure and be sure that value is less than DRL.	Tech + Radiologist + Physicist	Immediately
CT + X-ray	Justifying the requests and the repetition of the radiological exam	Physician	
X-ray	Ensure that Automatic Exposure control AEC working properly	Physicist	
CT + X-ray + Fluoroscopy	Ensure that all the exams taken within precise collimation. Applying in all procedures (e.g OR, IR, FR,endoscopy and urology)	Tech + Physician	
Fluoroscopy	Optimizing the Fluoroscopy parameters (e.g pulse rate, mA, kvp , FOV…etc) to be sure that value is less than entrance exposure rate.	Tech+ Physician	
All	Cover the unnecessary parts of patients by lead shielding before exposure and don't allow entrance of the patients accompany unless there is a justification and let him/her wear lead apron	Tech	
All	All stuff should be educated about how to deal with radiation safely	Physicist	

References

- https://rpop.iaea.org/RPOP/RPoP/Content/InformationFor/HealthProfessionals/1_Radiology/Optimization/diagnostic-reference-levels.htm
- http://www.icrp.org/docs/DRL_for_web.pdf
- https://www.aapm.org/pubs/ACRAAPMCollaboration.asp