



NATIONAL REVIEW OF DIAGNOSTIC REFERENCE LEVELS (DRL) FOR RADIOLOGY AND NUCLEAR MEDICINE

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INTRODUCTION

- ▶ Diagnostic reference levels represent sets of values of dose magnitudes in diagnostic and interventional radiology examinations/procedures and respectively values of activities administered in the case of radiopharmaceuticals used in diagnostic nuclear medicine procedures, established for typical groups of patients. They are used in the process of optimizing radiology and nuclear medicine practices.
- ▶ The legislative framework is represented by the Ministry of Health Order no. 1245/2021 which establishes the diagnostic reference levels for adult patients, in the case of the most common radiology and nuclear medicine procedures, as well as the method of their application in current practice.
- ▶ The MoH Order establishes the review every 3 years of the diagnostic reference levels for the common diagnostic procedures in radiology and nuclear medicine.
- ▶ In order to fulfill this legal obligation, a methodology was developed for the national collection of dose amounts specific to each type of examination with ionizing radiation and their statistical processing in order to estimate nationally representative values for the dose amounts used in current practice.

METHODOLOGY

- ▶ The medical units of diagnostic radiology, interventional radiology and diagnostic nuclear medicine transmit to the National Institute of Public Health (NIPH) the records of individual exposure parameters, for 20 adult patients, respectively 10 pediatric patients from each specific age group, for each type of examination performed with each radiology or nuclear medicine equipment in the facility.
- ▶ The data recorded and reported for each patient are: age, gender, height, weight, information about the examined region and the type of examination, as well as data regarding dose amounts, namely the dose-area product DAP (for radiological imaging and fluoroscopy investigations performed with equipment equipped with a DAP-meter), the dose-scanned length product DLP (for computed tomography procedures), mean glandular dose MGD (for mammography and tomosynthesis) and the activity of the radioactive substance administered in the case of diagnostic nuclear medicine procedures.
- ▶ At the same time, information is collected on the name and specifics of the medical unit reporting the data, as well as information on the type/model and year of manufacture for the radiological installations with which the medical examinations were performed, in order to ensure the representativeness of all types of medical units and equipment used.

RESULTS

- ▶ Following the statistical processing by the NIPH of the data collected at national level during the period 2021-2023, the annual results obtained were analyzed compared to the diagnostic reference levels established by the MoH Order.
- ▶ For each type of examination and each age group, the arithmetic mean of the DRL obtained in the period 2021 - 2023, as well as the maximum value and the third quarter of the distribution curve of the average values and the median values obtained within the methodology on medical exposure and the surveillance of reference levels in the years 2021 - 2023 were estimated.
- ▶ The values for which there is no satisfactory statistics corresponding to a sufficiently large number of examinations (over 30 examinations per age group) were not taken into account.

RESULTS

- The study obtained representative values for the most common types of examinations, both for adults and pediatric patients.

Radiography	DAP (Gy x cm2)			
	1-4 years	5-9 years	10-14 years	≥15 years
Head AP	0.28	0.34	0.41	0.64
Head LAT	0.20	0.27	0.29	0.62
Sinus	0.21	0.27	0.40	0.61
Thorax PA	0.07	0.11	0.17	0.31
Thorax LAT	0.19	0.23	0.39	0.58
Cervical spine AP	0.14	0.40	0.42	0.53
Cervical spine LAT	0.22	0.34	0.49	0.64
Thoracic spine AP	0.28	0.48	0.63	1.53
Thoracic spine LAT	0.40	0.69	0.82	1.48
Lumbar Spine AP		0.54	0.84	1.86
Lumbar Spine LAT		0.74	0.92	2.12
Abdomen	0.26	0.42	1.71	2.51
Pelvis/Hip	0.30	0.46	0.70	1.91
Renal			1.24	1.70
Urography	2.50	5.33	5.60	6.00
Dental - panoramic	0.09	0.10	0.13	0.16
Dental - CBCT	0.28	0.40	0.60	0.90
	MGD (mGy)			
Mammography				2.50
Tomosynthesis				10.50

CT	DLP (mGy x cm)			
	1-4 years	5-9 years	10-14 years	≥15 years
Head	800	880	950	970
Neck (soft)				730
Neck (spine)				755
Thoracic spine				820
Lumbar Spine				760
Thorax	130	180	460	500
Abdomen	200	300	420	650
Pelvis	200	220	280	700
Thorax - abdomen			460	740
Abdomen - pelvis			540	840
Trunk	230	380	650	1000

RESULTS

Interventional radiology	DAP (Gy x cm ²)
	≥15 years
Interventional - orthopedic	7.65
Interventional - urologists	5.3
Coronarography	35
Cerebral angiography	50
Carotid angiography	45
Abdominal angiography	55
Pelvic angiography	35
Lower limbs angiography	40
Upper limbs angiography	25
PTCA	60
Carotid angioplasty	45
Renal angioplasty	60
Peripheral angioplasty	40
Abdominal embolization	80
Cerebral embolization	55
Pacemaker implant	20

Nuclear medicine	Activity (MBq)			
	1-4 years	5-9 years	10-14 years	≥15 years
Thyroid scan - pertechnetate				160
Cardiovascular scan - MIBI				740
Parathyroid scan - Sestamibi				740
Lymphatic scan - Nanocoloid				85
Bone scan - HDP		360	400	740
Renal scan - DTPA	90	110	150	230
Renal scan - DMSA	50	60	90	135

PET CT - FDG	Activity (MBq)			
	1-4 years	5-9 years	10-14 years	≥15 years
	75	130	250	300
	DLP (mGy x cm)			
	250	420	510	780

CONCLUSIONS

- ▶ The results obtained for conventional radiology and diagnostic nuclear medicine are generally slightly lower than the DRLs established in 2021, but for CT examinations, the results obtained are slightly higher, this being attributed to the lack of regulations on clinical audits and consequently the lack of interest in optimizing examination protocols for many of the CT equipment.
- ▶ As a result of this study, new national DRLs are proposed both for the diagnostic radiology and nuclear medicine procedures mentioned in the MoH Order, as well as for other new types of diagnostic, radiology and nuclear medicine procedures.
- ▶ At the same time, the existing table was completed with DRLs for pediatric age groups, both for the procedures mentioned in the MoH Order, and for the new types of procedures introduced, given that the values established in 2021 referred only to adult patients.

THANK YOU !

