

Dosimetric measurements of the personnel working in children's nuclear medicine unit



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Purpose :

Our study involves the dosimetric measurements of the personnel working at Children's hospital nuclear medicine unit. The daily work of the unit involves SPECT/CT as well as PET/CT examinations. The personnel of the unit consists of three medical doctors, six technologists, one nurse and two medical physicists. Lack of previous data regarding dosimetric measurements of personnel involved in nuclear medicine pediatric examinations illustrated the necessity for such data.



Materials & Methods:

All staff was carrying chest as well as finger's (TLD) dosimeters during daily practices. Dosimeters' readings were analyzed by the National Committee of Atomic Energy and the values of personal depth dose equivalent $H_p(10)$ for chest dosimeters and $H_p(0.07)$ for finger dosimeters were reported in a monthly basis. The handling of children during the injection of dose and imaging process can be long time processes that can affect the involved personnel regarding dosimetry readings.

Results:

In SPECT/CT examinations the administered doses range between 0.1 – 20 mCi and in PET/CT 0.9-12 mCi. The exposure of personnel to radiation can be increased due to the handling of children during: i) dose administration, where children prove to be 'difficult' patients and ii) during the actual imaging process, either in the SPECT/CT camera or in the PET/CT, where children react due to claustrophobia, pain, clinical condition, psychological status, etc. risking to jeopardize imaging data due to motion artifacts. Each staff member is involved in different - specific stages of the imaging examination: physicists and some technologists measuring and preparing doses, medical doctors as well as nurse to locate vein and administer the prescribed dose and finally, technologists, nurse and medical doctors handling children during the imaging stage. Therefore, personal depth dose equivalent H_p was varied. Although, all measured annual doses are well within national limits, recorded relatively high doses of personnel involved in a specific step of the chain procedure would flag the need for consideration of further radioprotection measures.



Type:	2017		2018	
	Body Dosimeter	Finger's Dosimeter	Body Dosimeter	Finger's Dosimeter
Medical Physicist 1	0.0	6.24	0.0	2.91
Medical Physicist 2	0.0	0.0	0.0	0.0
Nuclear MD 1	0.97	0.0	0.13	0.0
Nuclear MD 2	0.0	14.70	0.0	0.0
Nuclear MD 3	0.0	0.0	0.0	0.0
Nurse 1	0.87	0.0	0.0	0.0
Technologist 1	0.0	0.0	0.0	0.0
Technologist 2	0.0	0.0	0.0	0.0
Technologist 3	0.0	0.0	0.0	0.0
Technologist 4	0.0	0.0	0.0	0.0
Technologist 5	0.0	7.42	0.0	4.79
Technologist 6	0.0	0.0	0.39	46.14



Conclusions:

Nuclear medicine examinations in children population can potentially involve longer exposure time periods to radiation for the personnel involved, either during dose injection, or during imaging process. Therefore, the correspondingly involved personnel can accumulate relatively higher doses with respect to the personnel working with adults. Overall, assessment of those procedures, that can generate long exposure times to the personnel, is required. Further radioprotection measures are considered and applied where necessary.