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ECR 2022 / C-17454

Local Diagnostic Reference Levels in Fluoroscopy Guided Procedures in Urology, Orthopedy and Neurosurgery

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Purpose

The use of imaging in the operating room, namely through fluoroscopy guided procedures, it's commonly used in several surgical practices. Is known that fluoroscopy is a source of ionizing radiation and therefore there's a need to keep the exposure levels on recommended values, as this type of radiation induces biological damages to cell atoms and therefore, it can cause deterministic and/or stochastic effects [1]. It's also worth mentioning that this kind of fluoroscopy guided interventional (FGI) procedures are performed at an operating room and therefore...

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Methods and materials

This study took place in an operating room of a public university hospital center from Portugal. A pre-study research was conducted to investigate which FGI procedures were most commonly performed on that operating room, in order to have a reliable sample. This sample was collected from the data storage of two mobile C-arm fluoroscopy equipments available at that department using a non-probability convenience method. DAP (in cGy.cm^2) and FT (in min) values were recorded, which are both cumulative and displayed on the equipment during the...

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Results

In figure 2, DAP was converted from cGy.cm^2 to Gy.cm^2 , as this is the recommended unit by International Commission on Radiological Protection (ICRP) to establish DRL's for FGI procedures. The 3rd Quartile columns are also highlighted to show that those are the established DRL's for each procedure of this study. [Fig 2] Data regarding figure 2 (where it's shown the established DRL's for each procedure) was used to compare the DRL's obtained in this study from others obtained in literature. This comparison using DAP is...

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Conclusion

The main objective of this study was to establish DRLs for several FGI procedures performed at a current hospital. This objective was fulfilled and the proposed DRLs are 0.390 Gy.cm² and 00:12min for pigtail catheter placement and 0.557 Gy.cm² and 00:18 min for the percutaneous nephrostomy placement. For the area of orthopedics, a DRL of 0.485 Gy.cm² and 00:13 min is proposed for DHS placement, 0.710 Gy.cm² and 00:23 min for IHS placement, 0.045 Gy.cm² and 00:13 min for ORIF on bimalleolar and trimalleolar ankle...

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Personal information and conflict of interest

D. R. Cordeiro: Nothing to disclose S. I. Rodrigues: Nothing to disclose A. F. C. L. Abrantes: Nothing to disclose L. P. V. Ribeiro: Nothing to disclose R. P. P. Almeida: Nothing to disclose

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Procedure	Area	Quantity	Total (cases)
Pipal Catheter Placement	Urology	71	108
Prostatectomy/Suprapubic	Urology	37	
Dynamic Hip Scan	Orthopedy	41	249
Intermediary Hip Scan	Orthopedy	81	
ORF on Bivalvular and Trivalvular Aortic Prostheses	Orthopedy	81	
ORF on Aortic Prostheses using Electrocardiogram	Orthopedy	86	
Cervical Arthrodesis	Neurology	9	59
Distal Arthrodesis	Neurology	21	
Lumbar Arthrodesis	Neurology	27	
Lumbar Arthrodesis	Neurology	20	
Total Procedures		538	

Fig 1: Total Sample

Procedure	DAP (Gy cm²)		Fluorscopy Time (min)	
	Median	3 rd Quartile	Median	3 rd Quartile
Pipal Catheter Placement	4.276	6.356	90:47	99:12
Prostatectomy/Suprapubic	5.339	8.577	90:11	99:16
Dynamic Hip Scan	5.316	8.883	90:09	99:11
Intermediary Hip Scan	5.019	8.718	90:31	99:27
ORF on Bivalvular and Trivalvular Aortic Prostheses	5.823	9:047	90:06	99:11
ORF on Aortic Prostheses using Electrocardiogram	5.618	9:029	90:11	99:16
Cervical Arthrodesis	6.290	9:428	90:26	99:37
Distal Arthrodesis	5.229	8.729	90:09	91:16
Lumbar Arthrodesis	5.817	8.311	90:41	91:09

Fig 2: Established DRL's for the present study

Procedure	Quant. (Gy cm²)	DAP (Gy cm²)				Fluorscopy Time (min)				
		Median	3 rd Quartile	Median	3 rd Quartile	Median	3 rd Quartile	Median	3 rd Quartile	
Pipal Catheter Placement	4.276	6.356	1.1	2:08	90:47	99:12				
Prostatectomy/Suprapubic	5.339	8.577	1.0	1:59	90:11	99:16				
Dynamic Hip Scan	5.316	8.883	1.0	1:58	90:09	99:11				
Intermediary Hip Scan	5.019	8.718	1.0	1:58	90:31	99:27				
ORF on Bivalvular and Trivalvular Aortic Prostheses	5.823	9:047	1.0	1:58	90:06	99:11				
ORF on Aortic Prostheses using Electrocardiogram	5.618	9:029	1.0	1:58	90:11	99:16				
Cervical Arthrodesis	6.290	9:428	1.0	1:58	90:26	99:37				
Distal Arthrodesis	5.229	8.729	1.0	1:58	90:09	91:16				
Lumbar Arthrodesis	5.817	8.311	1.1	1:58	90:41	91:09				

Fig 3: Comparison of median and 3rd Quartile of DAP values from this study with others...

Procedure	Quantity	Fluorscopy Time (min)			
		Median	3 rd Quartile	Median	3 rd Quartile
Pipal Catheter Placement	107	91.2	99.6		99.6
Prostatectomy/Suprapubic	37	91.3	99.6	1:58	1:59
Dynamic Hip Scan	41	91.1	99.6		99.6
Intermediary Hip Scan	81	91.2	99.6	1:58	1:59
ORF on Bivalvular and Trivalvular Aortic Prostheses	81	91.3	99.6		99.6
ORF on Aortic Prostheses using Electrocardiogram	86	91.3	99.6		99.6
Cervical Arthrodesis	9	91.7	99.6		99.6
Distal Arthrodesis	21	91.3	99.6		99.6
Lumbar Arthrodesis	20	91.8	99.6		99.6

Fig 4: Comparison of median and 3rd Quartile of FT values from this study with others...