



Paediatric CT Practice - How safe is imaging in different countries?

# Irish diagnostic reference levels for adult and paediatric CT dose data and comparison with European values

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In Ireland, at present, there is a national project (NIMIS, National Integrated Medical Imaging System) underway involving the installation of a radiology PACS network in the majority of publicly-funded Irish hospitals. As part of the PACS solution, dose tracking software (eXposure™ Radimetrics Inc., USA/Canada) has been installed in all of these hospitals (from 19 hospitals to date). The system has been used to gather and analyse CT dose data for comparison with National Diagnostic Reference Levels (NDRLs) in Europe.

## 1. List of the facility's CTDI and DLP for children from different age groups

**Table 1: Irish CT Diagnostic Reference Levels (DRLs) for Adult patients (all sizes) (generated August 2013)**

	n, Ireland	Adult DLP 75th Percentiles				
		Ireland 2013	UK 2003 <sup>2</sup>	Norway 2009 <sup>5</sup>	Swiss 2010 <sup>6</sup>	Germany 2010 <sup>7</sup>
Abdo-Pelvis	1.705	675	-	-	-	-
Chest	2.100	418	580	400	400	400
TAP	6.399	826	940	-	1000	-
Head	20.605	964	930	1000	1000	950
Hi-Res Chest	1.088	380	170	280	-	-
C-Spine	394	621	-	-	600	-

**Table 2: Irish CT DRLs for Paediatric patients (generated October 2013)**

Head	n, Ireland	Ireland 2013	Paediatric DLP 75th Percentiles			
			Europe 2000 <sup>1</sup>	UK 2003 <sup>2</sup>	Belgium 2003 <sup>3</sup>	Swiss 2008 <sup>4</sup>
Age Group						
<1	54	333	300	270	165	270
1 - 5	115	491	600	470	217	420
5 - 10	80	608	750	620	228	560
10 - 15	17	719	-	-	-	1000
<b>Chest</b>						
Age Group						
<1	22	73	200	200	79	110
1 - 5	50	106	400	230	94	200
5 - 10	20	153	600	370	147	220
10 - 15	24	237		580		460

## Poster References

- Shrimpton & Wall, 2000, Reference doses for paediatric computed tomography, Rad Prot Dos, 90 1-2, 249-252.
- Shrimpton et al, 2006, National survey of doses from CT in the UK: 2003, BJR, 79, 968-80.
- Pages et al, 2003, CT doses in children: a multicentre study, BJR, 76, 803-811.
- Verdun et al, 2008, CT radiation dose in children: a survey to establish age-based diagnostic reference levels in Switzerland, Eur Radiol, 18, 1980-1986.
- Friberg et al, 2009, National collection of local diagnostic reference levels in Norway and their role in optimisation of x-ray examinations, Norwegian Radiation Protection Authority.
- Treier et al, 2010, Patient doses in CT examinations in Switzerland: Implementation of national diagnostic reference levels, Rad Prot Dos, 142, 244-254.
- Federal Office for Radiation Protection, 2010, Notice of diagnostic reference levels for radiology and nuclear medicine examinations.

## 2. Information to indicate how radiation protection is promoted and practised

Radiation protection is promoted by the radiology team including the director of radiology, the Radiography Services Manager, and the medical physicist/Radiation Protection Adviser.\*

## 3. How radiation protection during paediatric CT is practised in the facility

The results of CT doses in terms of DLPs for a range of common examinations (adults and paediatric patients) are shown in Table 1 and 2 below and compared with published data. Some of the benefits identified with this national system are that the number of samples (n) in most cases far exceeds the typical number of ten average sized patients used for establishing DRLs. The adult data is based on all adults examined over a period of six months, not just standard size patients. Paediatric data is based on age groups; however, the system can easily be used to generate data based on body width. The 75th percentile was calculated for the country as a whole.

## 4. Assessment of the number of paediatric CT examinations that lack appropriateness

All paediatric CT exams are vetted by a consultant radiologist in advance.\*

## 5. Data on the % of dose reduction in children

The paediatric DRLs (compared to the adult doses) are a reflection of the dose reduction (on a national basis).

## 6. How we child size our CT imaging

All brain scans are adjusted by age and all other scans adjusted by weight.\*

## 7. Number of paediatric CT referrals that are reviewed by radiologists before giving appointments

All of them\*.

## 8. Discussion and Conclusion

Calculated DRLs were found to be broadly similar with data published elsewhere in Europe. The automated dose-tracking software, used on a national basis, was found to be a very powerful and efficient tool for determination of DRLs on large numbers of patients. Some problems in the dosimetry software were noted during data collation and were reported to the Radimetrics project team. A more comprehensive data integrity exercise will be undertaken in future work.

\*The data from Ireland is based on 19 CT facilities and as such, practice will vary among institutions. However these responses are a reflection of practice from one dedicated paediatric hospital that took part in the study.