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RADIATION DOSE COMPARISON IN BRAIN CT EXAMINATIONS AMONG 3 PUBLIC HOSPITALS

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Title: Radiation Dose Comparison in Brain CT examinations Among 3 Public Hospitals

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Introduction

Paediatric patients are susceptible to radiation-induced risks due:

- ✓ to their rapidly growing tissues
- ✓ the wide and increased cellular distribution of skeletal active marrow
- ✓ their great post-exposure life expectancy

Scarce data in literature for paediatric Brain CT radiation doses

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Purpose

To estimate effective doses for paediatric Brain CT examinations performed in 2 public paediatric hospitals (henceforth PH1 & PH2) and 1 public general hospital (henceforth GH)

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Methods

- ✓ 306 Brain CT examinations from paediatric patients were retrospectively reviewed
- ✓ Age-adjusted scanning protocols
- ✓ Acquisition settings and dosimetric data were extracted from the dicom header and recorded
- ✓ Effective dose (ED) calculation by utilizing age-specific DLP-to-ED k-conversion coefficients (ICRP 103 tissue weighting factors adopted): $ED = DLP \times k$

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Results- Demographics

		Age groups			
		0-1	1-5	5-10	10-15
PH1	# of patients	26	47	48	39
	Age	0.6±0.2	3.4±1.2	7.9±1.5	12.7±1.7
PH2	# of patients	-	19	54	57
	Age	-	3.1±1.3	7.8±1.4	13.1±1.7
GH	# of patients	5	6	3	2
	Age	0.7±0.2	2.9±1.0	8.7±2.3	13.0±2.8

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Results- Acquisition settings PH1

	Age groups			
	0-1	1-5	5-10	10-15
kVp	100.8±3.9	118.7±4.9	119.6±2.9	120.0±0.0
mean mA	176.6±38.4	179.7±53.3	240.5±53.2	259.7±69.6
Slice Thick. (mm)	2.5/5.0			
Mode	Axial			
CTDIvol (mGy)	28.3±9.9	50.2±20.0	54.7±23.6	69.4±32.0
DLP (mGy*cm)	411.3±142.7	743.9±307.7	819.9±405.8	1028.2±397.7

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Results- Acquisition settings PH2

	Age groups			
	0-1	1-5	5-10	10-15
kVp	-	99.5±14.3	116.7±9.5	121.1±4.5
mean mA	-	404.5±117.0	389.1±74.0	394.5±62.9
Slice Thick. (mm)	-	3		
Mode	-	Axial & Spiral		
CTDIvol (mGy)	-	31.8±15.9	44.6±15.3	53.1±15.3
DLP (mGy*cm)	-	435.8±251.4	663.3±263.3	805.9±280.9

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Results- Acquisition settings GH

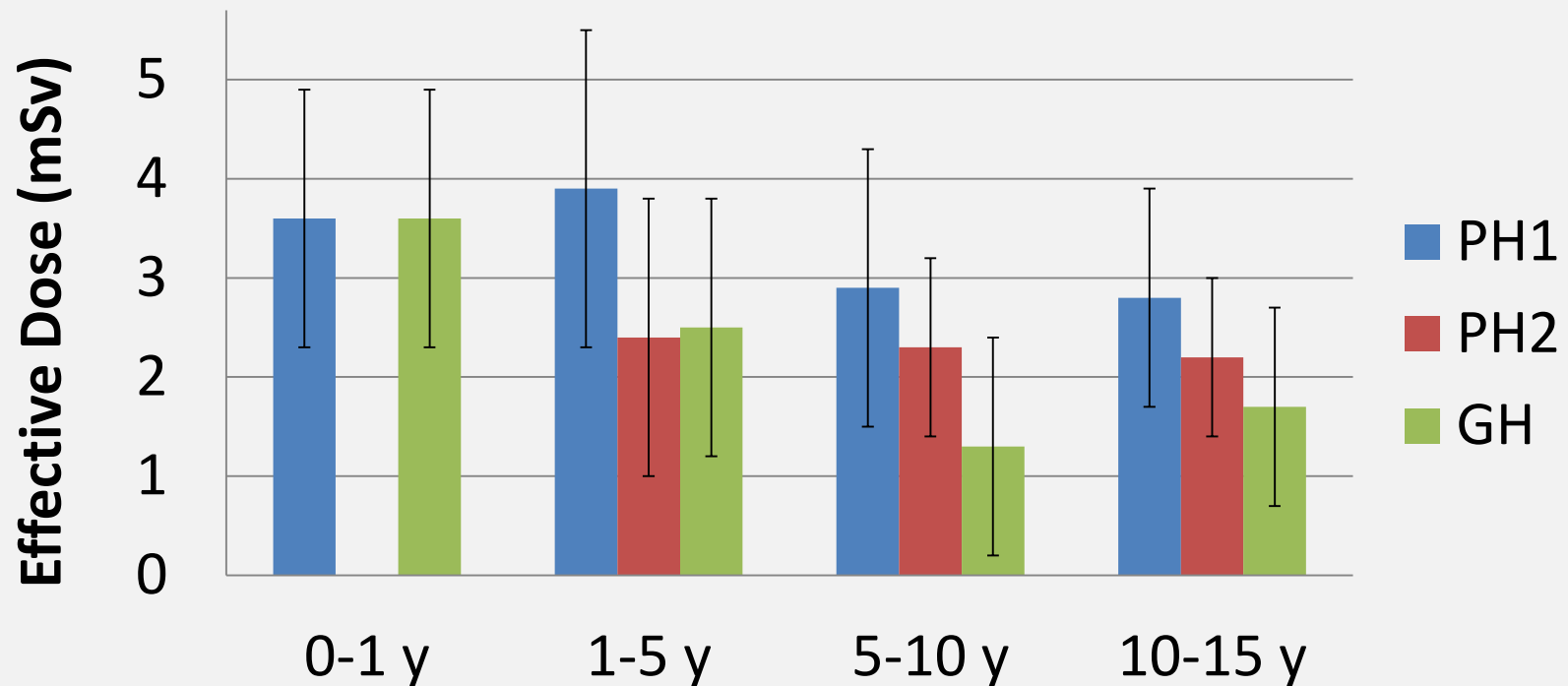
	Age groups			
	0-1	1-5	5-10	10-15
kVp	120±0	103.3±13.7	103.3±15.3	110.0±14.1
mean mA	235.8±83.9	323.0±115.3	224.0±97.9	233.5±65.8
Slice Thick. (mm)	2.5			
Mode	Axial & Spiral			
CTDIvol (mGy)	23.9±10.8	31.3±18.4	29.5±20.3	47.3±28.6
DLP (mGy*cm)	419.1±149.2	456.3±237.7	367.6±235.6	615.2±371.8

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Results- Effective Dose



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Conclusions

- ✓ CT protocols varied in terms of acquisition parameters and scanning mode but effective doses were comparable among the various hospitals for the same age group
- ✓ Trend for higher doses in younger ages
- ✓ Thorough optimization of CT scanning protocols is vital in each and every hospital that treats paediatric patients
- ✓ Age-categorization criteria in paediatric patients should be reconsidered