

Article title

Use of ionizing radiation in a Norwegian cohort of children with congenital heart disease: Imaging frequency and radiation dose for the Health Effects of Cardiac Fluoroscopy and Modern Radiotherapy in Pediatrics (HARMONIC) study

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Table S2.1 Record of dose area product (DAP) and effective dose values in common conventional radiography examinations stratified by body region for the Health Effects of Cardiac Fluoroscopy and Modern Radiotherapy in Pediatrics (HARMONIC) cohort of Norwegian patients with congenital heart disease

Body region	Age category	Number of examinations	Number of examinations with DAP	Median DAP (Gycm ²)	DAP IQR (Gycm ²)	Conversion factor: effective dose/DAP (mSv/Gycm ²) ^a	Median (IQR) effective dose (mSv)
Neck (AP/Lat)	0–3 m (newborn)	3	1	0.04	-	NA	-
	4–30 m (1 year)	16	8	0.02	0.01–0.02	NA	-
	31–90 m (5 years)	29	9	0.03	0.03–0.11	NA	-
	91–150 m (10 years)	20	10	0.12	0.02–0.21	NA	-
	151–210 m (15 years)	11	7	0.08	0.04–0.10	NA	-
	211–216 m (late adolescents)	0	0	-	-	NA	-
Thorax (AP/PA)	0–3 m (newborn)	4,615	428	0.01	0.004–0.01	2.20	0.012 (0.01–0.02)
	4–30 m (1 year)	9,322	2,376	0.01	0.01–0.02	0.58	0.008 (0.005–0.01)
	31–90 m (5 years)	6,567	2,780	0.02	0.01–0.04	0.41	0.008 (0.004–0.02)
	91–150 m (10 years)	4,216	1,910	0.05	0.03–0.07	0.28	0.013 (0.01–0.02)
	151–210 m (15 years)	3,840	1,323	0.08	0.06–0.12	0.16	0.013 (0.01–0.02)
	211–216 m (late adolescents)	177	19	0.13	0.1–0.17	0.15	0.020 (0.02–0.03)
Abdomen (AP)	0–3 m (newborn)	250	22	0.01	0.01–0.01	2.00	0.016 (0.01–0.03)
	4–30 m (1 year)	90	28	0.02	0.01–0.04	0.91	0.019 (0.012–0.04)
	31–90 m (5 years)	56	16	0.04	0.03–0.09	0.64	0.026 (0.02–0.06)
	91–150 m (10 years)	55	25	0.05	0.04–0.19	0.40	0.021 (0.02–0.08)
	151–210 m (15 years)	43	23	0.80	0.26–1.25	0.28	0.224 (0.07–0.35)
	211–216 m (late adolescents)	0	0	-	-	0.20	-
Pelvis (AP)	0–3 m (newborn)	10	4	0.01	0.004–0.01	2.20	0.013 (0.01–0.02)
	4–30 m (1 year)	27	9	0.01	0.01–0.02	1.10	0.012 (0.01–0.02)
	31–90 m (5 years)	30	13	0.03	0.02–0.05	0.60	0.020 (0.01–0.03)
	91–150 m (10 years)	43	18	0.11	0.04–0.33	0.28	0.029 (0.01–0.09)
	151–210 m (15 years)	62	26	0.19	0.11–0.48	0.21	0.039 (0.02–0.10)
	211–216 m (late adolescents)	3	3	0.24	0.22–0.65	0.22	0.052 (0.05–0.14)
Limbs	0–3 m (newborn)	26	2	0.02	0.02–0.02	NA	-
	4–30 m (1 year)	67	18	0.01	0.003–0.01	NA	-
	31–90 m (5 years)	127	46	0.01	0.002–0.02	NA	-
	91–150 m (10 years)	203	94	0.02	0.004–0.04	NA	-
	151–210 m (15 years)	214	113	0.02	0.01–0.07	NA	-
	211–216 m (late adolescents)	17	11	0.05	0.01–0.12	NA	-
Trunk (PA)	0–3 m (newborn)	3	1	0.04	-	NA	-
	4–30 m (1 year)	10	5	0.01	0.004–0.02	NA	-
	31–90 m (5 years)	66	29	0.03	0.01–0.06	NA	-
	91–150 m (10 years)	143	83	0.14	0.07–0.26	NA	-
	151–210 m (15 years)	306	172	0.50	0.28–0.75	NA	-
	211–216 m (late adolescents)	15	8	0.40	0.21–0.54	NA	-

^aConversion factors from DAP to effective dose [27]

AP anterior to posterior DAP dose area product, IQR interquartile range, Lat Lateral, m months, NA not available,

PA posterior to anterior

Table S2.2 Record of dose length product (DLP) and effective dose values in common computed tomography (CT) examinations stratified by body region for the Health Effects of Cardiac Fluoroscopy and Modern Radiotherapy in Pediatrics (HARMONIC) cohort of Norwegian patients with congenital heart disease

Body region	Age category	Number of examinations	Number of examination with DAP	Median DLP (mGycm)	DLP IQR (mGycm)	Conversion factor: effective dose/ DLP (mSv/mGycm) ^a	Median (IQR) effective dose (mSv)
CT head	0–3 m (newborn)	23	5	236.00	61–287	0.011	2.59 (0.67–3.16)
	4–30 m (1 year)	64	12	384.45	339–497.71	0.007	2.58 (2.27–3.33)
	31–90 m (5 years)	69	33	520.94	157.68–580.54	0.004	2.08 (0.63–2.32)
	91–150 m (10 years)	76	47	557.26	123.89–715.29	0.003	1.78 (0.39–2.29)
	151–210 m (15 years)	72	40	588.92	125.32–823.19	0.002	1.24 (0.26–1.73)
	211–216 m (late adolescents)	3	1	179.90	-	0.002	0.38(NA)
CT thorax	0–3 m (newborn)	58	27	61.04	43.1–65.65	0.039	2.38 (1.68–2.56)
	4–30 m (1 year)	138	51	54.00	23–88.65	0.026	1.40 (0.59–2.30)
	31–90 m (5 years)	104	48	42.30	25.81–69.73	0.018	0.76 (0.46–1.26)
	91–150 m (10 years)	94	44	72.14	36.355–126.65	0.013	0.94 (0.47–1.65)
	151–210 m (15 years)	75	41	169.65	58–248.15	0.014	2.38 (0.81–3.47)
	211–216 m (late adolescents)	6	2	247.5	154–341	0.014	3.47 (2.16–4.77)
CT abdomen	0–3 m (newborn)	6	1	34.31	-	0.049	1.68 (NA)
	4–30 m (1 year)	9	1	157.00	-	0.030	4.71 (NA)
	31–90 m (5 years)	11	7	91.21	51–110.16	0.020	1.82 (1.02–2.20)
	91–150 m (10 years)	21	8	149.73	127.09–184	0.015	2.25 (1.91–2.76)
	151–210 m (15 years)	13	7	470.00	206.33–1075	0.015	7.05 (3.09–16.13)
	211–216 m (late adolescents)	0	0	-	-	0.015	-

^aConversion factors from DLP to effective dose [28]

CT computed tomography, DLP dose length product, IQR interquartile range, m months, NA not available

Table S2.3 Record of dose area product (DAP) and effective dose values in common diagnostic fluoroscopy examinations stratified by body region for the Health Effects of Cardiac Fluoroscopy and Modern Radiotherapy in Pediatrics (HARMONIC) cohort of Norwegian patients with congenital heart disease

Body region	Age category	Number of examinations	Number of examinations with DAP	Median DAP (Gycm ²)	DAP IQR (Gycm ²)	Median fluoro time (min)	Conversion factor: effective dose/DAP (mSv/Gycm ²) ^a	Median (IQR) effective dose (mSv)
Gastrointestinal tract (neck + chest +abdomen)	0–3 m (newborn)	91	74	0.15	0.07–0.27	3.3	1.79 ^b	0.27 (0.12–0.48)
	4–30 m (1 year)	197	121	0.30	0.15–0.50	2.8	0.76 ^b	0.23 (0.11–0.38)
	31–90 m (5 years)	83	63	0.44	0.19–0.78	2.4	0.49 ^b	0.22 (0.09–0.38)
	91–150 m (10 years)	32	25	0.54	0.18–0.99	2.8	0.33 ^b	0.18 (0.06–0.33)
	151–210 m (15 years)	23	15	0.77	0.28–1.24	2.1	0.22 ^b	0.17 (0.06–0.27)
	211–216 m (late adolescents)	0	0	-	-	-	0.2 ^b	-
Uro-genital tract	0–3 m (newborn)	13	9	0.14	0.07–0.20	2.0	1.28	0.18 (0.09–0.26)
	4–30 m (1 year)	30	15	0.34	0.17–0.68	2.1	0.64	0.22 (0.11–0.44)
	31–90 m (5 years)	36	15	0.22	0.19–0.48	1.9	0.46	0.10 (0.09–0.22)
	91–150 m (10 years)	51	18	0.48	0.34–0.84	1.6	0.32	0.15 (0.11–0.27)
	151–210 m (15 years)	11	5	0.74	0.69–2.16	3.3	0.20	0.15 (0.14–0.43)
	211–216 m (late adolescents)	0	0	-	-	-	0.20	-
Angiography (excluding heart angio)	0–3 m (newborn)	9	9	1.37	1.13–6.02	19.7	NA	-
	4–30 m (1 year)	34	21	2.46	0.67–3.80	16.2	NA	-
	31–90 m (5 years)	18	12	8.23	3.66–22.02	15.0	NA	-
	91–150 m (10 years)	12	4	9.86	2.92–26.22	21.3	NA	-
	151–210 m (15 years)	22	17	16.73	7.20–38.48	15.2	NA	-
	211–216 m (late adolescents)	0	0	-	-	-	NA	-

^aConversion factors from DAP to effective dose [27]. ^bConversion factor for gastrointestinal track is the average of factors for stomach & duodenum and Oesophagus [27]

DAP dose area product, IQR interquartile range, m months, NA not available

Table S2.4 Record of dose area product (DAP) values in noncardiac interventional procedures for the Health Effects of Cardiac Fluoroscopy and Modern Radiotherapy in Pediatrics (HARMONIC) cohort of Norwegian patients with congenital heart disease

Exam	Age category	Number of examinations	Number of examinations with DAP	Median DAP (Gycm ²)	DAP IQR (Gycm ²)	Median fluoro time (min)	Conversion factor: effective dose/DAP (mSv/Gycm ²)
Noncardiac Intervention	0–3 m (newborn)	16	7	0.21	0.08–4.2	1.4	NA
	4–30 m (1 year)	29	18	0.72	0.21–3.19	2.95	NA
	31–90 m (5 years)	22	12	0.63	0.41–11.16	2.9	NA
	91–150 m (10 years)	7	5	1.70	0.09–11.55	18.2	NA
	151–210 m (15 years)	24	16	13.25	2.19–27.85	13	NA
	211–216 m (late adolescents)	1	1	40.19	-	22.7	NA

DAP dose area product, *IQR* interquartile range, *m* months, *NA* not available