

**Radiation dose reduction in congenital heart disease patients during cardiac catheterization by a novel protocol**

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**Objectives:** Cardiac catheterization remains as a major source of radiation exposure for patients with congenital heart disease, particularly for those patients with complex cardiac pathologies. As children are more prone to both deterministic and stochastic effect of radiation, every effort should be tried to reduce radiation exposure. One of the ways to reduce the radiation dose is to use lower pulse fluoroscopy rates. This study reports the magnitude of radiation exposure with 3.75 frame per second (fps) pulse fluoroscopy rate and compares the reduction with our previous 15fps protocol during cardiac catheterization for paediatric and adult congenital heart disease.

**Methods:** All diagnostic and interventional cardiac catheterization procedures from a single tertiary centre were analyzed from 1 January 2014 to 31 December 2015 which is 1 year before and after implementation of lower starting pulse fluoroscopy rates. Radiation dose was quantified as air kerma dose (mGy) and dose-area product (DAP;  $\mu\text{Gy}/\text{m}^2$ ). Radiation exposure were analyzed for diagnostic and interventional procedures; diagnostic group was subdivided to cyanotic and acyanotic patients whereas interventional group was subdivided according to most common indications.

**Results:** A total of 786 procedure details were analysed. The mean fluoroscopy times and contrast amount were almost identical for both periods (621 vs 601 sec). In the first year of study (n=371) the median air kerma for all procedures was 357.2 mGy, It was decreased to 104.60 mGy which means 70% reduction after lower pulse fluoroscopy rates during second year (n=415). When we analysed procedures as interventional and diagnostic angiograms doses were 164.4mGy and 493.6mGy respectively in 2014 and 158,1mGy and 67.8mGy respectively in 2015. Among all patient groups the most striking decrease was observed in diagnostic procedures which we use prominently fluoroscopy rather than cine angiography.

**Conclusion:** We demonstrated a significant radiation dose reduction by implementing 3.75 fps pulse fluoroscopy rate which is the lowest possible rate and never reported before. We claim that novel radiation dose reduction protocols could be easily applied without any increase in fluoroscopy time and should be applied both for patient and health care provider safety.