RADIATION DOSE SURVEY IN A PAEDIATRIC CARDIAC CATHETERIZATION LABORATORY EQUIPPED WITH FLAT-PANEL DETECTORS

O. Dragusin[1,3], M. Gewillig[2], K. Smans[1,3] L. Struelens[3], and H. Bosmans[1]
[1]Dept. of Radiology, Catholic University of Leuven, Belgium
[2] Dept. of Cardiology, Catholic University of Leuven, Belgium
[3]SCK-CEN Belgian Nuclear Research Institute, Mol, Belgium

In the paediatric cardiac catheterization laboratory it is a priority that the radiation dose of diagnostic and interventional procedures is as low as reasonably achievable. Flat-panel X-ray detectors (FPD) for fluoroscopy represent a new technology that has been implemented in these x-ray rooms and that has the potential to reduce these doses. The knowledge of the associated (effective) patient doses remains however very limited today. The minimal exposure levels to guarantee an acceptable image quality and the optimal beam quality settings in terms of effective patient dose are not completely investigated. This study reports radiation dose levels in paediatric patients with this new technology.
The patient population included 230 consecutive paediatric patients with congenital heart disease (age range from new born to 14 years old). Interventional paediatric cardiology mainly involves dilatation of stenotic vessels or valves and occlusion of abnormal communications. The exposure parameters of each patient could be retrieved from the Dicom header of the images (dose-area product – DAP - for fluoroscopy and cineangiography, kV, mA peak, pulse time, x-ray beam angulations, number of frames for each series, focus size, extra copper filter). For accurate risk estimation, effective doses have been determined for all patients, using the PCXMC software developed by STUK.
Effective doses could be plotted as a function of age and weight of the patients. We propose to report our local diagnostic and therapeutic dose reference level with a graph (effective dose or DAP versus weight or age) rather than with a single value. Our effective doses were comparable to literature information. The results of this study represent the first pillar in view of the optimization of the paediatric cardiac catheterization protocols. Patient doses as achieved with the most modern digital equipment are not automatically low. Monitoring of these doses is however more straightforward than before: a lot of information can be retrieved independently of any cooperation in the room. In a next phase, we will explore how our present doses could be reduced, in order to make full use of the dose reduction potential of flat panel systems.

E-mail presenting author: octavian.dragusin@uz.kuleuven.ac.be