

Challenges of Irradiation on Extrathoracic and Non-thoracic Organs in Portable Neonatal Chest Radiography: Do We Need Mandatory Protective Rules?

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Background: Chest X-ray (CXR) is known as the most common radiography used for adult and pediatric patients worldwide. Improper X-ray field collimation can result in excessive radiation dose on non-thoracic organs in chest radiographs.

Objectives: This study was to investigate X-ray field collimation quality in neonatal chest radiography.

Methods: A total of 213 chest radiographs of neonates from three hospitals were analyzed for collimation quality assessment in a retrospective study. Accordingly, ideal imaging field (IIF) and current imaging field (CIF) were initially defined. The margins of the IIF included acromioclavicular (AC) level to lower costal margin (i.e. top to bottom) and one centimeter beyond the broadest area of the chest on each side (that is, right to left). The CIF size was also defined as the square borders of collimators.

Results: The findings revealed that the area of the CIF was 1.65 _ 0.39 times to the ideal imaging field (IIF) for three hospitals, suggesting that collimation quality in neonatal chest radiographs was not accurate and it had defects. According to the results, acceptable collimation percentage (36.6%) in Hospital A was more than that in two other centers, and the given center also provided the lowest radiation due to the exposure of non-thoracic structures to primary beams.

Conclusions: It was concluded that training radiographers and using patient immobilization devices and stabilizers were important points that could reduce radiation exposure to non-thoracic organs in pediatric CXR.

Biography

I am Dr. Majid Sadeghi, a member of the faculty of Gonabad University of Medical Sciences. My research interests are in the fields of medical imaging dosimetry and radiation protection and imaging techniques.