Measurement of entrance surface dose during chest x-ray examinations in neonatal intensive care unit using OSL dosimeters

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Purpose

- Pediatric patient are known to have higher sensitivity to ionization radiation.
- Monitoring of radiation doses received by neonatal patients in our hospital is of primary importance to our patient radiation safety program in diagnostic Imaging.
- We are proposing to measure the entrance surface dose (ESD) using OSL dosimeters due to their higher sensitivity in comparison with TLD both used for occupational dose monitoring at our institution.

Materials & Methods

- Entrance surface dose was measured using the IAEA TRS-457 dosimetry protocol.
- The x-ray machine was a portable one routinely used in the PICU set up at the hospital with the following parameters: kV ranged from [70-73], the mAs [1.6-2.5] and the SID [100-115] cm.
- We have used a neonatal body phantom (Model: 610 GAMMAX) to simulate the patient body and the dosimeters were place on top of the phantom.
- Both OSL and TLD readings were cross checked with a diagnostic x-ray shadow free PTW ionization chamber model: SFD 34060 coupled to an electrometer model: UNIDOS E.

Results

- The range of measured ESD during chest x-ray examination of the neonatal patients in our institute was [54-76] μGy respectively.
- The OSL were found suitable to conduct ESD measurements during chest x-ray exam for the neonatal patient.
- The obtained patient dose measurement will serve as an indicator of quality and patient safety standard in diagnostic radiology services.
- Skin dose TLDs can be used as in-vivo dosimeters during infant and neonatal chest x-ray examination to measure ESD.

Conclusion

The measured values are within internationally published data. The study serves as a benchmark to our clinical practice against international diagnostic reference levels (DRL) in pediatric radiology.

References


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