

AbstractID: 14252 Title: Calculating the Effective Dose for Pediatric Patients from Multi-Detector CT Studies: New Vs. Old ICRP Recommendations

Purpose: To compare calculated effective doses for pediatric CT exams using the new and old ICRP recommendations.

Methods and Materials: A total of 178 pediatric patients who underwent trauma CT studies were analyzed retrospectively. Subjects were divided into 6 groups according to the type of exams performed, ranging from only a head scan to a full body assessment (head/face/neck/chest/abdomen/pelvis). Two versions of ImPACT software (ImPACT CT, version 0.99x & 1.0) were used to analyze study data and extract the effective dose: the older version used ICRP-60 to calculate effective doses whereas ImPACT 1.0 used ICRP-103 recommendations. The correction factors for pediatrics, which are included in spreadsheet, were applied to obtain the equivalent pediatric effective dose. A paired student's t-test was used with significance threshold set at 0.01.

Results: Pediatric effective doses using ICRP 103 were found to be significantly different from those calculated with ICRP 60 ($p < 0.01$) for the following scan groups: head/neck/chest/abdomen/pelvis, head/chest/abdomen/pelvis, head/neck, head/face, and head only. The difference in effective doses of full body group (head/face/ neck/chest/abdomen/pelvis) was not found to be significant ($p = 0.035$).

Conclusion: Our analysis showed that the calculated effective doses from CT studies using the newer ICRP 103 differed significantly from the old ICRP recommendations. The only scans which did not exhibit significant difference ($p > 0.01$) were when face scans were included in the "full body" scan. This is probably due to the fact that the new tissue weighting factors of face organs did not change significantly from ICRP-60. However, when only a head and face scans were performed, the difference was found to be highly significant most likely because of the inclusion of the brain and salivary glands, which accounted for a larger contribution of the received doses from head than face scan, in the new ICRP weighting factors.