

AbstractID: 12711 Title: Increasing source to image distance is a consistent dose reduction method across a range of attenuator thicknesses and collimation strategies

Purpose:

Increasing the source to image-receptor distance (SID) for radiological exposures is an effective yet under-utilized optimization technique. Although several studies have demonstrated that dose reductions are achievable using this technique, there is little agreement in the literature as to the precise mechanism behind this reduction. The objective of the current work was to investigate the mechanisms through which SID reduces dose by use of a physical attenuator methodology and to examine the combined effect of this with collimation.

Method and Materials:

A total of 810 dosimetry measurements were acquired using thermoluminescent dosimeters. Exposures of a homogeneous attenuator composed of poly methyl meth-acrylate were taken with a GE tube at 90kVp using SIDs of 100cm; 130cm and 150cm respectively. As field size is a known contributor to patient dose three different collimation strategies were also considered: collimating to the outer surface; collimating to the mid-point and collimating to the image-receptor.

Results:

A significant difference was determined for each of the SIDs tested ($p < 0.001$) with a trend of decreasing dose with increasing SID. Reductions in the ratio of the dose recorded at the image-receptor to that at a position 30cm from the image-receptor were found to be between 3.9% and 37.9% for 150cm and between 7.5% and 30.6% for 130cm respectively when compared to 100cm.

Conclusion:

Results from this study demonstrate that increasing the SID above 100cm reduces the dose to a 30cm object as the ratio of the dose at the entrance surface to that at the exit point is reduced with increasing SID. This reduction in dose with increasing SID is exclusive of patient size or collimation method. Further work will investigate if anthropomorphic phantom and patient based studies produce equivalent results. Radiographers should be strongly encouraged to increase the SID above 100cm in the clinical setting.