A basic assumption in radiation dosimetry, is that the in-air x-ray output of a linear accelerator has an inverse square relationship to the source detector distance (SDD). However, it has been shown that this simple relationship does not account for head scatter, caused by x-ray interaction with the collimator jaws and the physical wedge. Measured and in-air output factors can be brought into better agreement by replacing the nominal SAD with an effective source distance (ESD). Recently, linear accelerator manufacturers have been providing dynamic wedges with their accelerators. These devices could modify how photons scatter in the head assembly. This investigation looked into the dependence of ESD on energy, distance, and field size for open, physical, and dynamic wedged fields.

Our analysis agreed with previous studies showing that the ESD is affected by the addition of a physical wedge. The change in ESD is more pronounced for higher photon energies, at distances closer to the accelerator head, for thicker wedges, and for larger field sizes. The ESD's measured for dynamic wedges were similar to those measured for open fields. This is probably do to less scatter created in the head assembly, as compared to the physical wedge. Any inverse square corrections recommended in literature for in-air output factors for physical wedged fields do not seem as necessary for dynamic wedged fields.