

AbstractID: 12896 Title: Dependence of Entrance Exposure on kVp and Other Variables for Diagnostic Radiographic Units

Purpose: Data compiled from routine annual quality control of radiographic units was analyzed, and output dependence on various factors was studied. Trends in the data could be useful in estimating typical patient exposures. **Methods and Materials:** The data used include output in mR measured at various kV_p settings, measured values for kV_p, the mA and time set, the source-to-detector distance, and the half-value layer (HVL) with the peak voltage near 80 kV_p. A power function was fitted to the measured output data for each unit as a function of measured kV_p. **Results:** The normalized varied from one unit to another by as much as a factor of 4. Tube filtration is one factor that would affect normalized output, and it would also affect the HVL, but the correlation with HVL was not strong enough to account for much of the variation. The C-arms are clearly seen to be a group with distinct characteristics. In order to study in more detail the dependence of output on kV_p, the normalized data for each unit were divided by the output estimated at 80 kV_p. A power law provided a good fit to these graphs, which allowed a kV_p exponent to be estimated for each population: 2.06 for stationary rad units; 2.08 for mobile rad units; 2.21 for stationary R/F units; and 2.81 for C-arms. **Conclusions:** Due to the large variation in normalized output it is always necessary to measure the output of the individual unit before the patient exposure can be estimated, even if the units are of the same type. If the output per mAs is known for each unit, a technique specification that might allow exposures to be minimized would be to specify the exposure (in mR) and kV_p rather than specifying mAs and kV_p.