

AbstractID: 13468 Title: The “30-30-30 Rule”, a Practical Guide to Setting the Detector Input Exposure Rate for a Fluoroscopic Imager

Purpose: Introduce an empirical “30-30-30 Rule” for determining input exposure to an x-ray image intensifier (XRII); demonstrate expansion of the rule to a flat panel (FP) imager and to different pulse rates; compare calculated values with vendor settings or measured values; describe the detector input exposure measurement technique. **Method and Materials:** The rule is based on three fundamental parameters: 1. XRII input diameter (cm), 2. Video frame rate/fluoro pulse rate, and 3. Exposure rate (micro-R/s) at the input to the XRII. To apply the rule, each of these parameters is first set to the value 30 (hence the name 30-30-30 Rule). Adjustments are then made for different input diameters and fluoroscopy pulse rates. The power of the rule is demonstrated by showing how it can be applied to FP detectors. **Results:** For XRII the only parameters required are the input diameter, and the pulse rate. For FP the pixel pitch is utilized. Comparison of calculated values with measured values from a variety of XRII and flat panel imagers showed reasonable agreement for some procedure protocols and for a nominal 30 cm (XRII) or 22 cm (FP) field of view. Results for other fields of view or pulse rates varied widely in their agreement with the rule; however, the discrepancies could sometimes be explained by showing that the measured values followed a modified version of the rule. **Conclusion:** The 30-30-30 rule is based on fundamental physics principles associated with XRII and FP imagers, and can be used as a benchmark for comparison of the expected detector input exposure to the measured value. It can also be readily modified so that measured values of input exposure can be better understood. It thus provides a basis for comparing expected and measured values to determine whether adjustments in the input exposure might be beneficial.