Purpose: Although air kerma (AK) is displayed during a case, often it does not represent the entrance skin dose (ESD), which can be estimated. The purpose of this work is to develop and provide system-customized AK-to-ESD look-up tables (LUTs) for immediate reference so that physicians can better evaluate the likelihood of deterministic skin reactions to weigh the risk-versus-benefit of continuing high-dose procedures.

Methods: Four correction factors are applied to estimate ESD from AK: inverse square correction from the interventional reference point to the average entrance table position, backscatter factor, mean energy absorption coefficient ratio, and measured table attenuation. Correction factors are room and service specific; therefore, room-specific AK-to-ESD LUTs are posted for easy reference. LUTs also list corresponding tissue reactions and their approximate time-of-onset.

Protocols can be established for nurse or technology staff to provide verbal AK dose notifications during the case at crucial skin reaction dose thresholds (e.g. 2Gy indicating possible skin erythema and 5Gy indicating potentially prolonged recovery or permanent skin damage). Patient follow-up protocols can be established if the estimated ESD exceeds a set trigger level (e.g. 5Gy).

Staff and physicians surveys evaluate usefulness and impact of dose awareness by system users.

Results: Two surveys report feedback on LUTs from physicians and technologists with 14 years median experience (range: 3-24 years). Over three-quarters of all angiography system users identify the LUTs and verbal dose notifications as positively affecting the institution’s Patient First initiative and roughly one-half of the imaging system users indicate that the LUTs and site-specific dose trigger level improves the dose awareness of care providers.

Conclusions: Our efforts have focused on educating care providers about the differences between displayed AK and the estimated ESD. LUTs provide physicians and staff an immediate reference for estimated ESD and the associated deterministic skin effects at specific dose levels.