AbstractID: 14086 Title: Clinical Experience with an EPID-based Quality Assurance System for Linear Accelerators

Purpose:
To report our experience with the implementation and clinical use of an electronic portal imaging device (EPID) based tool for the routine quality assurance (QA) of linear accelerator (Linac) radiation field geometry.
Methods and Materials:
The development of an EPID-base QA tool, eQA, for routine QA of Linac radiation field geometry has previously been reported. Implementation of eQA began in 2007 for both Elekta and Varian Linacs in our clinic, with deployment completed by mid-2008. The eQA is currently used to perform all radiation field geometry QA, including radiation field size, light vs. radiation field congruence, jaw symmetry, MLC leaf position, and gantry, collimator and couch isocentre. The eQA is routinely used to accurately set the lasers to the radiation isocentre and perform MLC calibrations. Efforts were made to automate much of the eQA functionality, using information in DICOM header tags to automatically identify the type of test and determine associated parameters in the analysis of results. Email summaries of QA results are sent automatically to appropriate staff. Compared to a manual assessment of film-based measurements, eQA provides reproducible, non-subjective analysis of the radiation field, reducing the variability in measurements. This has enabled a tightening of the tolerance for radiation field size measurements.
Results:
The eQA has successfully replaced film for all radiation field geometry tests in our department, and has improved the efficiency of our QA processes. The non-subjective, reproducible results obtained with eQA have allowed a reduction of radiation field size tolerance from 2 mm to 1 mm. The eQA provides the unique functionality to map the locations of the gantry, collimator and table centre of rotations onto a common reference frame for determining the isocenter sphere.
Conclusions:
The EPID based software tool has been successfully implemented, improving the efficiency and overall performance of our QA processes.