An Analysis of 13,000 Patient-Specific IMRT QA Results from 13 Different Clinical Treatment Services

Innovation/Impact Because of an absence of standard acceptance criteria for treatment plan QA, retrospective review of QA results is a practical way to establish a reference point for pass and failure rates. Available literature (1,2) did not have a particularly large or varied population, limiting their ability to define clinical reference points for expected QA pass and failure rates.

In an effort to increase the scope of QA review performed in previous studies regarding both the number of plans and variety of treatment sites, we retrospectively analyzed the absolute dose and planar gamma results for more than 13,000 patient plans across 13 clinical treatment services and as a function of date for IMRT conducted between 2005 to 2011 at The University of Texas MD Anderson Cancer Center. This represents the largest review of QA results to-date.

Results Our retrospective review of 13,308 patient-specific IMRT QA measurements demonstrated different rates of absolute dose failure for different treatment sites based on the +3% criterion (21.2% of mesothelioma plans failing compared to 0.6% of genitourinary plans). The proportion of absolute dose failures was not negligible: 2.3% if all plans failed including 62 plans (21% of failures) that failed at two or more measurement locations. Although our point dose agreement has improved over time (figure 1(a)), our rate of absolute dose failures has remained relatively constant at over 2% (figure 1(b)). Unlike the absolute dose criteria, gamma analysis was found to be relatively insensitive to detecting dosimetric errors (0.7% of plans); only five plans that had an absolute dose failure also had a gamma failure. More than half of the failures were noted to be due to film processor error, and excluding these failures, the rate of gamma failure was 0.1%. Of note, clinically, no treatment plans were modified based on gamma failure.

References