

**Purpose:** To investigate if the degree of IMRT QA error characterized by the conventional metrics is correlated with clinically relevant dosimetric errors for prostate and head-neck treatments.

**Methods:** We examined 37 head-neck and 41 prostate treatments, each had at least one field failed IMRT QA on MapCHECK judged by one of the standards – 95% passing rate at 3%/3mm, 5%/4mm, or 7%/5mm. The resulting deviation on target and critical normal-structure doses was computed using in-house TPS PlanUNC. PPlanUNC reproduced the QA-failed treatment plan using MapCheck-measured beam characteristics. The modified plan represents the actual treatment that patient would receive if treatment (that failed QA) had been delivered. The degree of IMRT QA error was correlated with its dosimetric impact on minimum dose to 95% of the target volume [D95], mean and maximum doses to critical structures using Pearson correlation. A commercial software (3DVH) for 3D dosimetry study using MapCHECK QA data is also evaluated.

**Results:** There is a lack of general correlation between QA passing rate and resulting error in PTV D95 and critical structures ((bladder, rectum, femur heads for prostate and brainstem, cord, parotids for head and neck) mean and max. dose (Pearson r value -0.146, range -0.519 &#61485; 0.130). More stringent QA criterion does not have better correlation with the 3D dosimetry error than less stringent criterion ( $r = -.154 \pm 0.15$  for 3%/3mm,  $r = -1.93 \pm 0.192$  for 5%/4mm, and  $r = -1.85 \pm 0.14$  for 7%/5mm). The IMRT QA errors for all cases studied, if left uncorrected, would lead to errors of 0.7% for the D95 (range -4.0-2.8%), 2.15% for the cord dose (-3.3-21.9%), and 0.6% (-9.5-4.9%) for all other critical structures.

**Conclusions:** We observed no strong and consistent correlation between the degree of IMRT QA error and the degree of clinically relevant patient dose error.