Purpose: A continuous quality improvement (CQI) process for patient-specific Quality Assurance (PSQA) was implemented to track those that did not meet the pass criteria. We investigated the reasons for the failures and derived corrective actions.

Methods: At our clinic SBRT, Tomotherapy, and linac IMRT treatments are checked prior to treatment by a formal PSQA procedure. Plans are delivered using the record and verify system in QA mode, measured data are compared with calculated plan data and PSQA is assigned a pass or fail. We use MapCheck for point/planar dosimetry for IMRT and ion chamber/film in cheese phantom for Tomotherapy and SBRT with pass criteria of ≥ 90% (using 3%/3mm criteria). Plans that fail initial QA are re-measured and sometimes re-planned, costing departmental resources and causing patient treatment delays. Data for 2010 were analyzed and categorized.

Results: A total of 321 PSQA measurements were analyzed – 52% Tomotherapy, 7 % SBRT and 41% linac IMRT patients. Overall failure rate was 15% of which majority was Tomotherapy (11.2%). Failure due to incorrect QA plan generation was major reason followed by issues related to treatment planning such as small segment sizes, machine related failures, and Tomotherapy output being out of tolerance (+3%).

Conclusions: In one case, the failures lead to discovery of a machine problem. Tomotherapy failures in June and July lead to an investigation which led to a better understanding of the limitations of our current QA methodology, particularly the film measurement (artifacts). The point dose measurement pass criteria were re-evaluated and changes made. Patient treatment can continue if point dose >3% but <5% if approved by physicist. These type failures are tracked and if upward trending noted, a thorough investigation is triggered. Recognition of PSQA failure categories and implementing proactive measures has led to decrease in failure rate.