Can EPID Based Measurement Replace Traditional Daily Output QA On Megavoltage Linac?
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Presentations
SU-G-TeP2-1 (Sunday, July 31, 2016) 4:30 PM - 5:00 PM Room: ePoster Theater

Purpose:
To investigate the long term stability and viability of using EPID-based daily output QA via in-house and vendor driven protocol, to replace conventional QA tools and improve QA efficiency.

Methods:
Two Varian TrueBeam machines (TB1&TB2) equipped with electronic portal imaging devices (EPID) were employed in this study. Both machines were calibrated per TG-51 and used clinically since Oct 2014. Daily output measurement for 6/15 MV beams were obtained using SunNuclear DailyQA3 device as part of morning QA. In addition, in-house protocol was implemented for EPID output measurement (10x10 cm fields, 100 MU, 100cm SID, output defined over an ROI of 2x2 cm around central axis). Moreover, the Varian Machine Performance Check (MPC) was used on both machines to measure machine output. The EPID and DailyQA3 based measurements of the relative machine output were compared and cross-correlated with monthly machine output as measured by an A12 Exradin 0.65cc Ion Chamber (IC) serving as ground truth. The results were correlated using Pearson test.

Results:
The correlations among DailyQA3, in-house EPID and Varian MPC output measurements, with the IC for 6/15 MV were similar for TB1 (0.83-0.95) and TB2 (0.55-0.67). The machine output for the 6/15MV beams on both machines showed a similar trend, namely an increase over time as indicated by all measurements, requiring a machine recalibration after 6 months. This drift is due to a known issue with pressurized monitor chamber which tends to leak over time. MPC failed occasionally but passed when repeated.

Conclusion:
The results indicate that the use of EPID for daily output measurements has the potential to become a viable and efficient tool for daily routine LINAC QA, thus eliminating weather (T,P) and human setup variability and increasing efficiency of the QA process.