Purpose: In a typical model of Radiation Oncology data flow, treatment plan is designed on treatment planning station (TPS) under the supervision of physician and physicist, and machine specific parameters are pushed to Record and Verify system (RV) for treatment data storage, where it stays available for daily uploads to treatment station. While various QA programs could be established to verify uncorrupted planning data storage and transfer, the ultimate goal is a daily confirmation of patient treatment parameters versus original treatment plan.

Methods: A new computer vision approach, RTcheck, is used to digitize loaded machine parameters directly from the screen of Varian Clinical Console every time before the beam is turned on by a therapist. The verification engine runs a check against the parameters automatically extracted from the printed postscript planning report (Pinnacle, Philips) prepared during planning stage and approved by physician. All important beam data, MUs, jaws position, beam energy, couch angle, and wedge specifiers are displayed side by side on the screen of RTcheck station. All field verifications are recorded to a log file, periodically reviewed by a physicist.

Results: In our clinical tests, the electronic verification of machine treatment parameters shortened patient “on the table” time, as the manual therapist’s “time out” check before every beam on may take up to several minutes for patient treatments with multiple beams (more than 10). Our analysis of verification logs revealed several instances of a small X1 jaw position discrepancy of 0.1cm for jaw position range of 0 to -2cm. After jaw recalibration, the problem was eliminated.

Conclusions: RTcheck is the end-to-end quality assurance approach to verify data flow from TPS to treatment machine for every patient treatment. Computer vision approach may help reduce human error factor, and shorten patient treatment time.

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Conflict of interest: S. Kriminski and I. Lysiuk: provisional patent application is submitted to United States Patent and Trademark Office