

AbstractID: 13728 Title: Radiotherapy plan integrity verification with dynamic Pinnacle scripts

**Purposes:**

5 The purpose of this study was to automate elements of the quality control (QC) necessary for IMRT plan generation process. Physicists often review all dosimetrist-generated IMRT plans prior to physician approval with the aim of detecting sub-optimal or technically undeliverable plans. We report here an automated suite of QC tools designed to carry out a majority of these laborious physics verification tasks efficiently and accurately within the Pinnacle treatment planning system (TPS).

**Method:**

10 The IMRT plan integrity verification tool is implemented as a combination of Pinnacle scripting routines and Perl programs which collect/derive the plan data, compare the data against pre-defined physical and dosimetric rules, and report the results of the logical comparisons to the user. Important technical details include (a) a unique Perl program library which has been created to allow easier processing of Pinnacle data and (b) a dynamic script generation method which was developed to allow features and flexibilities of Perl programming for plan data processing inside Pinnacle. This QC tool is able to check many rules in the categories of patient setup, contouring, beams, dose calculation, IMRT optimization and dose distribution.

**Results and conclusion:**

20 This tool has been in routine clinical use for several months, and initial results have shown that it improves both the efficiency and accuracy of physicists and dosimetrists, virtually eliminating some errors commonly encountered prior to the tools introduction. While this technique cannot be extended to all elements of the IMRT QC process, it has been adapted to include elements such as IMRT objective conflict analysis and IMRT cost function ranking which would be time-consuming, if not impossible, for a human to manually verify. Further, the dynamic Pinnacle script method which facilitated the IMRT QC could also be expanded to other radiotherapy QC including 2D, 3D conformal, and brachytherapy planning.