

Purpose:

To develop software which both increases the comprehensiveness of the AAPM recommended treatment planning system (TPS) quality assurance and decreases the time required to complete it.

Method:

The AAPM Task Group Report #40 recommends a monthly check of the “checksum” or a constancy check of monitor unit (MU) calculations for a subset of all possible beam configurations. An in-house, Interactive Data Language (IDL) based software program was developed to perform the TPS QA. The program was designed to interface with the Pinnacle TPS to automate these tests. First, a Pinnacle script was developed to calculate a comprehensive set of beams configurations belonging to commissioned machines. After computation the 2x2x2 mm grid for each beam is automatically exported and saved. Second, the IDL software imports this dose grid and compares it on a voxel-by-voxel basis to the dose grid created after commissioning. Any nonzero deviation would direct the physicist to the specific beam parameters to check.

Results.

For each energy of each machine, the program exports a list of baseline, calculated and their percent difference for various field size and beam modifier combinations. The program is quite sensitive to beam data modification. A slight modification such as 1% change in MU or a 1mm shift in isocenter from their baseline configuration produced an identifiable change in the sum of the dose grid.

Conclusions: Our in-house software successfully automates the TPS QA process. It maximizes the benefit-vs-cost ratio by providing a highly sensitive constancy check of the TPS beam data while minimizing physicist involvement.