

AbstractID: 4781 Title: The Effect of Total MU, Number of Segments, and Field Size on IMRT Point Dose QA Results

Purpose:

To investigate the relationship between Corvus IMRT treatment plan parameters (total MU, number of segments, and average field size) and point dose QA results (ion chamber measurements and RadCalc independent MU calculation software).

Method and Materials:

The Corvus treatment planning system (TPS) employs a "calibration factor" in its dose calculations. We determined this factor using a set of test plans with an average of 555 MU, 220 segments, and 7.3x7.3cm² equivalent square field size. The TPS was then used to calculate 95 patient plans. Hybrid plans were created by transferring patient plans to a 30x30x18 cm³ solid phantom. A 0.3cc ion chamber and Kodak EDR2 film were placed inside the phantom. The treatment fields were delivered on a Varian 21EX via the QA Mode of Impac Multi-Access R&V system. For each plan, dose to the isocenter was calculated with RadCalc and compared to the plan's prediction. Ion chamber and RadCalc percent error values versus total MU, number of segments, and field size are plotted and analyzed with the Pearson's product moment correlation coefficient.

Results:

The data indicate that for this equipment configuration, both ion chamber measurement and independent calculation percent error results are directly proportional to total MU, number of segments, and average field size. In general, RadCalc predicts a smaller percent error than ion chamber measurements for all three variables. For ion chamber measurement, field size produces the strongest positive correlation with percent error and MU the weakest. For RadCalc percent error, number of segments produces the strongest correlation and field size the weakest.

Conclusion:

For the Corvus TPS, the measured dose percent error increases as the total MU, number of segments, and field size increases beyond the average value used to determine the calibration factor. RadCalc independent MU calculation software predicts the same trend.