Purpose: Analyze the calibration data, beam data and RPC dosimeter checks of x-ray and electron beam data at the University of Rochester Medical Center over a three year period. The goal is to assess the accuracy and precision of patient dose delivery at the four radiation therapy sites in the system.

Methods: The University of Rochester Medical Center operates a total of six dual-energy Varian accelerators which have had their beam characteristics matched. Dose output is determined using four Exradin model A12 ion chambers. The values of the dose calibration factors defined by the Task Group 51 report are determined annually, where they exhibit small variations year-to-year and machine-to-machine. These variations are anticipated to be due predominately to measurement uncertainties. A study was initiated to extract useable standard values, as a means of improving our overall calibration uncertainty. We report on the measurements of the TG-51 factors and an appropriate standard set of values determined from that data, for photon beams of 6 and 16 MV and for electron beams of 6, 9, 12, 16, and 20 MeV. Independent calibration measurements using the Radiological Physics Center’s services are correlated with our analysis to shed light on how using a standard set of chamber factor values affects overall calibration uncertainty.

Results: The TG-51 parameters vary typically by less than 0.5%. The x-ray and electron beam characteristics vary by an average of 0.5% and the RPC dosimeter results averages are less than 2%.

Conclusion: As a member of the Radiation Therapy Oncology Group, the University of Rochester data undergoes rigorous quality assurance through annual internal and external audits. Using standard values for TG-51 factors, the dose delivery is accurate to between 1.5 to 2%, excluding uncertainties in the treatment planning systems.