

AbstractID: 2775 Title: A practical method evaluating the effectiveness of the existing vault shielding for IMRT

Purpose: To re-evaluate shielding of the existing linac vault due to the recent implementation of IMRT in a community center. While the prescribed dose per fraction to the treatment volume remains the same, IMRT delivery requires a much higher number of monitor units (MU). It is estimated that the required number of MU needed for IMRT treatment increases by a factor of two to five over conventional techniques. This increase in MU per fraction has a direct impact on the shielding of the vaults used to deliver IMRT.

Method and Materials: Two methods were used for the evaluation. The first method incorporated a radiation survey, a modified Modulation Scaling Factor (MSF_{mod}) and a gantry use factor. The results were compared to the current regulatory guidelines. The second method analyzed the area and personnel film badges, by reviewing the records of the area and personnel radiation monitoring for a two year period. During the first year, the prostate patients received only conventional 3D treatments with 15MV photons. In the second year, IMRT utilizing 6MV photons was offered to all prostate patients. The area monitors were placed on the door to the vault. Technologists assigned to this vault before and after IMRT introduction were also identified

Results: Radiation exposure results of the area and personnel monitoring decreased from the first year to the second, due to reduced production of neutrons from the decrease in use of 15MV photons. Radiation surveys identified two previously unidentified areas of radiation levels above background, but not in excess of the regulatory limits for radiation exposure.

Conclusion: The radiation survey demonstrated that the existing shielding was effective for the increased IMRT workload. Standard personnel and area dosimeters, available from commercial dosimetry vendors, can also be used effectively to demonstrate and document continued compliance with evolving treatment modalities.