

AbstractID: 3488 Title: Comparative Workloads for Four Multi-modality Linacs in Two Facilities

Purpose: Physicists performing radiation shielding calculations and post- construction surveys conservatively assume linacs will be used at highest energy (23X) and largest field sizes (FS) $(40\text{ cm})^2$ for equal times at primary angles (PA) $(0^0, 90^0, 180^0, \text{ and } 270^0)$. Intensity modulated radiation therapy (IMRT) use challenges these assumptions. How are linacs used in IMRT programs?

Materials and Methods: From patient records, we performed a daily workload analysis for four linacs in two facilities. Facility X, a Veterans Affairs (VA) hospital, Varian 2100C, has no IMRT program and treats male patients with standard methods. Facility Y, a university hospital, treats male and female patients with three Varian 21EX linacs. Linac B treats conventional non-IMRT patients, C treats conventional and IMRT prostate patients, and D treats IMRT head and neck patients, conventional patients, and patients requiring 6X total body irradiation. This unit was analyzed excluding (D-NoTBI) and including (D-TBI) TBI treatments.

Results: Results are presented as follows: VA, B, C, D-NoTBI, and D-TBI. Daily ports and patients were: (165, 47); (78, 28); (98, 30); (77, 19); (86, 20). Daily beam times (min) were: 30, 15, 21, 25, and 55. Modality uses (6X, 18 or 23X, EB) were: (16%, 81%, 3%); (37%, 59%, 4%); (40%, 57%, 3%); (85%, 15%, 0%); (86%, 14%, 0%). Minimum, average, and maximum FS, excluding TBI, were similar $(6\text{ cm})^2$, $(14\text{ cm})^2$, and $(23\text{ cm})^2$. Use at other than PA varied from a minimum (VA; 9%) to a maximum (D NoTBI; 48%). Data for average depths and doses will be presented.

Conclusions: A 50% 6X IMRT use decreased, by 50%, patients treated daily but beam time decreased only 15%. 6X use increased to 85% and non-PA use increased by 48%. 6X TBI treatments can double beam use. Consequences for facility designs, programs, and radiation surveys will be presented.