

**Purpose** Due to the limited machine availability, a clinical decision has to be made as whether a patient can be treated on a different machine of the same nominal energies. This work investigates the feasibility of switching patients between machines for IMRT.

**Method and Materials:** We have performed Monte Carlo simulations of photon beam from different models and different vendors' clinical accelerators. Treatment plans of Siemens Primus, Primart and Varian-21Ex accelerators and tumor sizes are studied including prostate and head and neck tumors. We have compared the maximum, minimum and mean dose to the target and to the critical structures, and the tumor-control-probability to determine the possibility to switch a patient or cancel the treatment.

**Results:** In FCCC, three attuned Primus linacs can be used one set of beam data for commissioning the treatment planning systems, while Primart and two Varain-21Ex linacs have different beam data. Our results show that the two Siemens machine models share similar features. The dose difference at the minimum dose point for Primus is 2% higher than Primart. Owing to a larger beam penumbra for Varian machines, it appeared a cold spot at the target, but more volume at higher dosages to the surrounding structures. To reduce the cold spot, a factor of 1.042 can be used to increase the MUs. The TCP results show that treating a patient with slightly less accurate dose is generally better than canceling the treatment.

**Conclusions:** Patients can be safely treated using same nominal energy photon beams on linacs of the same model and vendor; small differences are found between different vendors, which may be compensated by adjusting MUs to ensure target coverage. It is generally more therapeutically beneficial to switch a patient to a different machine than to cancel a treatment.