Purpose: The purpose of radiation shielding is to reduce the effective equivalent dose from a medical linear accelerator (LINAC) to a point outside the room to a level determined by individual state/international regulations. The study was performed to design LINAC's room for newly planned radiotherapy centers.

Methods: Optimized shielding calculations were performed for LINACs having maximum photon energy of 20 MV based on NCRP 151. The maximum permissible dose limits were kept 0.04 mSv/week and 0.002 mSv/week for controlled and uncontrolled areas respectively by following ALARA principle. The planned LINAC's room was compared to the already constructed (non-optimized) LINAC's room to evaluate the shielding costs and the other facilities those are directly related to the room design.

Results: In the evaluation process it was noted that the non-optimized room size (i.e., 610 x 610 cm² or 20 feet x 20 feet) is not suitable for total body irradiation (TBI) although the machine installed inside was having not only the facility of TBI but the license was acquired. By keeping this point in view, the optimized INAC's room size was kept 762 x 762 cm². Although, the area of the optimized rooms was greater than the non-planned room (i.e., 762 x 762 cm² instead of 610 x 610 cm²), the shielding cost for the optimized LINAC's rooms was reduced by 15%. When optimized shielding calculations were re-performed for non-optimized shielding room (i.e., keeping room size, occupancy factors, workload etc. same), it was found that the shielding cost may be lower to 41%.

Conclusions: In conclusion, non-optimized LINAC's room can not only put extra financial burden on the hospital but also can cause of some serious issues related to providing health care facilities for patients.