

عنوان مقاله:

A Study of the Impact of TRS-483 Recommended Correction Factors for Dosimetry of Small Fields in Flattening Filter Free Beams used in TrueBeam Linear Accelerators

محل انتشار:

مجله فیزیک پزشکی ایران، دوره 18، شماره 3 (سال: 1400)

تعداد صفحات اصل مقاله: 9

نویسندگان:

Gopinath Mamballikalam - 1. R&D, Bharathiar University, Coimbatore, Tamilnadu, India ۲. Aster Medcity, Kochi, Kerala, India

Senthil kumar - Rajaji Hospital & Madurai Medical College, Madurai, Tamilnadu, India

Clinto C.O - Aster Medcity, Kochi, Kerala, India

Jaon bos R.C. - Aster Medcity, Kochi, Kerala, India

Ahamed Basith P.M. - Aster Medcity, Kochi, Kerala, India

خلاصه مقاله:

Introduction: To study the effect of the International Atomic Energy Agency (IAEA) TRS-483 recommended beam quality correction factor in reference dosimetry and to examine the recommended field output correction factor for relative dosimetry of 6-MV flattening filter free (FFF) small fields, used in a Varian TrueBeam linear accelerator (LINAC). Material and Methods: The beam quality and field output correction for 6-MV FFF beams were adopted from the TRS-483 protocol. Monte Carlo (MC) simulation of the output factor was performed using the PENELOPE-based PRIMO software and compared with the TRS-483 corrected output factors. Two analytical anisotropic algorithm (AAA) models in the Eclipse™ treatment planning system (TPS) were created; one with an output factor taken as the ratio of meter readings and one with an output factor obtained by multiplying the TRS-483 correction factor by the ratio of meter readings. Besides, box field and dynamic conformal arc (DCA) plans were created for both AAA models for verification and validation. The patient-specific quality assurances (QA) for ten different targets were performed, and deviations between the measured and TPS-calculated point doses in both models were examined. Results: Separate beam quality correction factors for FFF beams in the TRS-483 protocol only resulted in an improvement of 0.1% in reference dosimetry. The TRS-483 corrected output factor was in a better agreement with the MC-calculated output factor. For a patient-specific QA of DCA plans, the output factor-corrected AAA dose calculation algorithm showed a better agreement between the measured and simulated doses. Also, there was a smaller deviation (1.2%) for the smallest target of 0.23 cc (8 mm equivalent sphere diameter) used in this study. Conclusion: The field output factors for the LINAC small beams can be improved by incorporating the TRS-483 correction factors. However, the extent of improvement that can be expected depends on the source model of the calculation algorithm and how these well-generalized corrections are suitable for user beams and detectors.

کلمات کلیدی:

FFF Beams TRS, 483 Linear Accelerator Small Field Dosimetry

