

## ABSTRAK

*Linear Accelerator (LINAC)* sebagai alat utama radioterapi modern harus menjalani program *Quality Control (QC)* secara rutin untuk memastikan performa alat tetap sesuai standar. Penelitian ini bertujuan untuk menganalisis pelaksanaan *quality control* harian pada pesawat LINAC Varian Clinac-CX di Unit Onkologi Radiasi RSUD Bali Mandara serta mengevaluasi kesesuaian hasil pengujian terhadap standar toleransi yang direkomendasikan oleh *American Association of Physicists in Medicine (AAPM)* Task Group 142 dan Verifikasi Dosis Absolut Bulanan berdasarkan TRS 398. Penelitian ini menggunakan metode kuantitatif deskriptif dengan pendekatan retrospektif dan observasi langsung. Data diperoleh dari hasil pengukuran QC harian selama periode 1 April hingga 30 April 2026. Parameter yang dianalisis meliputi aspek keselamatan, aspek mekanik, serta aspek dosimetri berupa *output constancy* berkas foton dan elektron. Hasil penelitian menunjukkan bahwa seluruh parameter keselamatan berfungsi dengan baik selama periode pengamatan. Parameter mekanik menunjukkan deviasi maksimum sebesar 2 mm yang masih berada dalam batas toleransi TG-142. Pengukuran *output constancy* foton dan elektron menunjukkan deviasi berkisar antara -1,60% hingga 2,62%, masih berada dalam batas toleransi  $\pm 3\%$ . Hasil pengukuran dosimetri absolut bulanan untuk energi foton 6 MV dan 10 MV menunjukkan nilai deviasi masing-masing sebesar -0,03% dan -0,03%, yang mengindikasikan kestabilan keluaran radiasi yang sangat baik. Berdasarkan hasil penelitian dapat disimpulkan bahwa pelaksanaan *quality control* harian pada pesawat LINAC Varian Clinac-CX di RSUD Bali Mandara telah memenuhi standar AAPM TG-142. Kinerja sistem keselamatan, mekanik, dan dosimetri menunjukkan kondisi yang stabil dan konsisten sehingga mendukung keamanan serta kualitas pelayanan radioterapi.

**Kata kunci:** *Quality Control* Harian, Dosis Absolut, LINAC Varian Clinac-CX, Dosimetri.

## ABSTRACT

*The Linear Accelerator (LINAC), as the primary equipment used in modern radiotherapy, requires routine Quality Control (QC) procedures to ensure accurate radiation delivery, treatment effectiveness, and patient safety. This study aimed to analyze the implementation of daily quality control on the Varian Clinac-CX LINAC at the Radiation Oncology Unit of Bali Mandara Regional General Hospital and to evaluate compliance with the tolerance standards recommended by the American Association of Physicists in Medicine (AAPM) Task Group 142. Monthly Absolute Dose Verification was also assessed based on the IAEA TRS-398 protocol. This study employed a descriptive quantitative method using a retrospective approach and direct observation. Data were obtained from daily QC measurements conducted from April 1 to April 30, 2026. The analyzed parameters included safety systems, mechanical performance, and dosimetric characteristics, including photon and electron beam output constancy. The results demonstrated that all safety parameters functioned properly throughout the observation period. Mechanical parameters showed a maximum deviation of 2 mm, remaining within the tolerance limits specified by AAPM TG-142. Measurements of photon and electron beam output constancy exhibited deviations ranging from  $-1.60\%$  to  $2.62\%$ , which remained within the acceptable tolerance limit of  $\pm 3\%$ . Monthly absolute dosimetry measurements for 6 MV and 10 MV photon beam energies showed deviations of  $-0.03\%$  and  $-0.03\%$ , respectively, indicating excellent radiation output stability. In conclusion, the implementation of daily quality control and monthly absolute dose verification on the Varian Clinac-CX LINAC at Bali Mandara Regional General Hospital complied with AAPM TG-142 and IAEA TRS-398 standards. The safety, mechanical, and dosimetric systems demonstrated stable and consistent performance, supporting the delivery of safe and high-quality radiotherapy services.*

**Keywords:** Daily Quality Control, Absolute Dose Verification, Varian Clinac-CX LINAC, Dosimetry.