

**EVALUASI KUALITAS PERENCANAAN DOSIS
3D BRAKITERAPI KANKER SERVIKS
DALAM PENENTUAN PANDUAN STANDAR
DI RUMAH SAKIT UNIVERSITAS ANDALAS**

SKRIPSI



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FAKULTAS MATEMATIKA DAN ILMU PENGETAHUAN ALAM
UNIVERSITAS ANDALAS
PADANG**

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**Karya tulis sebagai salah satu syarat
untuk memperoleh gelar Sarjana Sains
dari Universitas Andalas**



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ABSTRAK

Penelitian tentang evaluasi kualitas perencanaan brakiterapi kanker serviks berbasis CT Simulator telah dilakukan di Instalasi Onkologi Radiasi Rumah Sakit Universitas Andalas (RS UNAND). Penelitian bertujuan menentukan tingkat kesesuaian perencanaan dosis brakiterapi terhadap batas dosis konsensus *American Brachytherapy Society* (ABS) dan protokol EMBRACE I serta menganalisis variasi kualitas perencanaan berdasarkan dokter penanggung jawab pelayanan (DPJP) dan skema fraksinasi sebagai dasar penyusunan panduan standar perencanaan brakiterapi di RS UNAND. Penelitian menggunakan 52 data perencanaan dosis pasien kanker serviks stadium IIB–IVA periode 2024 – 2025 yang diperoleh dari *Treatment Planning System* (TPS) Oncentra. Parameter yang dianalisis meliputi D90 *High Risk Clinical Target Volume* (HR-CTV) dan D_{2cc} *Organ at Risk* (OAR) melalui *Dose Volume Histogram* (DVH). Nilai dosimetri dikonversi ke *Equivalent Dose in 2 Gy Fractions* (EQD2) kemudian dibandingkan dengan batas dosis konsensus ABS dan protokol EMBRACE I. Hasil penelitian menunjukkan 50 dari 52 pasien memenuhi batas D90 HR-CTV berdasarkan konsensus ABS sedangkan seluruh pasien memenuhi batas protokol EMBRACE I. D_{2cc} kandung kemih memenuhi batas pada 40 dari 52 pasien sedangkan D_{2cc} rektum memenuhi batas pada 15 dari 52 pasien berdasarkan kedua acuan. Variasi capaian OAR ditemukan antarkelompok DPJP sedangkan D90 HR-CTV menunjukkan tingkat kesesuaian yang konsisten. Kelompok 5 fraksi menunjukkan capaian dosimetri yang lebih baik dibandingkan kelompok 4 fraksi. Hasil evaluasi menunjukkan bahwa kualitas dosis target telah sesuai dengan acuan sedangkan pembatasan dosis OAR, terutama rektum masih perlu diperhatikan dalam perencanaan. Hasil tersebut dapat menjadi dasar penyusunan rekomendasi standar perencanaan brakiterapi berbasis CT Simulator di RS UNAND.

Kata kunci: *American Brachytherapy Society* (ABS), brakiterapi, *Dose Volume Histogram* (DVH), *European Study on MRI-Guided Brachytherapy in Locally Advanced Cervical Cancer I* (EMBRACE I), kanker serviks

EVALUATION OF THE QUALITY OF 3D BRACHYTHERAPY DOSE PLANNING FOR CERVICAL CANCER IN DETERMINING STANDARD GUIDELINES AT ANDALAS UNIVERSITY HOSPITAL

ABSTRACT

A study evaluating the quality of CT Simulator-based brachytherapy planning for cervical cancer was conducted at the Radiation Oncology Installation of University Andalas Hospital (RS UNAND). The study aimed to determine the level of compliance of brachytherapy dose planning with the dose limits of the American Brachytherapy Society (ABS) consensus and the EMBRACE I protocol, as well as to analyze variations in planning quality based on doctors responsible for patient care (DPJP) and fractionation schemes as a basis for developing standard guidelines for brachytherapy planning at RS UNAND. The study used 52 dose planning data from cervical cancer patients with stages IIB–IVA during 2024–2025 obtained from the Oncentra Treatment Planning System (TPS). The analyzed parameters included D90 of the High-Risk Clinical Target Volume (HR-CTV) and D2cc of organs at risk (OAR) using the Dose Volume Histogram (DVH). The dosimetric values were converted to Equivalent Dose in 2 Gy Fractions (EQD2) and compared with the dose limits of the ABS consensus and EMBRACE I protocol. The results showed that 50 of 52 patients met the D90 HR-CTV limit based on the ABS consensus, while all patients met the limit based on the EMBRACE I protocol. The D_{2cc} bladder limit was met by 40 of 52 patients, while the D_{2cc} rectum limit was met by 15 of 52 patients based on both references. Variations in OAR dose attainment were found among DPJP groups, while D90 HR-CTV showed a relatively consistent level of compliance across the groups. The 5-fraction group showed better dosimetric attainment than the 4-fraction group, based on D90 HR-CTV, D_{2cc} bladder, and D_{2cc} rectum. However, this difference cannot be used to establish the 5-fraction scheme as a standard because dosimetric attainment may also be influenced by patient characteristics, anatomical conditions, applicator position, contouring process, and treatment planning optimization. The evaluation results may serve as a basis for developing standard recommendations for CT Simulator-based brachytherapy planning at RS UNAND, considering D90 HR-CTV and D_{2cc} OAR evaluation, dose limits, EQD2 conversion, contouring, and dose distribution optimization.

Keywords: American Brachytherapy Society (ABS), brachytherapy, cervical cancer, Dose Volume Histogram (DVH), European Study on MRI-Guided Brachytherapy in Locally Advanced Cervical Cancer I (EMBRACE I)