Procedural Competency in Brachytherapy: Stepping Beyond Case Minimums

Fara Dayani, MD, MAS

Brachytherapy is one of the foundational treatment modalities in radiation oncology. It is an integral component of management across multiple disease sites in the definitive, adjuvant, and recurrent settings. During residency, we gain early and consistent exposure to external beam radiation therapy, developing proficiency in simulation, treatment planning, and patient management.

In contrast, brachytherapy requires a distinct educational approach rooted in technical skill acquisition, real-time procedural decision-making, and the cultivation of procedural competency. Mastery is achieved through a strong cognitive foundation, simulation-based learning, supervised clinical performance, graduated autonomy, and competency-based assessment.

The educational landscape in brachytherapy is heterogeneous,[1-3] with marked variability across training programs driven by differences in patient volume, faculty expertise, institutional practice patterns, and procedural exposure. Current procedural minimums set by the Accreditation Council for Graduate Medical Education (ACGME) represent an important step toward defining baseline expectations for training. These minimums are accompanied by case log forms that deconstruct each procedure into discrete components, spanning from pre-procedure history and physical examination to appropriate post-procedure management.[4]

Notably, the minimum required number of interstitial brachytherapy cases increased from 5 to 7 beginning in the 2023-2024 academic year. However, numerical thresholds may not serve as an adequate measure of technical fluency, procedural competency, or readiness for independent practice.

The variability of resident experience in brachytherapy is reflected in the national trends in brachytherapy procedure volumes. ACGME reports for academic years 2017-2025 demonstrate a national mean of approximately 50 intracavitary brachytherapy cases, with standard deviations ranging from 32 to 45 cases (60%–85% of the national mean), indicating substantial dispersion in case exposure.[5] A similar pattern is observed for interstitial brachytherapy procedures, suggesting markedly different procedural exposure among residents, despite satisfying minimum requirements.[5]

This is further supported by the findings of Basree et al[6] regarding perceived confidence levels of graduating radiation oncology residents from 2020 to 2024 with different treatment techniques. They found that only 25.7% and 22.6% of graduating radiation oncology residents reported comfort in independently performing high-dose

Dr Dayani is a senior radiation oncology resident at Kaiser Permanente Los Angeles Medical Center. Her clinical and academic interests are management of genitourinary and gynecological malignancies, brachytherapy, and medical education.

Disclosures: The author has no conflicts of interest to disclose. None of the authors received outside funding for the production of this original manuscript and no part of this article has been previously published elsewhere.
Corresponding author: Fara Dayani, MD, MAS, Department of Radiation Oncology, Kaiser Permanente Los Angeles Medical Center Graduate Medical Education, Los Angeles, CA, USA. (faradayani2022@gmail.com, faradayani2@gmail.com)

https://doi.org/10.37549/ARO-D-26-0001

rate and low-dose rate prostate brachytherapy, respectively, upon completion of residency.

The findings above underscore the importance of incorporating structured, competency-based frameworks into brachytherapy training, in which clearly defined training objectives are mapped to developmental milestones, linked to graduated levels of entrustment, and evaluated using appropriate assessment tools, rather than procedural minimums.

The Joint ABS/GEC-ESTRO Consensus Statement on the objectives of training in brachytherapy for physicians represents a meaningful step in this direction, outlining comprehensive knowledge domains and procedural skills required for safe practice.[7] This approach enables programs to determine whether a resident can perform a procedure safely and effectively.

Competency-based training and assessment does not eliminate the challenges posed by institutional differences in procedural volume and exposure. Therefore, individual training programs must identify and address these gaps. For those in need of additional brachytherapy experience, regional collaborations, external rotations, and initiatives such as the American Brachytherapy Society's "300 in 10" program provide valuable opportunities to supplement training.

As practice patterns continue to evolve, it is essential to ensure equitable access to brachytherapy expertise. This requires standardizing the training curriculum, strengthening procedural competency through meaningful assessment, and creating intentional pathways to further develop and maintain procedural competency.

References

1) Donnelly ED, Sachdev S, Zhang H, et al. Development of a gynecologic brachytherapy curriculum and simulation modules to improve radiation oncology trainees' skills and confidence. *Brachytherapy*. 2020;19(6):732-737. doi: 10.1016/j.brachy.2020.09.016

2) Williams VM, Mansoori B, Young L, et al. Simulation-based learning for enhanced gynecologic brachytherapy training among radiation oncology residents. *Brachytherapy*. 2021;20(1):128-135. doi:10.1016/j.brachy.2020.08.022

3) Fields EC, Kahn JM, Singer L. Education in gynecological brachytherapy. *Int J Gynecol Cancer*. 2022;32(3):407-413. doi:10.1136/ijgc-2021-002516

4) Accreditation Council for Graduate Medical Education. *Brachytherapy direct observation form*. Accessed February 12, 2026. https://www.acgme.org/globalassets/430_Brachytherapy_DirectObservForm.pdf

5) Accreditation Council for Graduate Medical Education. *Case log statistical reports: radiation oncology*; 2024. Accessed February 12, 2026. https://www.acgme.org

6) Basree MM, MacDuffie E, LeCompte M, et al. Trends in program satisfaction and perceived confidence levels among United States radiation oncology residents: a 5-year aggregate analysis of the 2020-2024 association of residents in radiation oncology graduating resident survey. *Int J Radiat Oncol Biol Phys*. 2025;123(1):28-42. doi:10.1016/j.ijrobp.2025.03.035

7) Keyes M, Sturdza AE, Crook J, et al. Joint ABS/GEC-ESTRO consensus statement on the objectives of training in brachytherapy for physicians. *Brachytherapy*. 2025;24(5):631-643. doi:10.1016/j.brachy.2025.05.006