

# Closing the Global Brachytherapy Training Gap With Virtual Reality

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Brachytherapy is among the most consequential procedures residents learn to perform during their training. It is also one of the most technically complex. Mastery demands hands-on repetition, close mentorship, and sufficient case volume. All 3 can be difficult to guarantee, whether you train in a high-resource setting with declining referrals or in a low- or middle-income country where only a handful of clinicians may serve millions of patients.

The stakes are not abstract. Cervical cancer remains a leading cause of cancer death in women worldwide, and outcomes are sensitive to brachytherapy quality. The 2024 Lancet Oncology Commission on Radiotherapy and Theranostics was unambiguous: gaps in access to high-quality brachytherapy are significant, preventable contributors to avoidable mortality.<sup>1</sup> Building new infrastructure matters, but without parallel investment in education, we risk scaling capacity without scaling competence.

The International Atomic Energy Agency (IAEA) is working to close this gap. Its Rays of Hope: Cancer Care for All initiative, launched in 2022, coordinates with Rays of Hope Anchor Centres—established regional hubs for oncology training, research, mentorship, and quality assurance—to expand capacity outward.<sup>2</sup> The IAEA's Nucleus initiative uses scalable digital tools, including virtual reality (VR), to facilitate workforce development.<sup>3</sup>

With the global radiation therapy workforce needing to grow by more than 60% by 2050 and

brachytherapy training a recognized bottleneck, the case for technology-assisted education is compelling. In 2025, the IAEA equipped all Rays of Hope Anchor Centres with VR headsets loaded with a harmonized gynecological radiation therapy training curriculum developed by a global team of experts.<sup>3</sup>

For those of us in residency, including well-resourced programs, tools like these provide highly valuable learning opportunities, especially as brachytherapy volumes decline. Integrating VR-based introductory modules into residency curricula could potentially standardize foundational learning and build procedural confidence before trainees ever enter the suite.

The evidence base for simulation in procedural training is well established across other specialties—brachytherapy should be no different. Although a standardized VR module will not capture the full spectrum of complexities encountered by a brachytherapist, such as managing a patient in distress or navigating a difficult consent conversation, it can allow trainees to rehearse the technique in a risk-free environment and arrive to real-world procedures feeling more confident and prepared.

Brachytherapy is an essential component of radiation oncology care, and the increasing demand for brachytherapy expertise makes expanding access to high-quality training a global priority. VR can play an important role in bridging existing skill gaps by simulating the procedural experience that might not otherwise be possible.



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**Disclosures:** The authors have 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.

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Ultimately, the goal is a future where a patient in Karachi receives the same quality of brachytherapy as one in Kansas City. Although that reality is still in the distance, residency is exactly the right time to start building the path there using the tools that are available.

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## References

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