2017

Proficiency-Based Cervical Cancer Brachytherapy Training: An Effort to Combat Recent Trends in Radiation Oncology That Result in Worse Outcomes for an Underserved Population through Resident Education

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Proficiency-Based Cervical Cancer Brachytherapy Training: An Effort to Combat Recent Trends in Radiation Oncology That Result in Worse Outcomes for an Underserved Population through Resident Education

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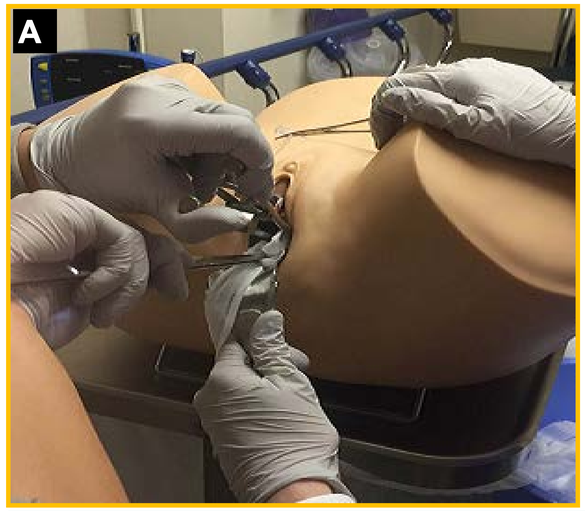
Introduction

- Gynecologic brachytherapy to doses of 80-90Gy result in the highest rates of local control and overall survival [1-2].
- Local recurrence and disease-free survival are impacted by inferior applicator placement [3].
- Across the country there is a decline in utilization of brachytherapy[4].
- Despite the need for adequate cervical BT training in residency, a recent analysis of ACGME case logs was notable for the lack of HDR intracavitary uterus/cervix procedures at some institutions[5].
- The effectiveness of procedural simulation training, especially proficiency-based training, has been well established in other medical specialties, but rarely employed in radiation oncology[6-10].
- **There is no simulation training for cervical cancer brachytherapy used anywhere else in the country at this time.**
- We developed and implemented a proficiency-based cervical BT simulation curriculum with outcome assessments.

Materials and Methods

- A pelvic model was modified to permit cervical BT.
- Each resident placed tandem and ovoid applicators with attending guidance and again alone two weeks later **(Figure 1).**
- Residents used the brachytherapy board to immobilize the applicator for imaging **(Figure 2).**
- AP and lateral X rays **(Figure 3)** were taken of the pelvic model and we evaluated applicator placement quality using the 5 parameters Viswanathan *et al.* established as important for tumor control [3]
    1. **Symmetry**
    2. **Displacement of the ovoids in relation to the cervix**
    3. **Mid-pelvis positioning**
    4. **Bisection of the ovoids by the tandem**
    5. **Appropriateness of packing**
- Other metrics included retention of key procedural details, the time taken for each procedure and pre and post-session surveys to assess confidence.



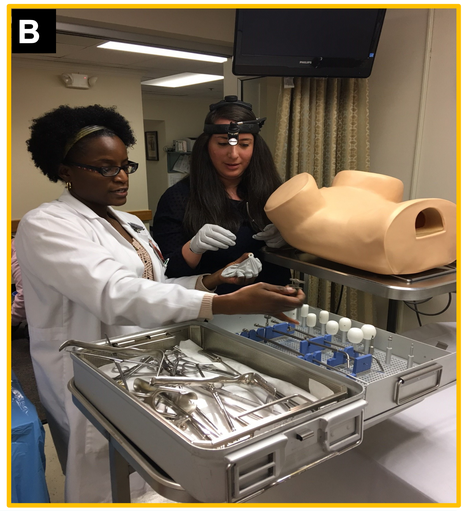
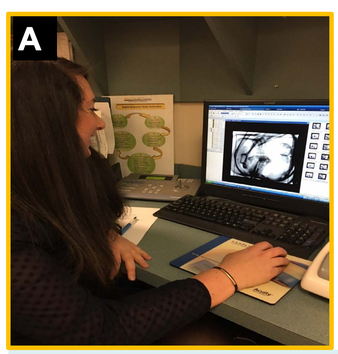


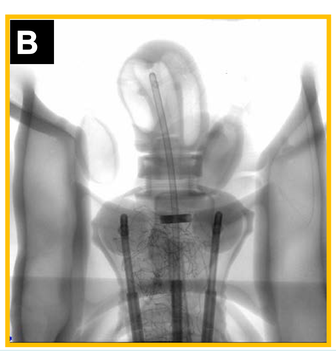
Figure 1: Resident placing applicator in pelvic model with A: guidance from gynecologic attending and B: without attending guidance.

Results

- During the initial session, residents on average met 4.5 out of 5 placement criteria, which improved to 5 the second session.
- Novice residents (n=3) showed the greatest improvement, from 4 to 5, whereas experienced residents (n=5) started at 4.8.
- On average, residents were able to remember 7.6 of the 8 key procedural steps.
- Execution time decreased by an average of 10.5%, with novice residents taking 15.2% and experienced residents 5.6% less time the 2nd session.
- Resident confidence with the procedure improved dramatically.
- All residents strongly agreed that the training helpful and wanted to participate again the following year.

Figure 2: Resident attaching applicator to brachytherapy board





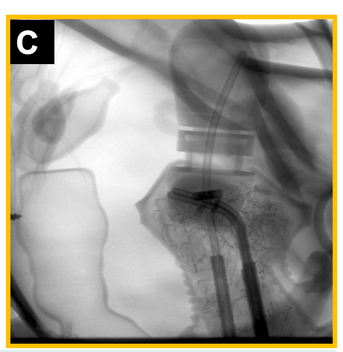


Figure 3: A) Resident evaluating her application in real-time at the planning station. B) AP x-ray and C) lateral x-ray showing a good insertion, meeting all 5 of the "Viswanathan criteria."

Conclusions

- Simulation training plays a crucial role in medical education, but has been underused in radiation oncology.
- Residents participating in this simulation training had measurable improvements in the time to perform the procedure, applicator placement quality and confidence, which translate to fewer complications and better tumor control for patients.
- This training model will allow residents and attendings to become and remain proficient in this technically challenging, but incredibly important skill.
- Currently there are no other simulation models or similar curriculum being implemented in radiation oncology.
- **This simulation training will be able to be modified and replicated at training programs across the country and will be particularly practical for programs with less exposure to gynecologic brachytherapy.**

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