

Conference Abstracts

RO Brain: A Randomized Evaluation of Point-of-Care Clinical Decision Support for Radiation Oncologists

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Purpose/objective

Radiation oncologists, particularly those practicing as generalists in resource-constrained settings, must make time-sensitive clinical decisions across a wide range of disease sites. Traditional educational tools are often fragmented, time-consuming, or difficult to use during clinic. We evaluated whether RO Brain, a mobile clinical decision-support application, improves performance on a realistic, open-resource clinical simulation exam designed to mimic real-world radiotherapy practice.

Materials/methods

We conducted a randomized 2:1 trial of RO Brain versus control among radiation oncology physicians and trainees recruited globally through the nonprofit Rayos Contra Cancer. Participants completed a baseline survey and a 17-minute, timed, open-resource multiple-choice clinical simulation pre-test with randomized question order, designed to mimic real-world radiotherapy clinic decision-making. Participants were then randomized to receive access to RO Brain (intervention) or no access (control). Four weeks later, participants completed a second exam with the same design, drawn from the same question

bank. Each exam included up to 72 questions (no expectation of completion), evenly distributed across disease sites to reflect clinic heterogeneity. Participants were permitted to use any resources during the exam (e.g., textbooks, websites, search engines, AI tools). Correct answers were scored +1, and incorrect answers -1 to emphasize careful clinical decision-making over speed. Pre- and post-test scores were compared within individuals using paired one-tailed t-tests. App analytics objectively measured RO Brain usage during the exam.

Results

Of 178 enrolled participants from 39 countries, 118 were randomized to the intervention arm and 60 to the control. The cohort included 118 radiation oncologists, 20 clinical oncologists, and 40 residents. Among those completing the post-test and survey, 68 were in the intervention arm (36 RO Brain users and 32 non-users), and 41 were in the control arm. Participants who used RO Brain during the exam demonstrated a significant improvement in test performance (mean score 1.8 pre-test to 6.1 post-test; one-tailed $p = 0.0005$). No significant improvement was observed among intervention participants who did not use RO Brain (0.9 to -0.6; $p = 0.2$)

or control participants (4.3 to 5.1; $p = 0.3$). RO Brain also demonstrated high user acceptability, with a mean recommendation score of 8.81/10, and 57 of 68 intervention participants reported regular ongoing use.

Conclusion

In a realistic, open-resource clinical simulation designed to reflect everyday radiotherapy

practice, use of RO Brain was associated with significant improvements in clinical decision-making performance. These findings suggest that time-efficient, point-of-care decision-support tools may meaningfully enhance quality of care in diverse and resource-limited clinical environments.