RADIODIAGNÓSTICO

➢ Longitudinal Remote SBRT/SRS Training in Latin America: A Prospective Cohort Study

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REVISTA: Int J Radiat Oncol Biol Phys 2021 Nov 1;111(3S):e192-e193. doi: 10.1016/j.ijrobp.2021.07.700.

ABSTRACTO: Purpose/objective(s): Opportunities for long-term clinical training in stereotactic technology are scarcely available or accessible. We report the results of upscaling a longitudinal telehealth training course on stereotactic body radiation therapy (SBRT) and stereotactic radiosurgery (SRS) for clinicians in Latin America, after successfully developing a pilot course. Materials/methods: A longitudinal training program on implementing SBRT and SRS was provided to several radiation oncology centers in Peru and Colombia at no cost. The program consisted of regular 1-hour live video conferencing sessions weekly for 4 months with interactive didactics and a cloud-based platform for case-based learning. Participant-reported changes in confidence levels were measured in 16 practical domains of SBRT/SRS, based on 1-to-5 Likert scale levels. Pre- and post-curriculum practical knowledge-based exams were required for participation credit. Participant baseline features, completed pre- and post-curriculum surveys, overall and single professional-group confidence changes, and exam results are analyzed and reported. Results: One hundred and seventy-five different radiotherapy professionals participated. An average of 56 (SD ± 18) attendees per session were registered. Fifty (29.7%) participants completed the pre- and post-curriculum surveys, of which 30% were radiation oncologists (RO), 26% radiation therapists (RTT), 20% residents, 18% medical physicists and 6% neurosurgeons. Significant improvements were found across all 16 domains with overall mean +0.55 (SD ± 0.17, $P < 0.001$) Likert-scale points. Significant improvements in individual competences were most common among medical physicists, RTT and residents. Pre- and post-curriculum exams yielded a mean 16.15/30 (53.8 ± 20.3%) and 23.6/30 (78.7 ± 19.3%) correct answers ($P < 0.001$). Conclusion: Longitudinal telehealth training is an effective method for improving confidence and knowledge on SBRT/SRS amongst radiotherapy professionals. Remote continuing medical education should be widely adopted in lower-middle income countries.

➢ Monte Carlo simulations and phantom validation of low-dose radiotherapy to the lungs using an interventional radiology C-arm fluoroscope

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REVISTA: Phys Med 2021 Dec 31;94:24-34. doi: 10.1016/j.ejmp.2021.12.014.

ABSTRACTO: Purpose: To use MC simulations and phantom measurements to investigate the dosimetry of a kilovoltage x-ray beam from an IR fluoroscope to deliver low-dose (0.3-1.0 Gy) radiotherapy to the lungs. Materials and methods: PENELOPE was used to model a 125 kV, 5.94 mm Al HVL x-ray beam produced by a fluoroscope. The

model was validated through depth-dose, in-plane/cross-plane profiles and absorbed dose at 2.5-, 5.1-, 10.2- and 15.2-cm depths against the measured beam in an acrylic phantom. CT images of an anthropomorphic phantom thorax/lungs were used to simulate 0.5 Gy dose distributions for PA, AP/PA, 3-field and 4-field treatments. DVHs were generated to assess the dose to the lungs and nearby organs. Gafchromic film was used to measure doses in the phantom exposed to PA and 4-field treatments, and compared to the MC simulations. Results: Depth-dose and profile results were within 3.2% and 7.8% of the MC data uncertainty, respectively, while dose gamma analysis ranged from 0.7 to 1.0. Mean dose to the lungs were 1.1-, 0.8-, 0.9-, and 0.8- Gy for the PA, AP/PA, 3-field, and 4-field after isodose normalization to cover ~ 95% of each lung volume. Skin dose toxicity was highest for the PA and lowest for the 4-field, and both arrangements successfully delivered the treatment on the phantom. However, the dose distribution for the PA was highly non-uniform and produced skin doses up to 4 Gy. The dose distribution for the 4-field produced a uniform 0.6 Gy dose throughout the lungs, with a maximum dose of 0.73 Gy. The average percent difference between experimental and Monte Carlo values were -0.1% (range -3% to +4%) for the PA treatment and 0.3% (range -10.3% to +15.2%) for the 4-field treatment. Conclusion: A 125 kV x-ray beam from an IR fluoroscope delivered through two or more fields can deliver an effective low-dose radiotherapy treatment to the lungs. The 4-field arrangement not only provides an effective treatment, but also significant dose sparing to healthy organs, including skin, compared to the PA treatment. Use of fluoroscopy appears to be a viable alternative to megavoltage radiation therapy equipment for delivering low-dose radiotherapy to the lungs.