Research abstract example

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Assessment of Adaptive Margins Using a Single Planning Computed Tomography Scan for Bladder Radiotherapy

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Purpose: A novel 'plan of the day' (PoD) adaptive radiotherapy approach is presented for bladder cancer patients. The PoD strategy has been used to reduce planning margins and lower integral dose to healthy tissue. Until now, bladder PoD schemes have used planning computed tomography (pCT) plus cone-beam CT (CBCT) data acquired during initial treatments, or multiple pCTs to delineate a library of PTVs and create a corresponding library of treatment plans for PoD selection. Here, we assess a less resource intensive PoD approach to adaptive treatment of bladder cancer.

Methods: One pCT was used to delineate a clinical target volume (CTV), which is used to create a library of five planning target volumes (PTVs), using simple margin expansion/contraction tools, and five corresponding treatment plans. Retrospective offline simulation of the proposed adaptive approach was performed using pCT and daily CBCT datasets from eight previously treated bladder cancer patients. Three radiation therapists individually simulated a treatment process by rigidly registering daily CBCTs to the pCT and selecting the smallest PTV possible that covered the prostate as seen in the CBCT. Post-simulation analysis measured the selection frequency of PTVs within the library and estimated the dosimetric impact on CTV coverage, as defined in each CBCT (CTVCBCT) and bowel bag sparing. Dosimetry was compared between the adaptive protocol and standard treatment using a uniform isotropic 2.0cm planning margin.

Results: With respect to daily CTV coverage, the percent volume of CTVCBCT receiving 95% of the prescription dose (V95%) was ≥ 98% for all CBCTs, although a statistically significant overall difference between the adaptive protocol and standard treatment was not found due to the small sample size. Absolute volumes of bowel bag receiving ≥ 55Gy (V55Gy) and normal tissue treated with ≥ 95% prescription dose (V95%) were significantly lower when using the PoD technique , resulting in a mean reduction of 115cm3 and 264cm3, respectively. The most common PTV sizes selected were the 1.0cm margin size (70%), 1.0/1.5cm margin size (20%) and the 1.5cm margin size (8%).

Conclusion: Although a reasonable conclusion comparing coverage of bladder using adaptive margins could not be established due to small sample size, coverage was demonstrated on every individual CBCT assessed, suggesting that a single pCT may be used to generate appropriate PTVs for PoD selection.

Practice Innovation/Initiative abstract example

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Certifiable: Development and Piloting of a National Advanced Practice Certification Process for Radiation Therapists in Canada

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Aim: An advanced practice (AP) certification process for radiation therapists (RTTs) was developed by the Canadian Association for Medical Radiation Technologists to set the bar for a recognized and transferable AP designation in Canada.

Process: An externally-facilitated blueprinting exercise was undertaken for the AP competency profile originally built in Ontario, to evaluate its validity nationally. Eighteen competency items fell under three core competency areas: clinical (n=8), technical (n=2), and professional competencies (n=8, subdivided under leadership, research, and education). These were agnostic of disease site or technical specialty, focusing on the knowledge and skills traversing all areas; such as 'assessment of the patient's physical condition', 'prescription/dispensing of correct pharmaceutical from defined and approved formulary', and 'leading the ongoing development of best professional practices using evidence-based approaches'. A weighting system was developed for the competencies based on two criteria; the frequency with which RTTs would expect to engage in that competency, and the criticality of performing the task competently. External consultation provided a shortlist of competency assessment methods commonly employed by credentialing bodies (i.e., testing knowledge, ability to apply knowledge, communication skills), and each rated according to feasibility and psychometric properties. A three-phased certification process was chosen to ensure a comprehensive AP certification process: Phase 1: professional portfolio, Phase 2: patient case log, Phase 3: virtual case-based oral examination. This process was piloted with three candidates in 2016 (two in the palliative specialty, one in head and neck specialty), culminating in oral examinations in June 2016. Each candidate had an APRT Committee advisor to facilitate navigation. Assessors were recruited and trained for each phase. For Phase 3 these included radiation oncologists and medical physicists with subject matter expertise, ensuring the full novel APRT scope of practice was covered

Benefits/Challenges: The pilot project suggested the process was feasible, with face and content validity, but that some efforts were required to standardize Phase 1 and 2 submission templates, address Phase 3 technology limitations, and improve communication of requirements throughout.

Impact/Outcomes: The new APRT Certification Process will be accepting applications in 2017.