which, if inaccurate, could lead to issues during beam optimization and dose delivery. Ideally, errors that are easily seen by the human eye should be caught and addressed before approval. One error that may go undetected is missing slices in the superior aspects of the mandible, including the ramus, coronoid process, or condylar process; either unilaterally or bilaterally. The goal of this study was to demonstrate that an automated method is capable of detecting missing slices in mandible contours while minimizing false positive results.

Materials/Methods: A dataset consisting of 40 unique images was acquired across multiple institutions. Each image was segmented by an expert physician and each structure set contained a contour for the mandible. These 40 segmentations were then independently reviewed to count how often slices were missed on one or both sides of the mandible. An automated program was developed in commercially available software to detect and report when this instance occurred on axial slices. The program was run over the same dataset, and all error detections were recorded. The errors detected by the program were then cross-checked with the independent review results.

Results: During the manual review, 3 of the 40 mandible contours (7.5%) were found to have skipped axial slices unilaterally or bilaterally. The automated program detected all 3 errors, but also found 5 false positives. This resulted in an initial sensitivity / specificity of 100% / 88.1%.

Conclusion: Upon further inspection of the false positives, 4 were caused by the presence of stray voxels in the contour. The remaining false positive detected was due to the lower half of the mandible being cut-off by the image field of view before the two halves connected at the midline. While not being the focus of this test, if stray voxels were present in clinical contours, they could also lead to issues and thus should be addressed before treatment. If the process was refined to intentionally detect both missing slices and stray voxels, the results would improve to a final sensitivity / specificity of 100% / 97.1% on this dataset. Future work should be done to refine the process for these detections, investigate similar errors, and repeat the test with a larger dataset. With these promising metrics, an automated contour QA method, such as this, would make any clinical QA process more robust, providing greater treatment efficiency and accuracy.

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Evaluation of Patient and Staff Safety Through Continuous Delivery of Radiation Therapy During COVID-19 Pandemic

J. Asper,[1] J. Viles,[1] M. Fakhreddine,[2] T.D. Wagner,[1] R. Mesa,[1] C. Ramirez,[1] C. Sickora,[3] W. Nordwick,[4] and M.D. Bonnen[1]; [1]*UT Health San Antonio, San Antonio, TX,* [2]*UT Health San Antonio MD Anderson Cancer Center, San Antonio, TX,* [3]*UT Health San Antonio, School of Nursing, San Antonio, TX,* [4]*CTRC, San Antonio, TX, United States*

Purpose/Objective(s): The current COVID-19 (COVID) pandemic has presented many challenges to the treatment of cancer patients. Radiation therapy departments were forced to create new operational workflows that permitted the monitoring of patient's COVID status during continued treatment; while simultaneously protecting the oncology care team. Radiation therapy planning process involves a very complex hand-off workflow between highly skilled care team professionals. The time between initiation of planning and first treatment is critical for optimal treatment outcomes. Insertion of pre-screening of COVID status prior to initiation of therapy could have considerable impact on the overall time between the initiation of planning and initiation of treatment. Our department CT SIM to treatment time average the four months prior to COVID was 8.9 days. Our study aimed to evaluate the effectiveness of our departmental COVID screening process and its effect on the safe delivery of radiation therapy. Further, we investigated if the insertion of a COVID screening process would have a negative impact on the total time to start.

Materials/Methods: Operational workflow changes were set in place to pre-screen all patients prior to the initiation of radiation therapy. Patients presenting with COVID symptoms after initial clearance, were subjected to additional round of COVID testing. These patients were placed in the sequestered protocol until cleared. UT Health San Antonio School of Nursing, with the help of grant supplied by Hyundai, provided COVID testing for all our patients. Quality assurance tracking mechanisms were put into place to track COVID testing and results. COVID positive patients were treated in a clinically sequestered protocol. Positive results were subjected to contact tracing.

Results: Data were collected from April 1, 2020 to December 31, 2020. During this time period, a total of 684 patients underwent COVID testing. A total of 679 patients tested negative. Five patients identified as COVID positive. A total of 18 sequestered radiation treatments were delivered. During the study timeframe a total of 4 care team members tested positive for COVID. All patient and care team contact tracing indicated source of infection was encountered outside of the treatment setting. Average time from initiation of CT simulation order to the resulting of COVID testing was 7.08 days. Average simulation to initiation of treatment during this time period was a total time was 7.7 days an improvement of 1.2 days.

Conclusion: With appropriate protocols and team vigilance; continued delivery of radiation therapy to cancer patients can be achieved. These protocols did not affect the overall time to initiate treatment. Due to more frequent observation of status and a streamlining of process the team was able to reduce cycle time from simulation to initiation of treatment from 8.9 to 7.7 days.

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Statistical Approaches to Optimize QACT Frequency During Proton Therapy: A Single Institution Study

N.C. Biswal, M. Zakhary, R. Mogilnay, E.M. Nichols, M.E. Witek, and B.Y. Yi; *Department of Radiation Oncology, University of Maryland School of Medicine, Baltimore, MD*

Purpose/Objective(s): Patients treated with proton beam therapy (PBT) undergo routine quality assurance CT (QACT) scans during their course of treatment, which determines whether the initial plan remains accurate for the whole course of treatment or needs to be re-planned based on the findings on their QACTs. The objective of this study is to optimize and reduce the QACT frequency, while maintaining the treatment quality. The benefits of reducing QACT frequency include reducing imaging dose and optimizing use of patient time and staff resources.

Materials/Methods: We performed a retrospective IRB-approved single-institution review of all patients of three anatomical sites (e.g., Brain, Prostate and Head and Neck [HN]), who were treated with PBT between July 2019 and July 2020. The number of patients treated for these three sites, number of QACTs performed, number of patients re-planned and number of re-plans are listed in the table. For each anatomic site, the QACT and re-planning pattern were analyzed to find the optimal frequency of QACTs needed.

Results: Brain: Out of 204 QACTs, 6 (2.9 %) were used for adaptive planning. One patient was re-planned twice. It was found that 3 out of 5 patients were re-planned due to weight loss or anatomical changes. All revision plans were delivered within 7-12 fractions of the treatment. One QACT per patient at the beginning of the second week of the treatment was proposed for the brain patients. **Prostate**: Out of 236 QACTs, 3 (3.6 %) were used for adaptive planning. All three revision plans were delivered within 17-29 fractions of their treatments. Hence, one QACT per patient during the middle of the treatment course was proposed for this group. **HN**: Out of 97 patients, 32 (33 %) underwent adaptive planning on their QACTs. A total of 37 revision plans were made on 437 QACTs, where 8.5% QACTs were used for adaptive planning. Out of 32 patients re-planned, 26 of them were due to either weight loss or anatomy change and/or tumor shrinkage, 4 patients were due to need for a new mask and the remainder due to air density changes within sinuses. The average time between a QACT and the revision plan delivery was five days. Bi-weekly