

AAPM Annual Meeting 2022 Abstract

Title: Development and Maintenance of a Knowledge-Based Planning Quality Assurance Tool for a Statewide Radiation Oncology Quality Consortium

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Purpose: Knowledge-based planning (KBP) has shown to be a valuable quality assurance (QA) tool for assessing treatment plan quality. A drawback of KBP is the creation and maintenance of models can be complex and time consuming. Leveraging large, well-maintained databases and streamlining of the update process could potentially overcome this drawback. This work discusses the experience of updating a lung KBP model originally developed in 2017 based on recent statewide quality consortium data.

Methods: 60 lung cancer patient plans treated during 2021 that met consortium planning goals were collected from 24 institutions with a variety of planning systems. Plan and contour quality were reviewed over 6 hours of video conferences by a group of physicists and dosimetrists, resulting in 47 high quality plans that were used to retrain the 2017 model with an updated cost function. The model was tested by creating VMAT plans for the remaining 13 patients and relevant DVH metrics were compared.

Results: The KBP model created acceptable plans for the 13 remaining patients, maintaining target coverage while often improving upon organ-at-risk doses. Most notably, 69%, 61%, and 77% of the KBP plans improved the mean lung dose, mean heart dose, and spinal canal D0.03cc, respectively. The consortium database was advantageous for the update due to its ability to filter for specific DVH goals, resulting in high quality training plans. Some difficulties discovered during the update were inconsistencies in contour naming conventions, contouring methods, and hot spot planning goals between institutions, causing potential variance in the model.

Conclusion: A multi-institutional KBP model was updated using plans from a statewide consortium and displayed plan improvements in independent plans. With the implementation of additional policies and further web-based plan review tools, the model update process could be further streamlined, resulting in a valuable statewide plan QA tool.