AbstractID: 13382 Title: Open-source tool for assessing variability in DICOM data

Purpose: To develop tools and methodology for analyzing the variability of DICOM attributes in advanced technology radiotherapy treatment planning datasets.

Method and Materials: The POSDA open-source toolkit (www.posda.com) and PostgreSQL database (www.postgresql.org) were used to create a tool for analyzing DICOM datasets, consisting of CT, MR, and PET images, RT Structure Sets, RT Plan, and RT Dose objects. All images and RT objects for a patient were anonymized together to maintain referential integrity. These anonymized datasets were used to populate a database tracking components of each object type; e.g., RT Structure Sets were represented in terms of the ROIs, ROI contours, and ROI observations.

Results: This tool has been used to examine DICOM attributes in datasets submitted to the Image Guided Therapy QA Center from a variety of commercial treatment planning systems. Query parameters include image pixel spacing, the number and type of ROIs in RT Structure Sets, ROI Name, ROI Observation Label, and RT ROI Interpreted Type values, the number of beams and control points in RT Plan objects, and RT Dose grid spacing, The database created by this tool will be used to find inconsistencies in the use of DICOM unique identifiers and DICOM data model, e.g., multiple modalities in a single Series, to assess the use of optional attributes, and to check completeness and referential integrity in clinical trials submissions.

Conclusion: The tool developed in this effort provides an efficient means for studying variability in the content and encoding of DICOM RT treatment planning data. Analyzing clinical trial datasets from a variety of treatment planning systems provides important information for designing data quality assurance tools and will be helpful in developing IHE-RO profiles for improving interoperability among treatment planning systems. Supported in part by NIH U24 grant CA081647.