RT PACS Is Becoming an Indispensable Information System for Clinical Practice and Research in Radiation Oncology

Y. Yan[1], J. Wu[1], W. Lu[1], M. Lin[1], R. Reynolds[1], S. Jiang[1]

[1] Department of Radiation Oncology, University of Texas Southwestern Medical Center, Dallas, Texas, U.S.A.

JULY 12–16 2020 VIRTUAL
JOINT AAPM | COMP MEETING
EASTERN TIME [GMT-4]

INTRODUCTION

Patients often get retreatments of radiation therapy at the same clinic or other clinics. Retrieving digital treatment records in DICOM format is becoming a routine practice, however it can be laborious when plans are archived or the treatment planning system (TPS) has been decommissioned. RT PACS (PACS capable of viewing radiation therapy DICOM objects) is the much needed solution for clinics to efficiently retrieve plan datasets no matter what TPSs they were created from.

AIMS

1. Configure, customize and develop RT PACSs that consolidates DICOM RT objects exported from all TPSs.
2. Automate the data collection process.
3. Offer DICOM query/retrieval services for automated data retrieving.
4. Offer database web portals for easy access.
5. Offer a DICOM RT viewer for users to examine the integrity and details of datasets.

METHOD

Treatment planning systems make plans for specific machines. Their internal planning data is not exchangeable, however, most of planning information can be made commonly understandable through DICOM export. DICOM has been the format of choice for clinical practice and research in radiation oncology and other disciplines of medicine, yet RT-specific PACS has not been fully implemented and deployed. We installed and customized two commercial DICOM servers and added a web portal for better performance and usability. DICOM architecture is constructed the way that all planning systems will automatically send DICOM objects to RT PACS when a plan is approved. For archived patients in decommissioned systems, we manually opened individual plans and exported DICOM objects to RT PACS.

RESULTS

Two commercial PACS were installed. One for clinical use and other for research. Two PACSs will be synchronized every day so that they can back up each other. The DICOM data flowchart is illustrated Figure 1.

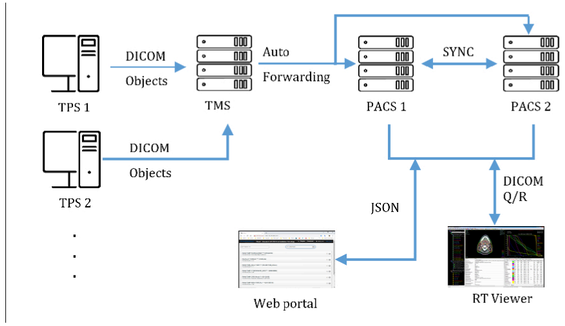

Figure 1 DICOM data flowchart for RT PACSs

There are two ways to access plan datasets.

1. Through web portals.

   For regular users, plan datasets can be accessed through a website as shown in Figure 2. Plans can be found by either patient name or medical record number. Records are organized in the standard DICOM hierarchy, i.e., patient >> studies >> series >> instances. Datasets can be retrieved to local storage or forwarded to a remote listening server at any hierarchical level.

2. Through DICOM Q/R services.

   For advanced users, there is a more efficient way to access plan datasets through DICOM Q/R services. Both server and client ends need to be configured correctly to establish the connection.

Plans of more than 20,000 patients were put in RT PACS. The average dataset retrieval time was reduced to less than 1 minute. The in-house developed RT viewer retrieves and presents plans exported from all TPSs at their digital format instead of printouts (Figure 3). The RT PACS also acts as the secondary plan backup in addition to native backups in TPSs, and a data warehouse for internal AI research projects.

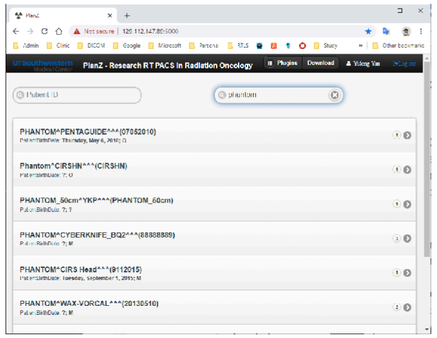

Figure 2 RT PACS web portal.

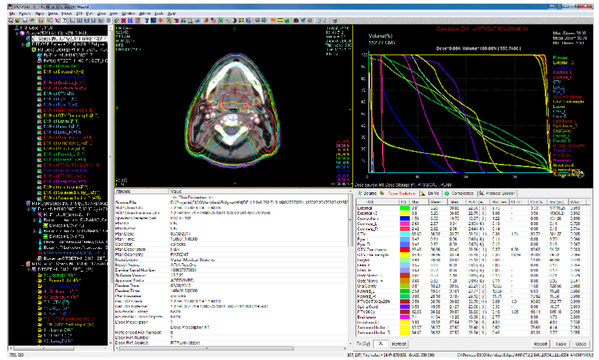

Figure 3 The in-house developed DICOM RT viewer. It works seamlessly with both RT PACSs.

CONCLUSIONS

Huge amount of data is being created in modern radiation therapy facilities. RT PACS is highly desired to effectively manage and utilize the data to promote clinical practice and research.

ACKNOWLEDGEMENTS

Seven summer interns have worked on this project since it started three years ago. Thank them for excellent work on exporting plan datasets to RT PACS. Thank our IT director Tim Foo and senior system administrator Nathan Hooper for their support on system upgrades and maintenance. Thank our department chair, Dr. Hak Choy, for funding support.

CONTACT INFORMATION

Yulong Yan PhD, Yulong.Yan@utsouthwestern.edu (214) 645 7636