Purpose: To develop a DICOM-based electronic patient record system with computer-aided evaluation (CAE) of intensity modulated radiation therapy (IMRT) plans and to assess the technical aspects of the system and its performance.

Methods: The system was developed using the WampServer version 2.0, a package of Apache web server 2.2, PHP 5.2 and MySQL 5.1 to facilitate evaluation of IMRT plans in any Web browser. After tracing the clinical workflow, a set of routines were written to parse key data items from the DICOM-RT objects. To save planners from tedious manual evaluation, the direct relationships between the DVH curve to the corresponding CT images, RT dose data and ROI contours were visualized. Extraction of both overdose and underdose regions was based on the edge-based approach. Followed by reconstruction of ROI contours, the grid doses were constructed by multiplying each pixel value stored in the Image pixel module with the Dose Grid Scaling attribute in the RT Dose module. Graphic User Interfaces (GUIs) were created to allow planners to establish customized plan acceptance criteria and query for evaluation results. Thirty IMRT plans were collected for technical verification and performance validation.

Results: The CAE system was successfully developed, allowing better appreciation of resultant plans. There was no statistical difference between CAE results and those obtained manually by experienced planners on all datasets. With prompt problem detection feature, the direct relationship between the DVH data to the corresponding inhomogeneity regions on CT slices could be shown within an average of 20 seconds.

Conclusions: The CAE system will represent a breakthrough in the routine IMRT planning workflow by eliminating all tedious manual evaluation steps and introducing remote plan evaluation across multiple locations by the local area network and Internet. The concept could also be adopted in the evaluation of plans other than IMRT.