

Purpose: To implement a software framework for quality control and optimization of a paperless radiation therapy process.

Methods: After analyzing the radiation therapy process as implemented using a conventional paper chart, we re-implemented it in a paperless environment using workflow mechanisms available in Radiation Oncology Information System (ARIA, Varian Medical Systems), such as on-line Appointments, Tasks, Dynamic Word Documents, and Checklists. In order to ensure that the software-based procedure steps of the paperless process were being adhered to, we have developed a collection of software modules which queries the SQL-compliant database that underlies ARIA, analyses the results, and alerts users, mainly via emails, of the existence of any procedures or documentation they may not have completed.

Results: All treatment plans for our conventional accelerators are now developed in a paperless environment. Currently, there are a total of 10 software modules, written in perl and SQL and comprising around 17,000 lines of code, reporting on specific aspects of the paperless process, such as treatment consent presence, prescription approval, target volume approval, plan approval, pre-treatment check execution and others. The use of software control modules, which execute daily, weekly or monthly, has resulted in a several-fold decrease in the number of process errors. The email alerts from the reporting software have become an essential part of the workflow environment in the department. These have contributed to the general acceptance of the paperless process, despite the added computer-based effort it involves.

Conclusions: A paperless radiation therapy process opens up the possibility for automated monitoring and control of workflow steps essential for maintaining and improving patient safety. We have demonstrated that the implementation of software tools to perform this function results in significant, quantifiable process improvement.