

# Improving Radiation Oncology Workflow and Efficiency with RT Workspace

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## Introduction

Providing accurate, precise, and effective radiotherapy for patients suffering from neoplastic disease requires a concerted effort from an entire team of health care professionals. These team members each have specific roles that must be performed in order to provide the best possible care for the patient. Perhaps there is no other branch of medicine where a sustained effort from an entire team of individuals is necessary to provide effective treatment. Throughout the treatment process, the sharing of knowledge and communication between team members is of paramount importance. Any break in the workflow through a radiation oncology department can result in delays in treatment, errors, or costly repetition of work.

During the processes of radiotherapy treatment, the care of the patient is passed from one professional to another, in many cases forming a serial chain of workflow. If the communication is disrupted during the workflow, the patient's therapy is stopped. This can have serious repercussions for the patient due to the aggressive nature of neoplastic disease. In addition, a typical radiation oncology department will have many patients at various stages in the radiotherapy workflow. If the workflow is disrupted for one patient, the disruption may cause ripples through the department affecting the therapy of many other patients. For example, if one patient "falls through the cracks" and doesn't have a boost plan ready in time, that patient's therapy is stopped until a plan can be developed. The emergency condition created by this situation can cause physics, dosimetry, and physician resources to be pulled away from other patients in order to get the boost patient's therapy going again. Thus creating further delays throughout the department.

The importance of communication and workflow has never been more important in the field of radiation oncology. The level of sophistication and advanced technology in modern radiation oncology departments requires greater interplay between the physics department and the rest of the department. Physics and dosimetry is a key component in providing safe and effective radiotherapy. Often the duties of the professionals in the physics department are performed "behind the scenes". However, with advanced treatment modalities such as IMRT and IGRT, the role of physics and dosimetry must be more prominent in order to avoid errors in patient treatment. Physicists must be made aware of the need for patient-specific quality assurance tests in a timely manner so that any issues may be addressed before the scheduled beginning of therapy. Dosimetrists need to be informed of the needs of a specific patient or the timing of therapy to both maximize the benefit of radiation therapy and minimize possible side effects. Therefore, more than ever, the activities of the physicists and dosimetrists of the department must be integrated with the activities of the department as a whole.

In order to help radiation therapy departments improve the efficiency and effectiveness of their workflow, and to help seamlessly integrate the activities of physics and dosimetry into the overall department patient flow, Standard Imaging has worked closely with clinical radiation oncology professionals to develop RT Workspace. RT Workspace is a software solution that helps maximize the department's productivity and minimize errors by improving efficiency and communication throughout the department. RT Workspace has been developed over the span of several years in many busy Radiation Oncology centers with constant refinements based upon feedback from the clinicians who use it. The following sections will discuss some of the many ways that RT Workspace helps to improve the effectiveness of the radiation therapy team.

## Improving Communication

The specific goal of improving communication in RT Workspace is *not* to provide more communication between team members, but rather to provide *better* and *more effective* means of

communication. Effective communication between individuals involved in the radiation therapy workflow means conveying correct and accurate information in the most efficient way possible for each team member. Information should be conveyed in a way that enhances the workflow, rather than interrupting it.

As an example, imagine that a physician needs to convey an order to the dosimetrist concerning a patient currently in the planning process. The physician may simply pick up the phone and call the dosimetrist to convey the instructions. This method of communication is very effective from the perspective of the physician. Her workflow has not been interrupted at all. The information was conveyed when the physician was at a certain stage of **her** workflow. However, the dosimetrist was likely working on another patient's plan at the time and was interrupted during **his** workflow. His concentration has been taken from his current task, which may have deleterious consequences for his patient. Moreover, if his full attention was not on the telephone call, the information may not have been conveyed accurately, potentially affecting the therapy of the initial patient. A much more effective means of communicating the information would be for the physician to electronically pass the information to the dosimetrist in an unobtrusive and secure manner. The physician could then provide the information to the dosimetrist at the appropriate point in her workflow and the dosimetrist could retrieve the information at the appropriate time in his workflow; thereby maintaining the overall department workflow. Moreover, this scheme could provide a means of confidentially maintaining a record of the order for future review and documentation.

The above scenario could be addressed in three different ways in RT Workspace. The most effective and elegant would be to add a comment to the General Dosimetry Board in RT Workspace. This will associate the information directly with the patient and plan to which it pertains. RT Workspace will keep track of comments, when they were made and who made them. This record will be retrievable not only throughout the patient's planning workflow, but for as long as the patient remains in the RT Workspace system. The information is not only available to the planner, but also to any team member with access to RT Workspace.

The second way the RT Workspace could address the above example would be that the physician could send a "Sticky Note" to the planner in RT Workspace. The information will immediately be conveyed directly to the dosimetrist, but in an unobtrusive manner. The next time the dosimetrist looks at RT Workspace the sticky note will be visible to him in a way that immediately grabs his attention while still maintaining departmental workflow integrity.

Finally the physician could use the internal, secure electronic mail service in RT Workspace to convey detailed instructions. Again, the information will be delivered in an unobtrusive way that provides a permanent record of the physician order.

As shown in the example above, utilizing the tools provided in RT Workspace can allow communication between team members in a way that maintains an efficient workflow for the *entire* department. In addition, when the RT Workspace tools are used, the communications between team members regarding the patient's therapy become part of the patient's permanent record in RT Workspace. This can be very useful when trying to reconstruct the decision-making process regarding a particular patient's care and for documentation.

## **Improving Workflow Efficiency**

Each patient undergoing radiation therapy must pass through the department's workflow. The workflow of the department is the specific tasks that must be completed and the order in which they must be completed. Understanding the workflow for a department is essential if efficiency is to be maximized and errors are to be prevented. Having the workflow clearly defined not only improves the current flow of patients through the department, but also provides a platform for refinements in the process that can help to identify "bottle necks" and assess individual performance.

Moving patients through the departmental workflow requires every team member understanding the overall workflow and having access to the information in the workflow. Maximum efficiency in the workflow requires that each team member have access to the information in the workflow *without disrupting the workflow*. For example, a department may have a well-defined dosimetry workflow, but if team members are constantly interrupting the dosimetrist to see where a particular patient is in the planning workflow, the workflow will be prone to errors and be very inefficient.

RT Workspace provides the tools necessary for a department to optimize its workflow by means of the RT Workspace Dosimetry Boards. These boards are similar to the omnipresent “White Boards” historically seen in Radiation Oncology Departments. However, significant improvements in workflow efficiency can be realized by employing the RT Workspace solution. The most obvious improvement is that all of information is available to all team members simultaneously. By having RT Workspace available on all department workstations with all installations accessing the central database, all users have up to date information regarding each patient in the workflow on their desks. Moreover, the information on the boards can be updated from any workstation. Using a traditional white board, the person completing their task had to physically go to the board in order to update the workflow information. Conversely, all team members had to go to the planning board to gain access to the workflow information. Both circumstances results in wasted time and inefficiency, which can be costly in both terms of productivity and patient flow through the department.

Another area that RT Workspace improves departmental efficiency is by tying each user’s “ToDo” list to the workflow boards. Historically, when one person completed a task in the workflow, they had to notify whoever was next in the workflow. This often meant going to the board or physically finding that person. It is possible that between completing the task and notifying the next person, a distraction could occur, resulting in a breakdown in the workflow. With RT Workspace, the next person in the workflow is automatically notified via their ToDo list when the workflow information is updated on the board. Thereby closing potential “holes” in the workflow.

In addition to providing an efficient way for team members to access the current workflow information, RT Workspace provides a means to analyze workflow performance simply by using the system. Each step in the workflow for each patient is recorded in the RT Workspace database. This information can then be used to identify bottlenecks in the workflow and also to assess individual team member’s performance and efficiency. Using the board analysis function in RT Workspace, users can view the average time required for each step and view the time required for each team member to complete their assigned tasks. In addition, RT Workspace allows department administrators to assess the workload carried by each team member. Based upon the information provided by RT Workspace, action can be taken to address specific issues in the workflow. Resources can be allocated to rectify problem areas specifically, rather than investigating parts of the workflow that are performing efficiently. Moreover, this functionality is provided with *no additional effort* on the part of the clinical staff; the information is provided simply by using RT Workspace.

### **Improving Efficiency and Accuracy by Integrating Physics Activities**

Advances in technology and technique allow Radiation Oncology departments to provide treatments with unprecedented accuracy and precision. These advances provide a mechanism for tumor dose escalation without significantly increasing patient side effects. However, these advanced techniques require additional physics support and quality assurance. Therefore, it is essential that these crucial activities become part of the overall departmental workflow. RT Workspace provides multiple ways that the activities of the physics department are further woven into the overall fabric of the radiation oncology department.

With the RT Workspace dosimetry boards, patient-specific quality assurance tests are seamlessly integrated with the overall department flow. The physicist is notified when patient-specific QA is required for a patient through the dosimetry board. This notification places an item on the appropriate physicist(s) ToDo list and also adds the patient to the Physics QA board. Patients who are listed on the Physics QA board for IMRT QA are automatically added to the Pending QA list on the IMRT QA module, all without any additional effort than clicking on the Ready for IMRT QA box of the Dosimetrist Board. Moreover, the results of the QA tests are recorded in the database and available to everyone in the RT Workspace system. However, once the physicist marks the QA test as completed, the data are locked by the system and no modification is allowed. Thus, data integrity is preserved.

As has been previously mentioned, one of the largest sources of inefficiency in the departmental workflow is one team member interrupting another during their workflow to request information. RT Workspace greatly reduces this source of inefficiency by providing the Patient Dosimetry Summary module. Every step of the planning and quality assurance process is recorded by RT Workspace and easily available to all RT Workspace users. Therapists no longer need to call

dosimetry to determine if a particular patient's boost plan is done. The physicist does not have to be interrupted to find out if a patient's QA tests have passed. With this module, all of the physics and dosimetry activities directly related to typical patient care are visible to the entire department. This further integration of these activities helps to reinforce the role physics and dosimetry in the care of every radiation therapy patient. Moreover, all comments from the planning boards are available so that the entire planning history is available to all users. This helps to maintain a complete picture and historical record of the patient's entire radiotherapy experience.

Finally, RT Workspace solves common "holes" in the Radiation Oncology department workflow. Often the department's record and verify scheduling system does an excellent job of tracking a patient from initial referral to scheduling of simulation. From this point on, the patient leaves the scheduling system's workflow until the patient is ready to begin treatment. There are no simple, user-friendly tools in the Record and Verify system to guide the workflow through treatment planning. Many users have tried to make the systems useful in this capacity, such as creating cumbersome lists for each staff member, but no solution allows the familiar tools or elegance of RT Workspace. In addition, there is no other solution that allows the department to analyze their workflow with no additional effort on the part of the clinical staff. Moreover, no other system provides either the various communication tools that are available in RT Workspace or the ability to indicate the completion of one workflow task and the need for another with a single mouse-click.

This discontinuity in workflow management during the planning process is filled by the utilization of RT Workspace. RT Workspace picks up the patient when the simulation is scheduled and follows the patient throughout the planning and QA process. Once the planning team has developed an approved plan of therapy, the patient is automatically placed on the Waiting to Start Treatment board. This board is then used by the radiation therapists to schedule start times and manage their upcoming work load. Planning comments and crucial dates, such as the Projected Start date, are carried over from the planning session. RT Workspace helps to maintain a continuous, documented, and traceable workflow throughout the entire radiotherapy experience. The patient remains in the RT Workspace system during their entire course of therapy, making the process of QA and boost planning also an integrated part of the department flow, both of which are also often "holes" in the departmental workflow and documentation chain.

## **Conclusion**

This paper has given just a brief overview of the many ways that RT Workspace helps to improve overall department flow and the quality of patient care. By minimizing delays, omissions and errors during the entire radiotherapy process, both patient satisfaction and departmental resource utilization are maximized. In addition, by using the RT Workspace system, departments are able to perform analyses of their overall departmental flow, allowing them to commit resources only where they are needed.

The goal of RT Workspace is to improve the overall flow of patients through the department. This frees Radiation Oncology professionals from the frustration and stress created by needless inefficiency and interruptions. Thus, they are able to concentrate on providing the best possible care to their patients.