

Workflow Benefits Using COHERENCE Workspaces

New Zealand's health system is predominantly socialized medicine, with all radiation oncology treatments delivered in state-funded hospitals. With a population of 4 million, New Zealand has six oncology departments covering large geographic areas.

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LISA TE PAIHO, and Aaron Philips, at their COHERENCE Oncologist Workspace.

The Palmerston North Regional Cancer Treatment Service is a multidisciplinary clinic including radiation, medical, and hematology oncology. The service covers a population base of almost 600 000 people with approximately 2 000 new radiation treatment courses per year and 110 to 120 patients treated per day. The radiation oncology department is equipped with an ONCOR™ Linear Accelerator, PRIMUS® Linear Accelerator, Varian 600C Linear Accelerator, SOMATOM Emotion® 6 computed tomography system, CMS XiO® Radiation Treatment Planning (RTP) System, COHERENCE™ Dosimetrist and COHERENCE Oncologist Workspaces, and the LANTIS® Oncology Information Management System. Conventional simulators are becoming less used or nonexistent in oncology departments today. For a recent equipment replacement, the clinic preferentially chose a CT and virtual simulation software over a conventional simulator. This has resulted in increased workflow efficiencies and increased accuracy in treatment planning and delivery. The patient

process and workflow benefits are described in this article.

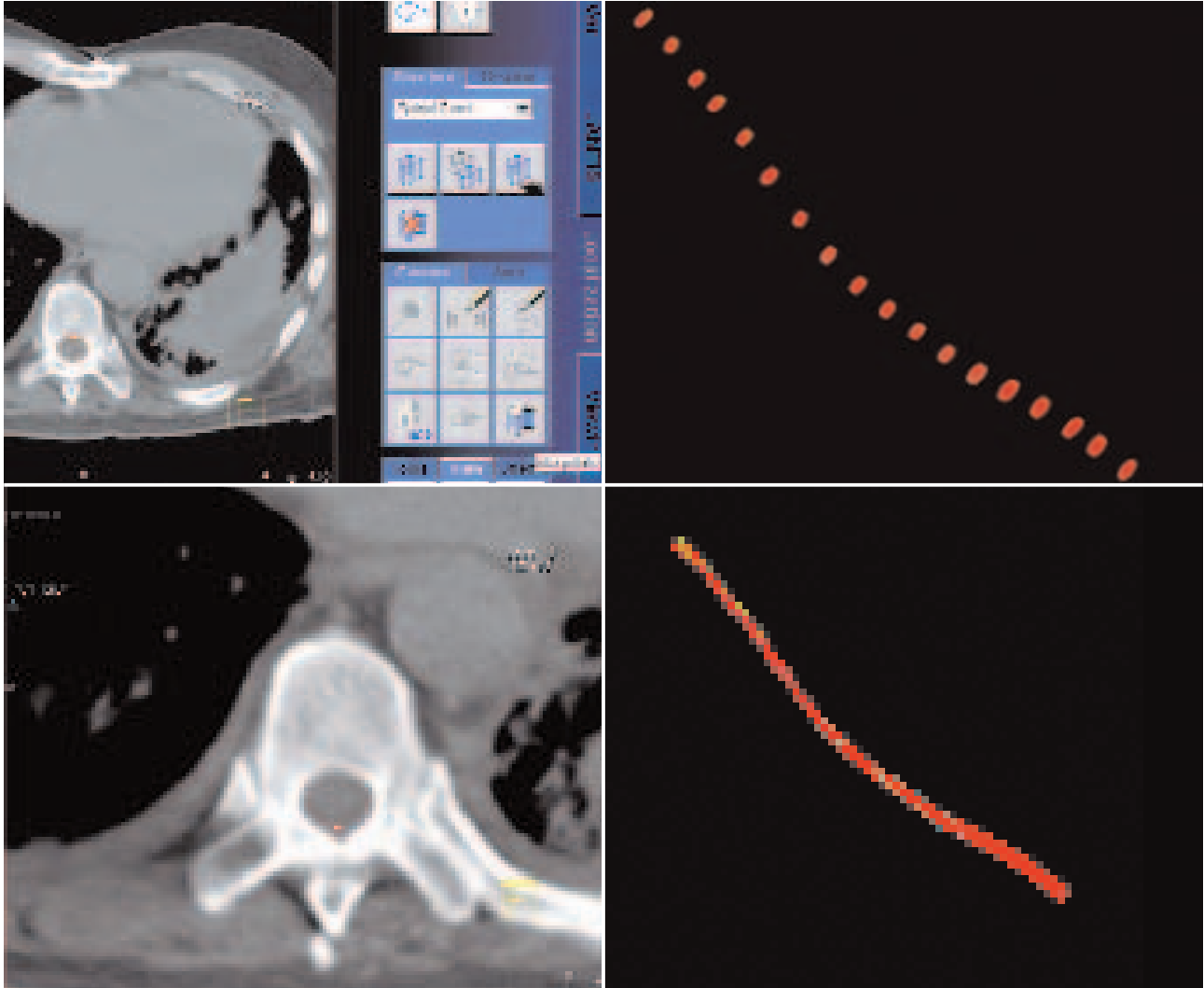
Patient Data Workflow

A well-established workflow exists in the radiation oncology department. Each step is a necessary prerequisite to beginning a treatment regimen.

The first step in the process requires that the radiation oncologist examine the patient and make the decision to treat. The physician indicates his plan of care and radiation prescription in LANTIS at this point. This serves as an indication to CT and dosimetry staff as to what technique will be required.

Next, a CT scan is performed according to department protocol. Using COHERENCE Dosimetrist and lasers from LAP, an isocenter is established. The patient is given a permanent reference mark on his or her skin (tattoo).

Virtual simulation is then performed on palliative cases and definition of the target volume is used for curative cases. The virtual simulation is performed on the COHERENCE



“INTERPOLATE” is demonstrated above in the contouring of this patient’s spinal cord. The spinal cord has been manually contoured on every 8th slice (0.4 cm apart). The interpolate function then completes the spinal cord as a whole structure. The interpolated contours are “dashed” instead of solid, as shown on the transverse slice above.

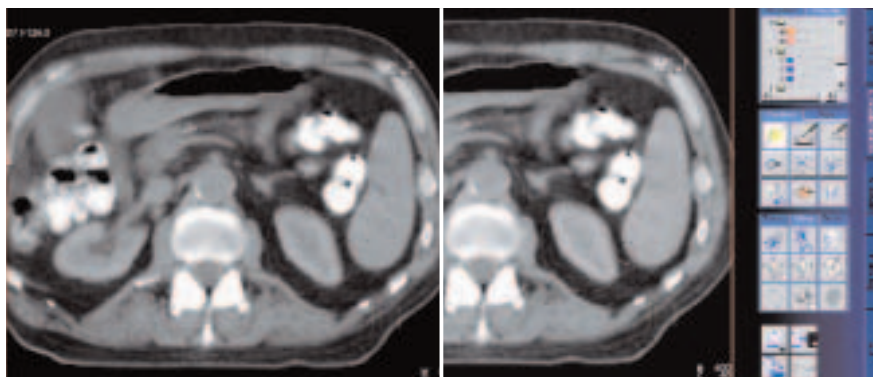
Dosimetrist Workspace and may occur at the time of CT scanning or at a later time on a terminal that is remote to the CT. Volume definition is performed on the COHERENCE Oncologist Workspace, which is situated in the radiation oncologist’s office, at a convenient time. The DICOM RT study set, structure sets, plan, and images are stored on the RTArchive. Finally, a plan is generated on the XiO Treatment Planning System according to established protocol. After approval, the radiation oncologist checks are performed and the plan is transferred to LANTIS. Following this, the patient is scheduled to begin treatment.

Workflow Efficiencies

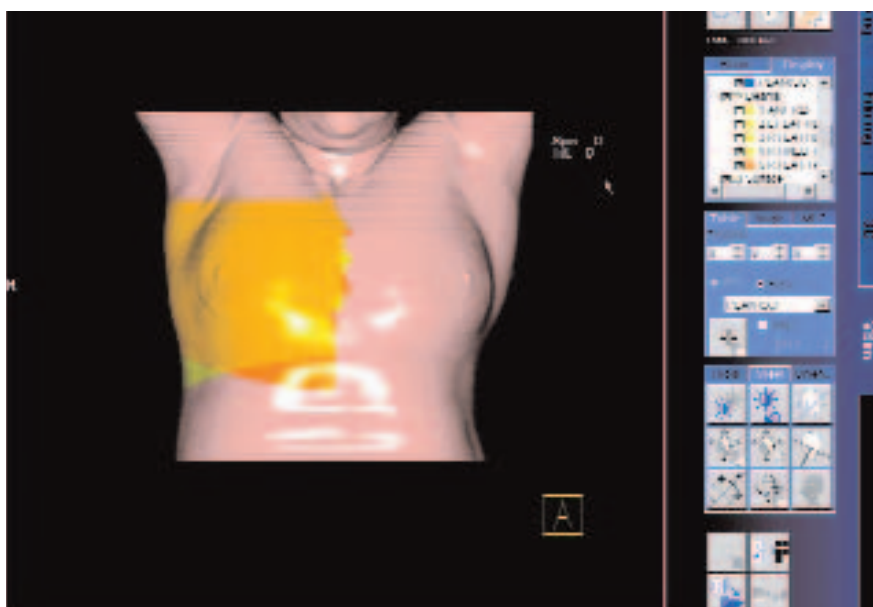
The fact that efficiencies are achieved in the overall workflow of the oncology department becomes obvious when one is able to look at what occurs with members of the cancer care team.

For radiation oncologists, effective utilization of time to achieve optimal patient care is a high priority. It also helps them to maximize their chargeable time. By using CT simulation, the routine requirement for oncologists to attend the simulation session is eliminated. In addition, having COHERENCE Oncologist Workspaces in their offices allows them the freedom to complete target volume definition at their convenience, without requiring access to an RTP station.

Radiation therapists (dosimetrists) have discovered that virtual simulation routinely takes 50 percent of the time of conventional simulation when comparing the entire process. With virtual simulation, the patient’s CT scan can occur at any time and is not dependent on the radiation oncologist’s schedule. This flexibility allows for efficient use of the CT scanner, with treatment planning sessions spread out through the week. When using the simulation feature within COHERENCE Dosimetrist, the



“NUDGE” is an editing tool that can be used to make fine or coarse adjustments to a contour, as demonstrated above.



“SURFACE” can be used to demonstrate the radiation field on the patient’s skin. For a breast patient this includes confirmation that contralateral breast tissue is not involved in the tangential radiation fields, as well as the surgical site (scar).

a conventional simulator, the use of virtual simulation can reduce the number of appointments required as well as the duration of each appointment. Our experience has demonstrated that routine cases have a 50-percent decrease in time required for the simulation process.

Because a significant percentage of oncology patients may be experiencing pain as a result of their disease, this reduction in time required can be of considerable benefit to the patient.

Increased Accuracy

A major increase in accuracy has occurred within the techniques that previously required conventional simulation and used fluoroscopy for field placement. By replacing the simulation process with a virtual simulation performed with a CT scanner and COHERENCE Dosimetrist, the oncologist is now able to use a digitally reconstructed radiograph (DRR) or soft tissue views in any plane to aid field placement. This helps the facility to ensure that field placement includes all disease to be treated that may not have been visible previously.

The use of CT data sets in the planning computation allows clinicians to view the actual dose distribution they prescribed. The calculated monitor units for individual patients will be more accurate than those calculated on a standard phantom separation.

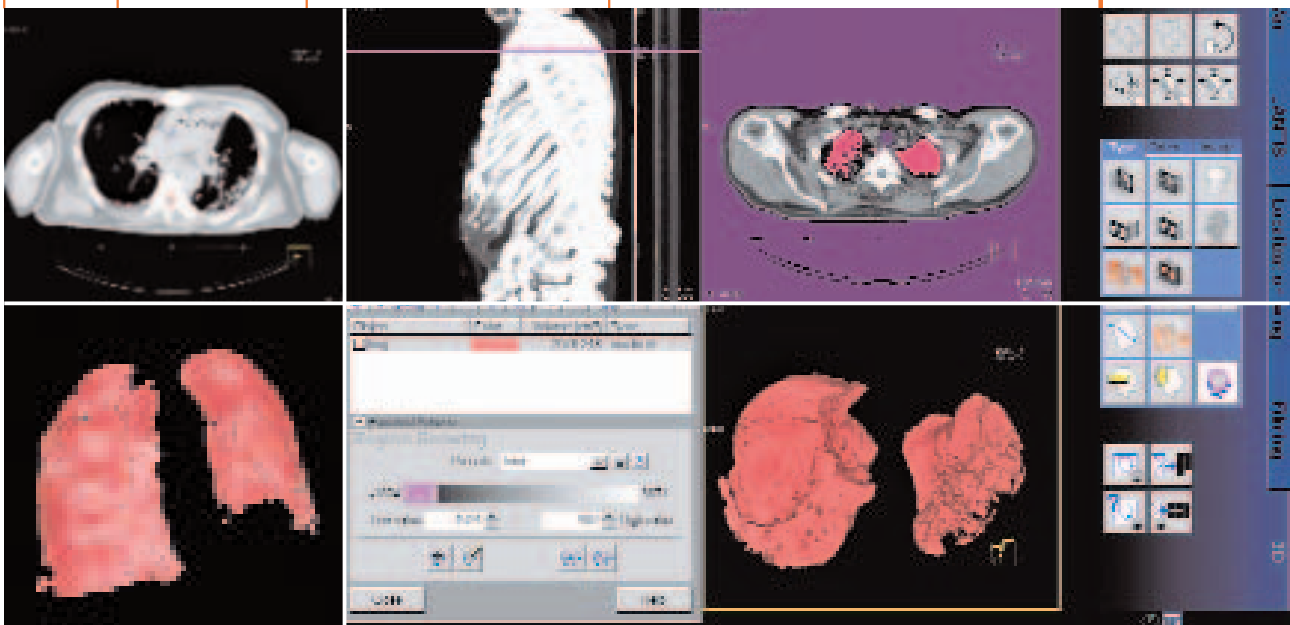
COHERENCE Tools

COHERENCE Dosimetrist provides unique and advanced contouring tools which are easy to use and complement an efficient workflow under the VSim tab.

“Extract skin” is an automated contouring tool that defines the skin based on threshold values. Since the introduction of this equipment routine, CT data sets can have the skin contoured in one to two minutes. This takes approximately one fifth of the time of the previous system, as “extract skin” does not require significant editing.

To create a contour on CT slices between those that have been manually created, the “Interpolate” tool is used. For datasets that require a significant amount of contouring,

radiation therapist can prepare a treatment plan without the presence of the patient. This means that the oncologist can modify or approve the plan at his or her convenience. Patients discover that scheduling the time for their treatment is flexible, as the time is not dependent on the presence of his or her oncologist. When many patients have multiple appointments and social circumstances to consider, this flexibility gives an improved focus on meeting the patient’s needs. Depending on the previous system used with



THE 3D TAB is a quick way to contour structures like the lungs. A threshold is set and the structure is created, as above. The structure is then imported into the VSim tab.

the use of this tool will produce time savings for both oncologists and therapists. In addition to this benefit, COHERENCE Dosimetrist indicates on the display which contours have been manually defined versus interpolated. Contours of any size or shape can be accurately interpolated.

An editing tool called "Nudge" allows the user to "push" the contour to the desired position. The magnitude of this adjustment is not limited, whether a fine or coarse variation is required. Any editing of contours becomes a simple and efficient process.

The display option "Surface" provides a 3D reconstructed image based on thresholds. A light field simulating the radiation field is projected onto the surface display. Skin contour and beam incidence are taken into account. This can also be used to confirm the inclusion or exclusion of skin lesions or scars that cannot be viewed on the axial CT slices.

Lastly, the 3D tab includes options for both viewing and contouring structures. Uses for this include the ability for oncologists to visualize anatomy using the volume-rendering technique (VRT) library. This can provide a more accurate guide for contouring. Structures can also be quickly and easily defined and imported into the VSim tab.

syngo

All of the COHERENCE products operate on the Siemens syngo® platform, and initially

our department introduced COHERENCE Dosimetrist Workspace. All staff became familiar with the tools and structure of the system, which made the later introduction of COHERENCE Oncologist seamless. More recently, they have commenced using the Siemens Emotion 6 computed tomography system. Although the therapists were unfamiliar with a CT, the universal user interface of the syngo platform meant that they were intuitively able to use the equipment, and the training required was minimal.

Maximize the Potential

Since the implementation of this technology and change in process, the Palmerston North Regional Cancer Treatment Service has made significant gains in efficiency and accuracy as outlined above. Healthcare professionals are a valuable resource in any clinic, and it is imperative that equipment is used efficiently to achieve optimum utilization of their time. COHERENCE Workspaces have been seamlessly integrated into our department.

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