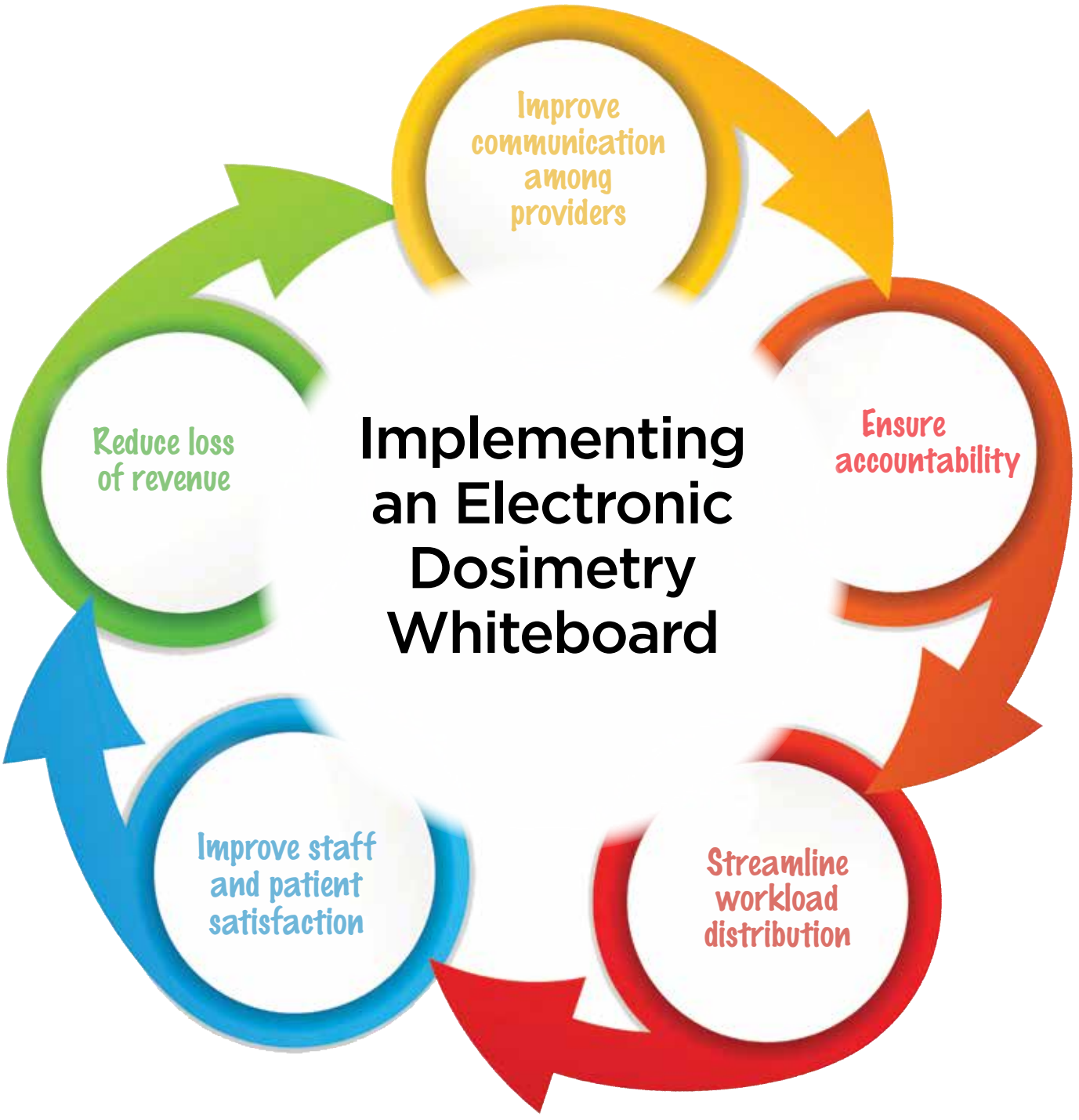
Improve communication among providers
Ensure accountability
Streamline workload distribution
Improve staff and patient satisfaction
Reduce loss of revenue
Implementing an Electronic Dosimetry Whiteboard

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How this tool improved processes and patient care at Temple University Hospital Cancer Center

At Temple University Hospital Cancer Center's Radiation Oncology Department, Philadelphia, Pa., patients are seen first as a consult by the radiation oncologist who reviews the patient's studies, pathology reports, labs, etc. After the decision is made for the patient to be treated with radiation therapy, a CT simulation appointment is scheduled. Once the CT simulation is completed, patients are tattooed to aid in proper alignment during treatment. Once the CT simulation is completed, the treatment planning phase is initiated. The goal of treatment planning: to deliver 100 percent of the radiation to the target area so that structures around the target area (organs at risk) are spared.

For many years, this treatment planning process was relatively simple. CT therapists came into the treatment planning area and wrote the date, the name of the new patient, the treating physician, and the tumor site (i.e., lung, brain, prostate) on a dry erase board. The CT therapists might also add a few other comments, such as if the patient needed to fuse to a PET/CT or a previous MRI.

However, radiation oncology has changed dramatically over the past several years—making the dry erase board an antiquated way of communicating among staff. For example, in addition to the CT simulation, the treatment planning process may now include previously performed diagnostic CTs, MRIs (both with and without contrast), PET/CTs, and CTs with contrast. These modalities are fused to the planning CT so that physicians can better delineate the target volume. From the time of CT simulation to the time of treatment, many tasks must now take place. These tasks are carried out by multiple staff members, including the radiation oncologist, the medical dosimetrist, and the medical physicist. Bottom line: the process of writing information on a dry erase board was not meeting the needs of this busy Radiation Oncology Department.

What Went Wrong?

In the past several years, some of the challenges the Radiation Oncology Department at Temple Cancer Center encountered, included:

- Transparency concerns
- Ineffective communication
- Accountability issues
- Uneven treatment planning workload distribution
- Decreased employee morale
- Decreased patient satisfaction
- Potential loss of revenue.

Transparency concerns. Physicians would come into the treatment planning area and want to know who was working on their treatment plan. They had to ask this question verbally as there was no process in place to easily access the information. Physicians had other questions such as, "Who can I talk to about my patient?" or "Have my volumes been contoured yet?" or "Has the fusion been completed, because I'm ready to draw my targets?" But it was sometimes difficult to get answers because the information was not readily available.

Communication. Physicians see their patients in clinic—not always in a location adjacent to the treatment planning area. So when radiation oncology staff needs information from the physicians, they generally call or page them. At Temple Cancer Center, some of the physicians were so busy at clinic that radiation oncology staff would leave sticky notes to tell them that their

Figure 1. Tiered Categorization System for Treatment Planning

	TIER 1	TIER 2	TIER 3
TREATMENT SITE	SIMPLE PORT PLANS, NO FUSION	SINGLE IMRT PLANS OR MULTIPLE CONFORMALS	RE-TREATMENTS, IMRT PLANNING, AND "UNKNOWN"
GU	Simple plans, with field and blocks done on day of simulation	Conformal with previous treatment, IMRT, VMAT	IMRT/VMAT re-treatments, special procedures
GI			
GYN			
Lung			
Mycosis			
Brain			
Breast	None	Single ISO breast tangential, Sclav tangential	Other (i.e., bilateral, IMboosts), chest wall
Prostate	None	IMRT, VMAT	None
Head and Neck	None	None	ALL
SBRT	None	Lung and spine without prior treatment	If prior treatment
Palliative Care (i.e., bone metastasis, whole brain irradiation)	If NO previous treatment	If previous treatment	None
	3 DAYS	7 DAYS	10 DAYS

plan was ready for review or that they needed to review the fusion. Most of the communication taking place between physicians and treatment planning staff was verbal—not all of it effective.

Accountability. Today many different disciplines are involved in the treatment planning process: the radiation oncologists, the dosimetrists, the physicists, and the radiation therapists. Since we did not have a process in place that allowed us to see the real-time status on each patient, sometimes staff was unsure about exactly where we were in the treatment planning process. Worse, staff began to experience instances of "He said, She said." For example, a staff member was not informed that it was time to complete a certain task or a staff member did not know that others in the treatment planning process were waiting for them to complete a task. In short, our Radiation Oncology Department was having accountability issues.

Treatment planning workload distribution. Under the old process, only new patients were written on the dry erase board. This approach was not optimal, as new patients are only a part of the work that is done in our Radiation Oncology Department. Staff also performs additional tasks, such as cone downs and re-plans. Physicians who came into the treatment planning room had no idea of all the other tasks assigned to treatment planning staff. The physicians only saw the dry erase board with a list of 9 or 10 new patients.

The Radiation Oncology Department has three FTE dosimetrists; so on the surface it might appear that staff was not as productive as possible. The situation resulted in frustration—for both physicians and treatment planning staff. Sometimes physicians had the impression that the dosimetrists and physicists did not have much to do, so they wanted their treatment plans completed more quickly. The dosimetrists and physicists—who were working on tasks unrelated to new patients—were frustrated that every treatment plan was being treated as an "emergency." The old process did not allow us to track the staff's workload and productivity or even know what task each staff member was doing.

Decreased employee morale. All of the challenges discussed above created a number of inefficiencies in our workflow. Ineffective communication among our team members sometimes led to instances of "finger-pointing." For example, a physician telling a dosimetrist: "You didn't tell me that it was time for me to draw my target and volumes." Or a physicist telling a physician: "I didn't know the plan was done and that I needed to check it." This type of uncertainty and turmoil had an adverse affect on employee morale.

Decreased patient satisfaction. Unfortunately, our Radiation

Oncology Department also experienced instances where treatment plans were not completed in a timely manner and patients had to change their appointment instances, or worse, treatment plans were not completed when a patient arrived for treatment. Imagine a radiation therapist having to tell a patient that the treatment plan wasn't ready and that the appointment would need to be rescheduled. Staff was not happy to deliver that message; patients were *really* not happy to hear that message. Patients are already very worried, and a delay in treatment only increases their anxiety. They start to question if there is something else wrong or if the tumor grew or the cancer spread. Additionally, Temple Cancer Center is an inner city program, and many of our patients need transportation assistance. For patients to struggle to get to an appointment and be told that their treatment plan was not ready was simply not acceptable.

Potential revenue loss. Finally, our Radiation Oncology Department was experiencing some loss of revenue. For example, if a treatment plan was not completed in advance, sometimes the dosimetrist had to finish and print the treatment plan on the day the patient came for treatment or a verification simulation. If that happened, we could not bill for the treatment plan and the verification simulation on the same day. In other words, we would lose the charge for the verification simulation. In today's reimbursement climate, no cancer program wants to lose charges.

Addressing the Challenges

Faced with these challenges, our first order of business was to put together a workgroup to look at all of these issues. The workgroup included:

- The administrative director of Oncology Services
- The director of Radiation Oncology
- Radiation oncologists
- A medical physicist
- The chief dosimetrist
- The chief therapist
- The Radiation Oncology Department's dedicated IT manager.

Nurses were not included in this workgroup, as they were not part of the radiation treatment planning process we were trying to improve. And while we did experience some communication gaps between our nurses and our radiation therapists, the hope was that these issues would improve organically when we improved our processes.

The workgroup had five key objectives:

- To improve communication
- To improve accountability
- To address the workload distribution
- To increase transparency in the treatment planning process
- To be cost-effective.

The workgroup believed that accomplishing these objectives would improve both patient satisfaction and staff morale, while minimizing the potential loss of revenue.

Take One

The workgroup first looked to the current EMR to help meet its objectives. The EMR option was low-cost; the cancer program already had the technology in place. The EMR also had a quality checklist functionality, which basically serves as a "to-do" list. Using this quality checklist, treatment planning staff can enter data, such as the patient's name, the study that the patient is having done, and the date the patient is returning for treatment. Additional notes, for example, if the patient is getting chemotherapy, can be entered in the comment section. Treatment planning staff was trained on how to use this EMR functionality, and the decision was made to pilot this new process for three months. Then, the workgroup would meet again to measure the effectiveness of the intervention.

Three months later, here's what the workgroup found. On the positive side, the EMR solution was definitely low cost and it did improve staff communication—but not to the level that the workgroup wanted. Specifically, treatment planning staff was constrained by what information they could enter into the EMR. If this solution were to truly work as the workgroup wanted, the EMR would need to be customized for our Radiation Oncology Department. With regards to transparency, the EMR allowed everyone to access the information, but it did not offer the visual transparency the workgroup wanted. The goal was for the entire department to be able to see all of the treatment plans at the same time.

On the negative side, the EMR option did not help with the accountability issues we were experiencing. The Radiation Oncology

(continued on page 25)

Table 1. Treatment Planning Tasks & Staff Responsible

TASK	STAFF RESPONSIBLE	DATE COMPLETED
CT simulation	CT simulation therapist	
Fusion	Staff member who performs this task	
Volumes	Physician	
Planning	Dosimetrist and physicist	
Approval of plan	Physician	
Print plan	Planner	
Physics check	Physicist	
Transfer of images	Physicist	
Treatment	Chief therapist	

Figure 2. Tiered Treatment Planning Schedule

	DAY 0	DAY 1	DAY 2	DAY 3
SCHEDULE 1	CT simulation fields done, treatment intent contour done	Planning, physics support, submit for MD approval, MD approval	Physics approval, transfer data to MOSAIQ, image transfer	Setup
Patient receives appointment slip on day of simulation	Monday	Tuesday	Wednesday	Thursday
	Tuesday	Wednesday	Thursday	Friday
	Wednesday	Thursday	Friday	Monday
	Thursday	Friday	Monday	Tuesday
	Friday	Monday	Tuesday	Wednesday

- Treatment intent represents the planning guidelines.
- Emergencies are done on an as-needed basis, and are not subject to these guidelines.
- If cases are completed before the scheduled start date, we will call the patient to come in earlier for his or her set up.

	DAY 0	DAY 1	DAY 2	DAY 3	DAY 4	DAY 5	DAY 6	DAY 7
SCHEDULE 2	CT simulation	Fusion, MD volumes, treatment intent, physics review	Dosimetry contours, previous treatment reconstruction, treatment intent (for re-treatments)	Planning, physics support, plan submitted to MD for review by the end of Day 4		MD plan iterations, MD approval by the end of Day 5	QA, physics approval, transfer data to MOSIAQ, image transfer	Setup
Patient receives appointment slip on day of simulation	Monday	Tuesday	Wednesday	Thursday	Friday	Monday	Tuesday	Wednesday
	Tuesday	Wednesday	Thursday	Friday	Monday	Tuesday	Wednesday	Thursday
	Wednesday	Thursday	Friday	Monday	Tuesday	Wednesday	Thursday	Friday
	Thursday	Friday	Monday	Tuesday	Wednesday	Thursday	Friday	Monday
	Friday	Monday	Tuesday	Wednesday	Thursday	Friday	Monday	Tuesday

	DAY 0	DAY 1	DAY 2	DAY 3	DAY 4	DAY 5	DAY 6	DAY 7
SCHEDULE 3	CT simulation	Fusion, MD volumes, treatment intent, physics review	Dosimetry contours, previous treatment reconstruction, treatment intent (for re-treatments)		Planning, physics support, plan submitted to MD for review by the end of Day 6			MD plan iterations, MD approval by the end of Day 7
Patient receives appointment slip on day of simulation	Monday	Tuesday	Wednesday	Thursday	Friday	Monday	Tuesday	Wednesday
	Tuesday	Wednesday	Thursday	Friday	Monday	Tuesday	Wednesday	Thursday
	Wednesday	Thursday	Friday	Monday	Tuesday	Wednesday	Thursday	Friday
	Thursday	Friday	Monday	Tuesday	Wednesday	Thursday	Friday	Monday
	Friday	Monday	Tuesday	Wednesday	Thursday	Friday	Monday	Tuesday

Department was still not able to identify where in the process any given patient's treatment plan was sitting. The EMR also could not address the workload distribution. Leadership was still not able to identify which staff member should be assigned to the next patient case coming out of simulation or even the actual workload of each staff member. For example, there was the perception that one dosimetrist was routinely getting the more complicated cases. So leadership wanted to streamline the workflow and distribute it evenly across all three of the certified dosimetrists.

Back to the Drawing Board

As the workgroup continued to meet, another issue became apparent. Treatment planning staff was experiencing a "bottleneck" of patient cases—mostly attributed to physicians who wanted their patients started on radiation therapy immediately. Of course, treating every patient as "emergent" often means that radiation oncology staff does not have the time or resources for actual emergencies. The workgroup believed that development and implementation of processes to improve patient flow would also bring standardization to the treatment planning process, thus reducing bottlenecks.

Accordingly, the workgroup created a system to categorize the types of treatment plans and to estimate how long each of these treatment plans should take from the time of CT simulation to the start of treatment (see Figure 1, page 22). Treatment plans are categorized into three tiers by treatment site:

- Tier 1. Simple port plans, no fusion. Treatment plan would take 3 days to complete.
- Tier 2. Single IMRT plans or multiple conformals. Treatment plan would take 7 days to complete.
- Tier 3. IMRT planning, re-treatment plans, and unknown (other complex) plans. Treatment plan would take 10 days to complete.

DAY 8	DAY 9	DAY 10
QA, physics approval, transfer data to MOSIAQ, image transfer		Day 10
Thursday	Friday	Monday
Friday	Monday	Tuesday
Monday	Tuesday	Wednesday
Tuesday	Wednesday	Thursday
Wednesday	Thursday	Friday

This system helps supervisors assign the next case coming out of dosimetry. Supervisors add up the category numbers (tiers) of the plans that each dosimetrist is currently working on; the dosimetrist with the lowest number is assigned the next case. This process has helped ensure that treatment planning cases as they come out of CT simulation are evenly distributed among the three dosimetrists.

With these tiers in place, the workgroup was able to go a step further and identify the tasks involved in each treatment planning process and the day that each task should be completed (see Figure 2, left). For example, the tasks and timeline for a 3-day treatment schedule are:

- Day 0. CT simulation fields and treatment intent contour
- Day 1. Planning, physics support, submission to MD for approval, MD approval
- Day 2. Physics approval, data transferred to MOSAIQ, images transferred
- Day 3. Treatment planning setup.

While this schedule is not followed rigidly, it serves as an important guide. The tool's real value is that it allows staff to know how far out to schedule patients for their return appointment. This schedule also allowed us to track and solve bottlenecked areas. By mapping treatment plans to the timeline created, we were able to stop this type of bottlenecking. Of course there are always instances when true emergent situations arise and the work on other treatment plans is slowed down.

Once the workgroup developed these tools, it was time for implementation. The workgroup wanted a way to display this information so that all the physicians and treatment planning staff could see it. Further, the workgroup wanted to use this information as a checklist to make sure that the steps (tasks) were being completed in a timely manner (see Table 1, page 23). Finally, the whole process had to be done at minimal cost.

The Electronic Dosimetry Whiteboard

The ultimate solution was surprisingly simple: use an Excel spreadsheet to enter and track the necessary data and then display the spreadsheet on a 46-inch monitor in the treatment planning area. The whiteboard is a shared Excel file, so anybody can access it from any computer in our department. Again, the solution was low cost—only the cost of the monitor, approximately $600. Further, the Excel functionality allowed the workgroup to customize and edit it on an "as-needed" basis. It is continually evolving to meet the changing demands of the department. Figure 3, page 26, is a representation of the electronic dosimetry whiteboard that is now displayed in Temple Cancer Center's Radiation Oncology treatment planning area. The populated fields are:

- Patient name
- Treating physician name

Figure 3. Representation of Electronic Dosimetry Whiteboard

PATIENT	PHYSICIAN	PLANNER	CATEGORY	AUTHORIZATION NEEDED	DUE DATE	LINAC	INITIAL/CONE DOWN/ RE-PLAN	DESCRIPTION
1. John Doe	VV	AE	2	N	07.09.2013	A	CD	3D breast boost plan
2. Jane Smith	CM	AE	2	N	07.12.2013	A	CD	VMAT boost prostate
3. Bob Jones	VV	ST	2	Y	07.23.2013	B	Initial	Lung, fuse PET scan from 11.30.2013 & CT from 06.20.2013
4. Dave Johnson	MIC	YD	2	N	07.15.2013	A	Initial	Neck, fuse with PET, IMRT-IGRT
5. Sarah Connor	MIC	YD	1	N	07.18.2013	B	CD	CD, scalp, re-simulation
6. Arthur Doyle	CM	ST	2	N	07.22.2013	B	CD	VMAT, boost
7. Daisy Dalyrmple	MIC	DP	2	Y	07.22.2013	B	Initial	Pelvis, prone (ON HOLD per MD dp 07.15.2013)
8. Ed Smith	MIC	YD	1	N	07.22.2013	A	CD	Re-scan post neck
9. Will Shakespeare	MIC	AE	3	N	07.23.2013	A	Initial	Clinical E-set up
10. Frank Martin	MIC	AE	1	N	07.23.2013	A	Initial	Left hip
11. Carol Peters	CM	ST	3	Y	07.24.2014	C	Initial	Prostate, MRI, 07.12.2013 at NE Hospital
12. Buffy Summers	CM	ST	2	N	07.25.2013	C	Initial	T7-T9
13. Anne Sanders	MIC	KD	2	N	07.25.2013	B	CD	Rescan pelvis
14. Mina Harker	MC	DP	2	N	07.26.2013	B	Initial	Pelvis
15. Jay Gatsby	CM	KD	2	N	07.26.2013	C	CD	VMAT, CD, prostate
16. David Lorel	MIC	DP	1	N	07.30.2013	A	Initial	Left breast
17. Johnny Utah	VV	PC	3	N	07.31.2013	C	Initial	SBF lung, 07.31.2013 at 2:30 on C
18. Dean Murphy	CM	KD	2	N	08.01.2013	C	CD	VMAT, CD, prostate
19. Stephanie Plum	VV	DP	1	N	08.02.2013	B	Initial	Patient cancelled (not to be treated per VV 07.22.2013)
20. Elle Woods	CM	DP	2	N	08.05.2013	C	Initial	Prostate, MRI, 07.19.2013
21. Edward Frankel	CM	YD	2	N	08.05.2013	C	Initial	Prostate
22. John Matheson	VV	YD	3	N	08.07.2013	C	Initial	HN larynx, IMRT, fuse PET+diagnostic CD
23. Matthew Kerns	CM	KD	2	N	08.21.2013	B	CD	VMAT, CD, prostate
24. Adam Santini	CM	DP	2	N	08.12.2013	A	CD	Prostate, VMAT, boost

- Tier category (1, 2, or 3)
- If a pre-authorization is needed (Yes or No)
- Date patient is due back for treatment
- Linac assigned
- Type of treatment (initial, cone down, re-plan)
- Description of treatment
- Date orders are received
- Date CT simulation is completed
- Date fusion is completed
- Date volumes are done
- Date planning is completed
- Date MD approves treatment plan
- Date treatment plan is printed
- Date physicists approve treatment plan
- Date images are transferred
- Date treatment is initiated.

As mentioned previously, we consider the electronic dosimetry whiteboard a work in progress. For example, the original whiteboard did not include the pre-authorization field. We began to experience issues with a specific payer that required a pre-authorization prior to IMRT treatment. Occasionally the dosi-

ORDERS	SIMULATION	FUSION	VOLUMES	PLANNING	MD APPROVAL	PLAN PRINTED	PHYSICS APPROVAL	IMAGE TRANSFER	THERAPY
			X	06.14.2013	06.14.2013	07.05.2013	07.05.2013	07.05.2013	
			X	07.01.2013	07.02.2013	07.08.2013			
06.19.2013	06.19.2013	06.24.2013	06.26.2013	07.01.2013	07.02.2013	07.09.2013			
07.08.2013	07.08.2013	07.09.2013	07.09.2013	07.10.2013	07.10.2013	07.11.2013			
			07.14.2013	07.14.2013	07.14.2013				
			X	07.01.2013	07.01.2013	07.11.2013			
	07.12.2031								
07.18.2013	07.18 3012	X	07.18.2013	07.19.2013	07.19.2013	07.22.2013			
X	X	X	X	07.22.2013	07.22.2013	07.22.2013			
07.19.2013	07.19.2013	X	07.19.2013	07.22.2013	07.22.2013	07.22.2013			
07.08.2013	07.08.2013	07.15.2013	07.15.2013	07.16.2013	07.17.2013	07.18.2013			
07.22.201	07.23.2013	X	07.23.2013						
07.18.2013	07.18.2013	X	07.18.2013	07.19.2013	07.19.2013	07.23.2013			
06.26.2013	07.16.2013	X	07.16.2013	07.17.2013	07.17.2013	07.18.2013	07.18.2013	07.18.2013	
	06.11.2013	X	06.11.2013	07.16.2013	07.16.2013	07.17.2013	07.17.2013	07.17.2013	
07.19.2013	07.19.2013	X	07.19.2013						
	07.17.2013	07.18.2013	07.18.2013						
06.06.2013	06.18.2013	06.18.2013	06.19.2013						
07.10.2013	07.10.2013	07.11.2013	X	X	X	X	X	X	
07.15.2013	07.18.2013		07.22.2013	07.22.2013	07.22.2013	07.23.2013			
06.24.2013	07.22.2013								
07.11.2013	07.18.2013	07.19.2013							
06.20.2013	06.25.2013	07.01.2013	07.03.2013						
06.26.2013	07.02.2013		07.05.2013						

metrists did not realize that a patient had that particular insurance coverage when they developed the treatment plan, and we lost some charges. To eliminate this issue, the workgroup added the pre-authorization column. Now staff must verify the patient's insurance plan and then check either "Yes" or "No" for pre-authorization required.

Because the Excel spreadsheet is a shared file, we also had instances where multiple people were making multiple entries at the same time, causing discrepancies within the file. To fix this problem, we now have three designated sections at the bottom of the spreadsheet—new simulation, cone down, and physics—where any new information is entered.

Briefly, here's how our electronic dosimetry whiteboard works. When a patient comes in for a CT simulation, the therapist doing the simulation starts the process by entering the patient's name, the treating physician, the treatment category (Tier 1, 2, or 3), the date the treatment is scheduled, the machine the patient will be treated on, the type of plan, etc. Rows are highlighted: blue for initial plans, green for cone downs, pink for physics plans, red for emergency plans, and yellow for re-plans. By the end of the day, the chief dosimetrist assigns the case to the dosimetrist who currently has the lightest workload. As each task is

completed—either by the dosimetrist, physicist, or physician—the person responsible for that task updates the corresponding field with the date the task was completed. The information is available in real time, and treatment staff can easily see where in the process every patient case is sitting.

At the end of each day, two designated "Super Users" (the director of Radiation Oncology or the chief dosimetrist) "sort" the electronic dosimetry whiteboard by date so that the next patient coming in for an appointment is at the top of the whiteboard. On the first day of treatment, one of the Super Users enters the date that treatment was initiated, and then moves that patient's information into the Completed Tab on the electronic dosimetry whiteboard. This requires copying all of the patient's information and pasting it into the Completed Treatment Tab and then deleting the information from the whiteboard. The functionality of Excel has it limits. For example, it is fairly easy to make a mistake and clear content. That is why only the two Super Users are responsible for sorting the whiteboard each day and moving patient information from the whiteboard and into the Completed Treatment Tab.

Implementation Challenges

Implementing the electronic dosimetry whiteboard required a change in staff work habits and workflow, which is always a challenge. To ensure that the process worked, the workgroup had to get 100 percent user buy-in. For staff, the whiteboard is just one more task they need to do. Our physicians are actually the biggest promoters of the whiteboard because they can now easily see the status of each patient's treatment plan.

Probably the greatest challenge involved the dosimetrists and the physicists. With the electronic dosimetry whiteboard, their work is out there in front of everyone. The workgroup received some feedback that staff felt like "Big Brother" was watching. However, staff soon understood that the benefits outweighed these concerns. Bottom line: the whiteboard increased the accountability of the department as everyone could now see the status of any given treatment plan.

As a shared file, the whiteboard had multiple benefits, but it also brought challenges. Any radiation oncology staff, including physicians in remote locations, can pull the whiteboard up on any computer. So if they leave the file open or do not refresh the file, they may not be seeing the most up-to-date information. To help mitigate this issue, we've asked staff to close the whiteboard down as soon as they are finished reviewing the schedule or entering information into the spreadsheet.

Measuring the Tool's Effectiveness

After implementation of the electronic dosimetry whiteboard, the workgroup assessed whether its original objectives were being met:

- ***Improve communication.*** The workgroup believed that the whiteboard had definitely improved communication in the Radiation Oncology Department. In fact, the whiteboard had a "water cooler effect" in that it became a meeting place where staff gathered to see what was going on with each patient.
- ***Improve accountability.*** The whiteboard improved accountability simply by the fact that the information was now displayed publicly for staff to see. Treatment staff could readily see when patients were coming in for treatment and ensure that everyone was on time with the treatment plans.
- ***Increase transparency in the treatment planning process.*** The electronic dosimetry whiteboard basically provides a one-stop, "big-picture" look at treatment plan progression. Any physician or staff member can easily see where we are in the treatment planning process for any given patient. Before the whiteboard, physicians and staff did not know when dosimetrists were working on tasks unrelated to new patients, such as cone downs and re-plans. Now that information is readily available to everyone. The whiteboard allows the department to understand its true patient volume—not just new patient volumes.
- ***Address the workload distribution.*** Workload distribution definitely improved with implementation of the whiteboard. It is now policy that patient cases must be assigned by the end of the day. With the new categorization system, supervisors can ensure that patient cases are evenly distributed when they come out of CT simulation.
- ***Be cost-effective.*** As our department already had Excel in its software suite, the only expenditure was the cost of the monitor to display the electronic dosimetry whiteboard.
- ***Minimize loss of revenue.*** Now that treatment planning is being carried out according to the schedule created by the workgroup, the incidence of lost charges has decreased.

Meeting their objectives allowed the workgroup to improve the efficiency of Temple Cancer Center's Radiation Oncology Department. For example, we reduced wasted steps, such as physicians having to leave clinic to come down to the treatment planning area to check on the status of a patient. Now physicians simply pull up the information they need on the shared file while in their own offices or clinics.

Quality of care and patient satisfaction has also improved. After implementing the categorization system, staff now knows how many days it should take from CT simulation to treatment. Patient scheduling has also improved; about 90 percent of our patients now leave the CT simulation with a return appointment. There are some instances where it's not possible to make a return appointment, for instance, if a patient is getting another diagnostic study that needs to be fused to the CT. In these cases, staff tells patients that if they don't hear from us within two weeks, they should call.

Today, treatment plans are completed on time, and the number of instances where patient appointments have been rescheduled or canceled has been greatly reduced. When staff does have to reschedule a patient, the whiteboard allows for more advanced notice. If patients are given ample notice and an explanation, such as the need for the patient to have an additional test, like a PET/CT and that treatment staff did not get the new image soon enough to fuse to an earlier image, patients understand the change.

Since the electronic dosimetry whiteboard was implemented, our Radiation Oncology Department had only two instances when a patient showed up for an appointment and had to be rescheduled. Both times were due to human error. For this to happen even once to a patient is unacceptable; our goal is to eliminate those instances altogether.

Finally, the electronic dosimetry whiteboard has greatly improved the morale of our staff. Communication is better and the use of the whiteboard has promoted a true team approach to care. Staff understands that they must work together to ensure that treatment plans are completed on time. Further improving accountability and transparency has improved provider satisfaction with their job and with their team members. OI

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OUR PROGRAM AT-A-GLANCE

Temple University Hospital, Philadelphia, Pa., is an academic medical center with more than 700 beds. The Temple Cancer Center is housed within the hospital. Here's a snapshot of our Radiation Oncology Department:

Our Equipment

- 3 linear accelerators
- A 16-slice CT simulator
- A high-dose rate brachytherapy unit
- Leksell Gamma Knife
- A hyperthermia unit
- Treatment planning system (Philips Pinnacle)
- An oncology electronic medical record (EMR) (Elekta Mosaiq)
- An Active Breathing Coordinator (ABC) for motion management

Services

- 3-D conformal radiation treatments
- Intensity-modulated radiation therapy (IMRT)
- Total skin electron beam that is used to treat a large population of patients with mycosis fungoides, the most common form of cutaneous T-cell lymphoma
- Image-guided radiation therapy (IGRT)
- Stereotactic radiosurgery (SRS)
- Stereotactic body radiation therapy (SBRT)
- Volumetric-modulated arc therapy (VMAT)
- I-guide with 6-D hexapod table
- High-dose rate (HDR) and low-dose rate (LDR) brachytherapy
- Gamma Knife radiosurgery
- Hyperthermia treatment
- 4-D symmetry organ reconstruction
- 4-D CT simulation.

Our Team

- 3 radiation oncologists
- 4 certified medical physicists
- 3 certified medical dosimetrists
- A chief therapist
- 12 certified radiation therapists
- 3 registered nurses
- 1 medical assistant
- An oncology social worker
- A nutritionist
- Clerical support
- A dedicated IT systems manager