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Going Digital in Mammography

Requires Focus on Workflow, Project Management to Achieve Desired Productivity

WHILE SPEAKING at a recent mammography conference, I asked the audience how many had acquired digital mammography and about 15 percent raised their hands. Then I asked how many were contemplating implementation of digital mammography within the next two years, and the rest of the hands went up. Finally, I asked those who had acquired digital mammography solutions if they were satisfied with their implementation, and only two attendees raised their hands. These responses reflect the general state of the U.S. breast center world in early 2006.

The release of the DMIST¹ results in the fall of 2005 has created patient demand, and this has in turn created a “must have” climate for digital mammography in communities across the nation, regardless of size. The recent reclassification of digital mammography systems as Class II devices for the purpose of FDA approval will provide an expedited process that better

ensures that affordable new digital mammography technologies will be entering this market, including those based on computed radiography (CR).

This article will focus on three areas that are often neglected in a digital conversion, but are critical to its success:

- Workflow Planning
- Project Management
- Setting Expectations

Before discussing the digital implementation process, it is critical to understand one fundamental truth: *digital mammography, whether DR or CR, is not just a modality change, it creates a paradigm shift in the way we work.* When fully implemented,

digital mammography will completely change everything from patient scheduling to the interaction with the technologists and the interpretation and reporting of the exam. It is, therefore, important to view implementation as a strategic process.¹¹ Strategy is defined as: a carefully devised plan of action to create a goal, or the art of developing or carrying out such a plan.

Strategic planning is the setting of goals and the mapping of the pathway to reach those goals. Digital mammography requires a careful evaluation of infrastructure and workflow as well as the modality itself,

training of the entire clinical staff, and the determination of how to create an entirely electronic medical record. To do this effectively, it is important to first address workflow and then to carefully manage each of the variables that will be involved in implementation.

Workflow Planning

Workflow planning requires a team approach. The team should be made up of representatives of each of the areas of the practice or center, plus the information technology representative.

The first step in workflow planning is to carefully document the existing process, from the patient scheduling call to the receipt of the payment for the service that is provided. Documentation is imperative because it ensures that each member of the planning team thoroughly understands all aspects of the process, rather than just his or her part of the process. The documentation will also show existing roadblocks, as well as critical pathways (e.g., the technologist cannot begin an exam until she physically has each patient’s film file.)

Once the documented pathway is in hand and well understood by all of the members of the team, it is time to take out a clean piece of paper and begin to design a new digital workflow. At this stage you are setting the system goals. You are not trying to “fit” digital into your existing delivery system. With digital images, you have the capability to become fully electronic. As you refer back to the pathway you have documented, think of how you can enter information into an electronic medical record and have that information available to anyone who needs it in the system. Follow that exercise with a careful consideration of when information should be entered into the system, and who

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should be responsible for each item of information.

As this analysis proceeds, it is important to view the clinical event(s), discover what needs to happen to get to the clinical event, and what needs to happen from the clinical event through to receipt of payment. The reason for this focus is that the costs are at their highest level at the clinical event. The imaging itself involves the expense of interpretation, technologist time and equipment. Efforts focused on reducing the patient's in-room time, and in optimizing the physician's interpretive time, will pay the highest dividends. The following two examples will illustrate how this can work.

A digital workflow can improve productivity and support greater patient volumes with existing staff.

Facilities can cut at least five minutes from each exam by eliminating the walk to and from the film processor, the wait for the processed films, and the QA examination of the films. Unlike the analog experience, the entire time that the patient is in the mammography room, she is with the technologist. This is all "quality" time, but it need not be extended (in a screening exam) beyond the time necessary to confirm a few items in the electronic record, position and expose the four images. It is important that the technologist not be responsible for entering the patient history in the record or doing other tasks for which she is over-qualified.

On the interpretive side, time is excruciatingly expensive. For the physician who interprets a digital exam in 90 seconds, each second of time is worth about 41 cents.

Therefore if a mammographic radiologist who interprets 5,000 mammograms per year can save 10 seconds per mammogram, he or she will realize almost \$20,500 in increased productivity. *Anything* that can be done to optimize the interpretive environment will provide rapid return on investment. It may be possible to justify digitizing all prior exams, for example, so that the physician can perform all interpretive tasks at the mammography workstation.

Obviously, there are many other areas throughout the process where productivity can be enhanced. Optimization must be *planned*; it will not happen by accident. It is equally important that the new workflow plan be documented, so that appropriate tasking and timelines can be adopted.

Project Management

When one analog unit is replaced by another analog unit, the unit is plugged in, calibrated and inspected

by the radiation physicist, the paperwork is sent to the ACR, and the unit goes into production. The initial implementation of digital mammography is considerably more involved and difficult. The challenges stem from the fact that multiple technologies must be carefully integrated to achieve optimized results. Those technologies are:

- PACS¹ or offsite networked storage system
- Interpretive workstation
- Information system
- Acquisition unit
- Acquisition workstation
- CAD
- Digital enhancements
- Digitizer (for prior exams)
- Laser printer

It is possible to purchase some of these items that are internally integrated from a single manufacturer, but no one manufacturer offers all of the links in the digital mammography "chain." The most critical integration is between the acquisition system, PACS and the information system(s). I recommend a project management approach to the integration issue. With this approach, the individual in the center or practice who has been designated to lead the implementation forms a team that is composed of the following:

- Project manager
- Engineering representatives from each of the new and existing vendors
- Lead technologist
- IT representative

Make certain there are no omissions, and that each vendor commits to the process in writing before any purchase orders are issued.

The project management process as the team meets to jointly develop a detailed implementation pathway. This pathway should include specific tasks for each individual or company and the date by which each task will be accomplished. Each task then needs to be signed off by the person or organization that is responsible. All team members can be required to report weekly with respect to readiness and the ability to meet the time commitments. It is important to allow sufficient time for the team meeting, and to have the meeting at a location that will eliminate interruption. Needless to say, cell phones must be turned off and only used during breaks.

What makes this system work is informing all vendors — as a precondition for quoting the equipment purchases and participating in the project — that *no payment will be issued until the system is fully functional*. With this requirement each engineer is looking not only at his or her tasks, but also to make certain that all pre- and post-requisite tasks are included in the project management document as well. If properly organized, this system is almost self-executing.

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Setting Expectations

Digital is *different*. The image is comparable to an analog image, but the new process of capturing, reading and storing the image causes a series of challenges that must be factored into the expectations that we have for the technology.

Installation of the digital imaging system takes a while. Unless you are putting the unit in a new room, you should plan to have two weeks of downtime for the room, as the unit must be installed, calibrated, validated by the radiation physicist, the paperwork submitted, and certification granted before the applications training can even begin. Applications training will then take about a week. If the clinical staff including physicians have not used digital mammography before, there is a further MQSA requirement that they each receive eight hours of new modality training before performing mammograms on patients.

Digital mammography is marketed as providing a vast improvement in throughput, and there is no question that exceptional performance can be achieved. It will not happen, however,

if you cannot already deliver a time-effective analog mammogram and if you have not thoroughly engineered an effective new digital workflow. Since each facility requires time to become familiar with the new equipment and process, I recommend that patient scheduling be kept at pre-digital levels for the first two to four weeks of operations.

From the physician's perspective, digital mammography is a mixed proposition. Not only is the image a little different, the entire interpretive process is different. More alternative "views" of the image are presented, and electronic tools such as magnification are available to provide the physician with more interpretive information than he or she has ever had. Add to these factors the need to learn to use mammography-specific

workstation tools, and this conversion can appear daunting to the physician. In fact, it is not unusual for physicians to require more interpretive time for each mammogram before they become familiar with the new tools and workstation.

Most breast radiologists find that it takes them from two to six months to become proficient at reviewing digital mammograms. Even then, because of the variety of views and tools that are available, dedicated breast radiologists cannot be expected to reach the same level of productivity as with analog interpretation. It is important, therefore, to provide the additional time in the schedule for the physicians to review screening mammograms.

Expect Need for Upgrades, Enhancements

Finally, the technology itself is in constant state of change. Digital mammography is rapidly evolving, with new "tools" for aiding interpretation, and even new digital developments like tomosynthesis and contrast enhancement on the horizon. As you enter the digital mammography world, expect the need to purchase upgrades and enhancements over the life of the equipment as prerequisites to achieving the benefits possible with this technology.

Digital mammography brings a whole new world to women's care. The power of the digital image and the digital information system is only beginning to be recognized, and we can scarcely dream of the advances to come. We can, however, make sure that we begin the journey of discovery by following the correct pathway. We must also create an environment of success for the journey by investing in careful planning and setting reasonable expectations. There is no doubt that digital mammography is the centerpiece for the future of breast imaging.

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NOTES

1 Note that the author addresses only PACS, and not CDRoms, DVDs or other storage systems. The reason is that each of these "alternatives" is temporary and finite in their capabilities. Breast imaging requires robust, scalable storage architecture to be sustainable.

i Pisano ED, Gatsonis C, Hendrick, et. al: Diagnostic performance of digital versus film mammography for breast cancer screening. N Engl J Med 2005; 353(17):1773-83. EPub 2005 Sep 16.

ii Kolb GR: Solving the digital dilemma: a strategic approach. Seminars in Breast Disease 2006; in press.