

## Structured Reporting — Speeding Clear Results to Referrers

By Dan Harvey  
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Integrating digital dictation, structured reporting, and voice recognition with PACS can improve report turnaround time (TAT) and reduce transcription cost. Michael Trambert, MD, presented data illustrating such savings at RSNA 2007, reporting a two-year return on investment (ROI) on the integrated system at Santa Barbara Cottage Hospital in California.

The study, conducted by Trambert and Alex Knapik, MD, a radiology resident at the hospital, compared the efficiency of integrated dictation and structured reporting with PACS to a previously outboard digital dictation system. In the earlier, nonintegrated environment, reports were transcribed to a separate RIS. (The hospital later implemented voice recognition with the new system.)

Santa Barbara Cottage Hospital, a large, community-based, acute care teaching facility, implemented PACS in 1998, at first using nonintegrated digital dictation. In December 2005, the hospital implemented digital dictation with a structured reporting system from its PACS vendor DR Systems.

“The company has created a soup-to-nuts RIS/PACS, including integrated dictation,” says Trambert, lead radiologist for PACS reengineering for the Cottage Health System and the Sansum-Santa Barbara Medical Foundation Clinic. He is also a medical advisor to DR Systems.

The comparison involved two three-month windows: the first from before the integrated system was in place in 2005 and the second from 2006 after the system had been installed.

The study measured report TAT, transcription full-time equivalents, and ROI. Trambert reported that the hospital realized significant reduction in labor and faster TAT for routine final reports and emergency exam reports. The hospital experienced a 45% reduction in full-time equivalent transcription within 90 days of installation. “While the number of transcriptionists employed during those windows decreased, we turned out reports much more quickly,” says Trambert.

In addition, average report TAT decreased by 8%, with a reduction of 70% for STAT exams. Further, Trambert estimated that, based on full-time equivalent reduction, the system would achieve ROI within two years.

### Automatic Report Population

Trambert attributed much of this improvement to the complete integration of structured report templates within the PACS that automatically populate many elements of a radiologist’s report and eliminate the need for transcriptionist data entry. Those elements can be mapped right into the report, explains Trambert, and users get to choose which elements to map in by exam type. “Integration led to productivity because automation fills out the report information that transcriptionists once had to type,” he says.

Another benefit of integration at Cottage Health was that users no longer needed two screens or two separate computers. “Often, with nonintegrated systems, a separate PC and separate screen is required for the structured reporting and/or VR [voice recognition],” he explains. “With integrated dictation, it’s all right there within the PACS workstation. Thus, you don’t need to orchestrate a second system.”

### Gaining Voice

While a voice or speech recognition feature hadn’t been utilized at the time of the study, the hospital has since implemented such technology and has realized additional advantages. “While we experienced great

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benefits from just the first step of the reengineering, the addition of VR makes report TAT virtually instantaneous,” says Trambert.

As such, the level of service has substantially increased during the 14 months after implementing the VR system. “Service can be incomparable when you’re able to produce a text report almost as quickly as you read the exam,” Trambert says.

He adds that DR System’s technology is designed to be user friendly and intuitive. “It has a Dragon-based engine with a straightforward lexicon that’s easy to use,” he says.

“Once you get past the learning curve, radiologist inefficiency is nearly nonexistent,” Trambert adds, “and when you’re expert enough, you can use VR in a mix of cases.”

At Southern Ohio Medical Center, radiologists have completely embraced VR technology. Within the Portsmouth, Ohio-based healthcare system, radiologists have gone 100% VR, according to RIS/PACS administrator Howard Stewart.

The medical center serves a seven-county region in southeast Ohio and northern Kentucky and includes a primary care hospital, five satellite centers, an urgent care center, a 70-bed long-term care facility, and a retirement center. Hospital staff includes seven radiologists and more than 80 technologists. The organization implemented VR technology in 1995.

Initially, the facility experienced sizeable improvement by reducing TAT to 12 hours. In seeking further improvements—and facing a transcriptionist shortage that forced the hospital to use off-site transcription, which proved an expensive and inefficient remedy—the center eventually deployed Agfa Healthcare’s TalkStation.

The hospital first installed Agfa’s IMPAX technology in 1998. During the next six years, it added Agfa’s TalkStation 2.2 for digital dictation and voice recognition, its IMPAX WEB1000 Web server, five IMPAX DS3000 diagnostic display stations with integrated Talk Technology speech recognition, IMPAX RIS, and a software upgrade to IMPAX v4.5.

“So we are an Agfa shop, and all of those products are fully integrated,” says Stewart. “When radiologists pull up a study to read, the images displayed are the ones they dictate on in the order used in the RIS. So everything is tied together very tightly.”

TalkStation enabled radiologists to dictate reports as audio files that could be transmitted online to transcriptionists who then returned the reports to radiologists for review and approval. This technology was followed by complete implementation of VR with the TalkStation 3.0 upgrade as radiologists’ comfort level with the technology increased.

“Our radiology group decided to go 100% VR, even though that’s not the way we designed the system,” says Stewart. “It was designed to allow radiologists to read STAT cases through VR and to use transcriptionists as editors for routine or nonurgent cases or for outpatient cases and referrals from other departments. But, as the radiologists found speech recognition easy to use, they wanted to use it exclusively.”

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Subsequently, efficiencies improved tremendously. “We removed the transcription/editor piece from our workflow,” says Stewart. “Now, our TAT for the final report is under two hours. Emergency department and STAT cases are turned around in under 30 minutes. So we’ve eliminated the need for a preliminary report. The first report a physician sees is the final report.”

### Oregon Leads, Not Trails

Sky Lakes Medical Center in Klamath Falls, Ore., made the switch with unanimous acceptance by its radiologists. “From what I’ve seen and heard, it’s fairly unusual for a group of radiologists to agree and go 100% VR vs. transcription,” says Bretton Breazeale, MD, diagnostic and interventional radiologist at Sky Lakes. “Usually, you meet some resistance from the older radiologists or people who worry about their typing or editing skills. Even our most senior members jumped right on board.”

Sky Lakes implemented DR System’s PACS solution in 2002 and is currently in the middle of a three-phase integration project that began in February 2007. It completed the first phase in approximately one week. “It helped that we have a small group,” says Breazeale. “Plus, DR Systems provided four days of good training.”

Sky Lakes is a 176-bed facility with 925 full-time employees and was one of the first community hospitals in the Pacific Northwest to deploy PACS. “We’re proud that we’re a rural community hospital that’s very high tech,” says Tiffani Mozingo, Sky Lakes’ PACS administrator. “Going 100% VR was a significant accomplishment.”

The center sought to improve TAT and report quality but was also interested in obtaining a VR system. “It was a natural transition to go with DR’s VR technology because we already had the DR PACS,” says Mozingo.

Like other integrated sites, Sky Lakes saw its biggest improvement in reporting. “Previously, for most studies, it took one or two days for transcription. Then we had to mail the report to physicians, which took a couple more days,” Breazeale explains.

In particular, TAT for their emergency department improved dramatically, dropping to an average of 5.4 minutes by November 2007.

Structured reporting produced another benefit by creating uniform reports, which Breazeale says makes it easier for physicians reading the reports to find the information.

Sky Lake’s radiologists also spend less time on the phone. “Often in the past, physicians wanted us to call them with study results,” Breazeale says. “But those requests have dramatically decreased. As soon as we sign off on a report, we immediately fax it to their offices. They can have the report on the same day.”

Back at Southern Ohio, Stewart reports that his organization has seen fewer clinically significant errors using speech recognition. The hospital also realized significant cost savings, as it no longer needs as many transcriptionists to complete radiology reports. In addition, Southern Ohio no longer prints and distributes preliminary reports, which translates into improved workflow.

The technology keeps Southern Ohio’s risk management group happy, as it eliminates clerical and diagnostic errors. “Because data is transferred electronically from different modalities and work areas, very few clerical

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and misread errors creep into the system," says Stewart.

### Structured Reporting Component

Structured reporting included in integration opens the door to "the future of radiology," according to James W. Baltzell, MD, a radiologist and adjunct assistant professor with the University of Minnesota Medical Center, whose Fairview site is utilizing an integrated system.

"The imaging field is moving into a difficult time, as more and more patients will be needing treatment," he says. "Systems will be taxed by at least a 10% increase in studies each year."

Structured reporting can help alleviate this burden by delivering reports in such a way that large amounts of data can be saved in a searchable format. Integrated with PACS and speech recognition and implemented properly, structured reporting offers better communication with referring physicians, faster TAT, and data-mining capabilities.

The university uses PowerScribe from Nuance. "PowerScribe's structural reporting provides templates, or you can make up your own templates," says Baltzell. "As such, it can record 'normal' or 'abnormal' dictation. The bottom line is that you can make your own structured report."

"Structured reporting is what I call hybrid reporting," says Daniel Steinberger, MD, a resident at the university who has been instrumental in the implementation of the technology within the organization. "It uses structured elements, free text, images, diagrams, etc, to generate a report."

Steinberger began his medical education at the university in the early 1990s, but his career took a detour. In 1994, he helped establish cMore Medical Solutions Inc., which later became ProVation Medical, Inc. and was ultimately acquired by Wolters Kluwer.

"My experience with structured reporting began when I founded the company," explains Steinberger, who served as CEO from 1995 to 2001. He started ProVation when he recognized the need for computer software to replace paper records and realized that transcription automation was inevitable. "Starting with GI [gastrointestinal] endoscopy and moving into other subspecialties, ProVation proved at hundreds of facilities that structured reporting could be extremely effective," he recalls.

The secret, he revealed, was in making a better report without slowing down the physician. ProVation developed two key tools that made the technology workable, he says. The first was a new software development model that used full-time physicians in a medical content group. "It arose from the recognition that the product was more than 50% medical content and medical rules," says Steinberger. "These physicians built knowledge bases day by day, term by term, rule by rule. That's a massive undertaking, but without this, the product would never have become smart enough to be useful."

The second key tool developed was a next-generation user interface that utilized artificial intelligence to anticipate what the physician wanted to do next. "Without this, programs are just too clumsy to be useful," Steinberger points out. "This tool set did for structured reporting what Windows did for desktop computing: It made it useable for everyone."

Organizations that bring these elements together can conceivably improve every radiology study performed

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in the future, he says. “It’s good for patients, referring physicians, radiologists, research, and even insurers.”

Eventually, Steinberger left the company to resume his medical career in radiology. “I’m currently in my final year of training at the University of Minnesota,” he says.

### Eliminating Jargon

Structured reporting reduces the use of medical jargon that can sometimes lead to miscommunications resulting in errors. “It uses standard terminology, which decreases confusion for referring physicians,” says Steinberger. “Theoretically, every radiologist should get the same result from a study and communicate it in a consistent way.”

But it doesn’t always work that way. “I typically work with 40 new residents each year, and it’s fascinating to hear the new words they come up with,” relates Baltzell. “But while they know what the terminology means, the rest of the medical world may not.”

Structured reporting gets around that. “It helps everyone use the same terms for the same definition,” says Steinberger.

Standardized terminology, he adds, results in quality improvement and improved research, as data can be better analyzed. “Structured reporting with standardized terminology creates data bases of findings and impressions which become rapidly searchable and analyzable,” says Steinberger.

Moreover, structured reporting improves billing cycles and compliance: Structured systems can automatically produce correct billing codes, which can reduce administrative costs, shorten billing cycles, improve compliance, and decrease undercoding, according to Steinberger.

And it significantly contributes to radiologist efficiency. “Structured reporting systems can rapidly find previous results for a patient from prior reports and put them at the radiologist’s fingertips,” say Steinberger.

Today, many organizations use a form of structured reporting, even if they don’t use VR, says Baltzell. “What they’re using are static structured reports,” he describes.

One thing that Steinberger has been doing for the university is developing dynamic structured reports. “A static report is a template, or a static block of text with a few blanks,” he explains. “But a dynamic structured report refers to the artificial intelligence piece that anticipates what physicians want to do next and rapidly enables them to take the report in the direct way they want to go, including and excluding elements. Templates are typically too rigid to accommodate the breadth of findings one encounters. Dynamic systems offer dramatic flexibility while still using standards, but they require a lot of intelligence to be built into the software.”

For organizations considering integration, Stewart offers several suggestions. “First, put your money into the back end and your support services,” he says. “With support services in place, you’ll have the right resources to deal with any problems that arise when you go live.”

Back-end considerations also include training. He recommends obtaining a robust managed service agreement from the vendor and that organizations pay for good data migration and testing. “When we did site

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visits, we found that some places balk at costs involved with preparing an old system to be integrated, imported, migrated into a new system. You need a lot of planning and resources for that piece.”

Expectations must also be realistic. “Things will never go completely smooth. Visit other sites. Talk to the staff—the radiologists and technologists—that use the system, as well as the IT departments, who actually handle the data migration. Typically, hospitals don’t want to put a lot of money into investigation and preparation for implementation. But that’s very important, and it will make a huge difference. Often, you’ll learn more from site visits than from vendors,” Stewart adds.

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