Surging 64-slice scanner sales fuel cardiac teleradiology

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Eighteen months ago, Dr. David Dowe of Atlantic Medical Imaging in New Jersey was attending a lecture by Dr. Jack Ziffer of Miami Baptist on the challenges of chest pain workups in the emergency setting.

Ziffer showed clearly what a huge problem the chest pain workup was, Dowe said. Patients were being jeopardized by the inaccuracy of the workup, and as a result, emergency departments were being exposed to significant liability. It was financially wasteful in the form of unnecessary admissions and inappropriate discharges.

Dowe, who has specialized in cardiac CT imaging, was also aware that there might be as many as 1000 installed 64-slice scanners in the U.S., most intended for coronary CT angiography, and that most were not being used for that purpose. Problems with education, staffing, and the unpredictable timing of chest pain admissions were getting in the way.

Thus was born a movement that this year quickly swept through radiology: remote cardiac reads via teleradiology. Hospital-based radiology groups and imaging centers that take this route can sign up for all-hours interpretations of cardiac CT images without the hassles of seeking specialized training or maintaining cardiac CT interpretive skills on staff.

In January, Dowe and some colleagues launched Emergency Cardiac Imaging. The company has access to 40 radiologists and operates 24 hours a day, 365 days per year, providing postprocessing and interpretations of coronary CTA and triple rule-out exams in all 50 states. It has also formed an alliance with an established teleradiology company, Images on Call, giving it added reach into the marketplace.

Since Emergency Cardiac Imaging opened for business, the nation's three largest teleradiology companies have also begun offering cardiac CT reads.

BIG PLAYERS ENTER THE PICTURE

NightHawk Radiology Services, the nation's largest teleradiology company, launched its cardiac service in April under the direction of Dr. William Shea. Initially, the company offered emergency coronary CTA and triple rule-outs as an extension of its existing service contracts for preliminary teleradiology interpretations, but the company also has its eye on the screening market. Plans were to train 20 of NightHawk's existing nonortho and non-neuro radiologists in cardiac interpretations, Shea said.

Image postprocessing was to be handled by specially trained technologists based in Austin, and interpretations were to be made at NightHawk facilities, including operations in Zurich and Sydney. In a partnership with TeraRecon, NightHawk planned to make both the postprocessed images and the data sets available to customers for viewing of the results or further manipulation of the data, Shea said.

The nation's second largest teleradiology company, Virtual Radiologic, has begun promoting a cardiac imaging service at its website and now offers round-the-clock reads with interpretation services that include cardiac CTA, triple rule-out, ejection fraction, calcium score assessment, and pericardial assessment, according to Dr. Sean Casey, chief executive officer and founder.

Subspecialty teleradiology provider Franklin & Seidelmann, the nation's third largest teleradiology company, began offering cardiology interpretations to a three-state imaging center chain based in Louisiana in April and as of mid-May was providing 10 cardiac interpretations per day. Although most of the work is currently screening scans, president Scott Seidelmann anticipates moving into the emergency market as well and expects that the company could be reading 100 cardiac scans per day within four months. Other smaller companies are also looking at providing specialized cardiac reading services.

The movement hasn't escaped the notice of academic radiology. In May, Massachusetts General
Hospital launched a cardiac teleradiology service under the direction of Dr. Ricardo Cury. Unlike the others, the MGH service won't provide emergency reads. It also has a fairly unusual marketing plan: to provide overreads and second opinions to the many radiologists who have been through the hospital's cardiac CT training program.

**CONFLUENCE OF FACTORS**

Fueling this growth is a confluence of factors that seems to have played right into the hands of teleradiologists and their ability to aggregate interpretation services that individual facilities are unable to provide economically:

- **The superior imaging capabilities of 64-slice CT scanners.** The ability of these scanners to rapidly image the coronary arteries and other chest structures (10 to 15 seconds for a coronary CTA and 20 to 25 seconds for a triple rule-out) has made them a faster and more economic alternative to catheter angiography and nuclear stress scans. It's now possible to quickly assess the most serious causes of ER chest pain and send patients to treatment or home earlier.

- **The vast number of devices installed.** Dowe guesses there may be 1000 64-slice scanners operating in the U.S., though a more conservative estimate from Diagnostic Imaging Scan places the figure at 700. That's still a lot of scanners, many of them purchased for heart imaging within the last one or two years.

- **A relative paucity of radiologists with the training and experience needed to read cardiac CT.** Training courses are proliferating-and filling up quickly-but for many facilities, cardiac interpretation skills are not that easy to acquire and maintain.

(A level 2 reader under American College of Cardiology/American Heart Association guidelines must have completed at least 18 hours of dedicated CCT classes and have interpreted 150 studies, for 50 of which the candidate must be physically present and involved in both the acquisition and interpretation of the scan. The standards are expected to become more rigorous a year from now.)

- **The resulting discrepancy between scanners and readers.** There are more 64-slice scanners out there than there are radiologists ready to provide interpretations of the cardiac images obtained from them.

Consider also the need to postprocess the images on sophisticated workstations, an added expense and training requirement for either the radiologist or a technologist, and the need to have trained experts ready to review them on a moment's notice, often at night. All of this amounts to a situation in which a facility that has the wherewithal to purchase a 64-slice scanner may not have the corresponding ability to get its emergency or screening scans interpreted.

"One of the surprising things we found is the number of hospitals that have bought these scanners and haven't thought through who is going to read the images or how they will get read," Siedelmann said.

As a result, while lots of facilities have acquired 64-slice scanners, many of them remain tied to old styles of treating chest pain admissions.

**BRINGING A NEW APPROACH**

Into this set of circumstances walk cardiac teleradiologists with a package that may include quality assurance, protocol development, image postprocessing, and interpretations by highly trained and well-qualified experts.

"The days of a patient presenting to ER and having an ECG, serial card enzymes, and a stress test in the morning are numbered," Shea said.

A minority of patients arrive at the hospital with acute coronary syndrome: angina, an abnormal resting ECG, and, typically, an elevated cardiac enzyme profile. They usually go immediately to the cath lab or are given tissue plasminogen activator (tPA). The majority, however, don't have all the signs and symptoms of acute coronary syndrome, but they still get part of the workup described. They are held in the ER for 24 hours, get serial ECGs, serial cardiology enzymes, and a stress test.

"It's expensive, time consuming, and inaccurate," Shea said.

A coronary CT scan, on the other hand, can inexpensively and accurately determine whether the coronaries are normal or not. It can also rule out pulmonary embolism and aortic dissection (the other two legs of the triple rule-out) and even whether the patient has pneumonia.
If these factors are normal, the patient is out the door and can bypass 24-hour observation, Shea said.

Or, as Dowe puts it, the hospital gets reduced medicolegal liability, shorter lengths of stay, lower costs of care, and the ability to legitimately market itself as a value-added chest pain center and thus distinguish itself from the competition.

At this point, Dowe is the person who has the most experience in this new clinical-business model. Emergency Cardiac Imaging went live on Jan. 8. The service started out providing interpretations to three hospitals and seven outpatient imaging centers in New Jersey.

The new company has a central processing lab in Somers Point, NJ, that operates 24 hours a day all year round, providing postprocessing and interpretations of coronary CTA and triple rule-out exams in all 50 states, Dowe said.

So far, it's been getting three to five scans per day per customer. Most of the scans are coronary CTA, and in these, 70% to 80% of patients have plaque without stenosis or are entirely normal and can be safely triaged home, Dowe said.

The remaining 20% to 30% have a potential or definite stenosis and are admitted. Dowe said they try to keep triple rule-out scans to a minimum because these involve 20 to 30 mSv of radiation exposure.

The triple rule-out scans should be reserved for the patient whose chest pain is entirely cryptic with no clues to point to an organ or vascular territory, he said.

"We postprocess the cardiac CT images, creating multiplanar reformats, maximum intensity projections, and 3D volume renderings," Dowe said. "All exams are postprocessed in our lab, and immediately after that the radiologist reviews the live data sets, interacts with the data, and issues a wet reading of the vascular territories of interest. On the same data set, we also look for relevant noncardiac findings. Reports are issued immediately by whatever means a customer desires."

The company accepts reads only from 64-slice scanners.

"We think that 16-slice technology CCTA exams are too rigorous for the typical ER chest pain population," Dowe said.

MOVING INTO CARDIOLOGY

The established teleradiology companies moving into cardiology are treating it as an extension of their existing business strategies and building from an existing customer base.

"We understand our current clientele will need this service," Shea said. "The second most common reason for presentation to the ER is chest pain. Teleradiology companies will need to be there to offer that service to their customers. Even the largest hospital systems, which have the scanners and workstations and software, are unable to provide 24/7 service. They don't have the resources. We will provide this service on a 24/7 basis."

Virtual Radiologic received numerous requests for cardiac imaging services from existing clients over the past year, Casey said.

"It was a natural evolution for us to enter into the field of cardiac imaging given the advancements in technology, market demand, and the positive impact on patient care," Casey said.

Franklin & Siedelmann has styled itself as a subspecialty teleradiology service, and cardiac teleradiology fits well into that concept.

"I see cardiac imaging as another subspecialty," Seidelmann said. "The technology is there-it's permeated the market-and the demand is there. More and more, they are asking for cardiac interpretations."

Seidelmann noted that cardiac CT angiography studies require experience to be read properly, but that many hospitals don't have that expertise onsite.

"This lends itself well to teleradiology," he said.

SUBSPECIALTY THINKING

Of all the teleradiology companies, Franklin & Siedelmann is the one that most frequently emphasizes the subspecialty element and the power and expertise that its focus on a single subspecialty gives practitioners. All of the cardiac teleradiology providers, however, seem to be headed in this direction, with plans to aggregate cardiac interpretations in ways that are impossible for the individual facilities they serve.

Also focusing on the subspecialty approach, but in a different way, is the Massachusetts General Hospital cardiac teleradiology program. MGH has a dedicated cardiac program and has been developing cardiac CT since 2000.

The teleradiology program is part of a cardiovascular CT core lab that also includes educational
monthly four-day courses covering 100 cases of cardiac CT with cath correlation and a dedicated group specializing in clinical trials in cardiac CT, said Cury, its director for teleradiology and education. The lab has 16 dedicated cardiovascular imaging workstations from five vendors: GE, Siemens, TeraRecon, Vital Images, and Philips.

Cury stresses that the images used in the interpretations-axials, MPRs, and thin-slab MIPs—are all derived from raw data and that the interpreting physicians are able to interact with the data on the workstations. A paper in the June issue of *Radiology*, of which Cury is one of the authors (Diagnostic accuracy of image postprocessing methods for the detection of coronary artery stenoses by using multidetector CT. 2007;243:696-702), concluded that multislice CT with interactive display methods, especially MPRs, is more accurate than analysis based on prerendered images.

Unlike the others, the MGH program will provide reads only for scheduled cases, and its six level 3-trained radiologists and one cardiologist will work regular five-day-a-week schedules, providing 24-hour turnaround on interpretations.

Although they started operations in late May with three contracts, Cury anticipates the business will build on the strength of the monthly training courses in cardiac CT already offered by MGH. The hope is that trainees will be able to apply their cardiac CT interpretation skills at their facilities but also turn to MGH for overreads and second opinions. Within six months the program could be providing 20 to 40 reads per day, he said.

All of the big commercial programs promise to devote considerable attention to getting facilities that collect the cardiac scans up to speed.

"We're interested in helping in all aspects: reading, training technologists, providing the protocols, plus helping maintain accreditation in safety," said Dr. Richard D. White, who is overseeing the cardiac teleradiology program for Franklin & Seidelmann.

Dowe agrees that there's more to it than just reading the exams.

"Coronary CTA is very much a 'garbage in, garbage out' exam. A customer's CT techs must be educated in the techniques necessary to make good CCTA images that can be postprocessed accurately," he said.

Dowe and others said they are willing to visit sites to train radiology departments in the acquisition of cardiac CT images.

Common problems in image acquisition include phase misregistration from irregular heartbeats, signal-to-noise issues related to obesity, and inappropriately low mA settings during the CCTA exam, he said. The teleradiology services generally said they recommend beta blockers, even when heart rates are low, to assure a steady heart rate during the scan.

**FLEXIBILITY NECESSARY**

All of the big commercial programs also indicate that they will be flexible in what types of services they offer.

"We will offer our clients the technical capability to do reconstructions 24/7 and the opportunity to do preliminary or final reads or both," Shea said. "Some customers are interested in preliminary reads during evenings and weekends. Others are interested in reconstructions only. Still others are interested in everything. We'll offer a full spectrum of services."

The bottom line is that these practitioners see a big and growing market for cardiac teleradiology.

"Hospitals need help in overcoming the education and human resources challenges and the onerous task of providing 24/7/365 coverage for CCTA," Dowe said. "They cannot do it alone."

*John C. Hayes is editor of Diagnostic Imaging.*

**Disclosures:**

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