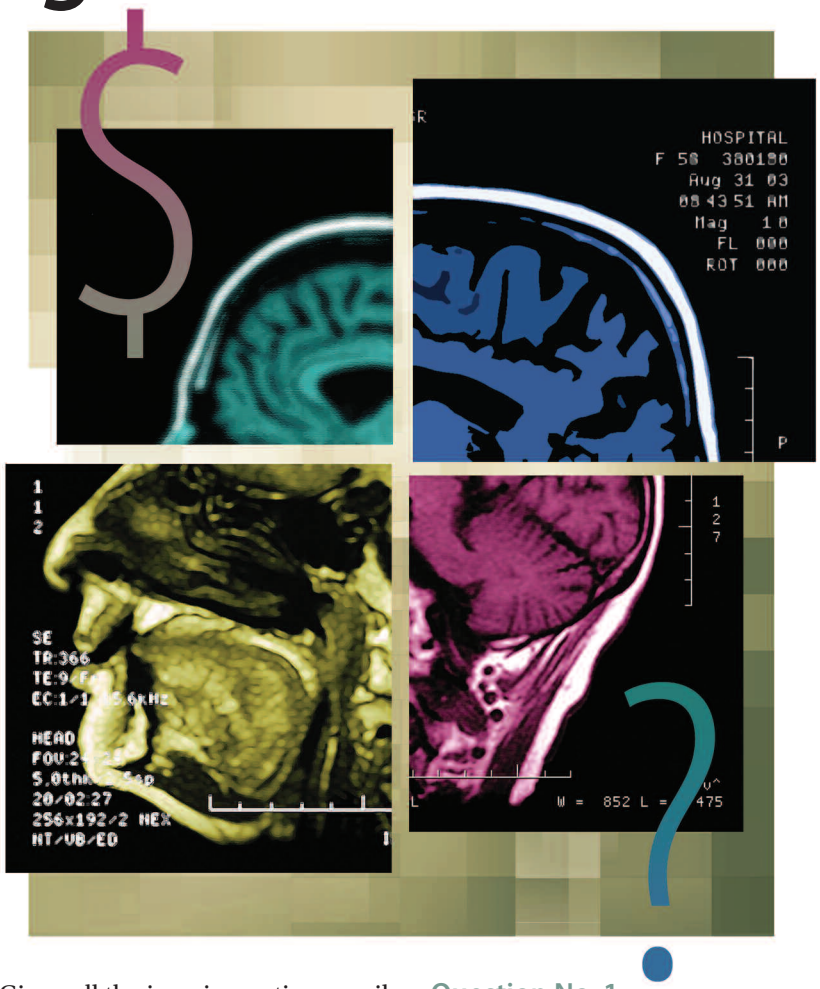
# The Imaging Question

## Are advances in MRI technology and CT scanners worth the investment?

By Anthony J. Montagnolo




Seeing is believing. That is why medical imaging has become so important to health care and why it will continue to require significant investment for providers to deliver quality care.

Imaging presents a huge challenge to providers because it requires a major investment in the face of declining reimbursement at a time when the variety of systems continues to expand. The list of different imaging technologies is long and varied: MRI (magnetic-resonance imaging), CT (computed tomography), ultrasound, PET (positron-emission tomography), nuclear medicine, cardiac catheterization and so on.

ECRI Institute, an independent nonprofit organization that researches the best approaches to improving patient care, and *Trustee* have teamed up to produce an occasional series that explores the value of new clinical technologies. The series is designed to help board members evaluate technology in the context of competing strategic priorities.

Given all the imaging options available, what emerging technology trends should trustees understand now and what questions should they ask when these expensive imaging systems are proposed for acquisition? Because so many imaging technologies exist now, an attempt to review them all comprehensively would be impossible. Nonetheless, a handful of key questions likely will apply to many in the near future. These questions also will serve as examples of the questions a board should ask when any expensive technology comes up for acquisition approval.

### Question No. 1

*Are we buying luxury, workhorse or economy?*

Let's start with two trends in the world of MRI: the diffusion of high field-strength MRI and intraoperative MRI. MRI has become an incredibly valuable imaging technology because it provides high-resolution, soft tissue images without using ionizing radiation like X-rays. This means it does not have as high a radiation-exposure risk as a CT scan or cardiac catheterization. It will continue unequivocally as a mainstay technology for the foreseeable future. It will not become ob-

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solete in and of itself.

MRI uses a powerful magnetic field, and the relative strength of the magnetic field is measured in units called teslas. The most common field strength in use now and still purchased today is 1.5T. In the past few years, new MRI systems have emerged that use a higher field strength of 3T. These systems offer better image resolution, but at a cost of roughly $1 million more than 1.5T systems. Reimbursement rates are generally the same regardless of field strength, and there is no conclusive evidence that higher field-strength imaging makes a huge difference in most patient outcomes.

Higher field strength does improve imaging for some clinical applications, particularly in neuro imaging. So, what is at question is whether to purchase the high-end 3T system or stick with the more basic 1.5T workhorse. In a recent survey from market researcher IMV, it was noted that about one in five hospitals plans to buy a 3T system. Clearly, some institutions are willing to pay the extra price to get better image quality. In the end, there is no absolute answer to whether to pursue the higher-end 3T or stay at 1.5T. It is, more or less, local factors that likely will drive the decision.

## Question No. 2

*Where does this imaging technology fit in our specific clinical pathways and overall patient population?*

The second new MRI technology worth noting is intraoperative MRI. This technology literally puts an MRI into an operating suite to allow for real-time imaging during surgery. It is used to help neurosurgeons improve tumor resection and navigational instrument-placement accuracy.

Like high field-strength MRI, this technology has huge potential but, because it costs millions to implement, it is diffusing slowly. Intraoperative MRI cannot be considered an absolute must-have technology at the moment, but imaging in the operating room has the potential to change outcomes and advance patient care. In this case, a board should ask the usual questions about costs and what other priorities might not be met if an investment of this size is made.

Trustees also should probe deeply to find out how committed the clinicians are. Taking on this kind of new technology requires more than just a single clinical champion to make the most of it. Too many times we have seen initial enthusiasm wane after early adopters of new technology either move to a new institution or there are too few cases to make good use of the technology in the first place. It is critical for decision-makers to understand whether the clinical users form enough "mass" to ensure the technology's use as well as to ensure there are enough potential cases or patients.

## Question No. 3

*Do we have the right mix of imaging technologies to meet our mission now and in the future?*

This question could be asked for all the imaging technology in your institution, but the point becomes clear if you limit it to CT scanners. Over the past two decades, the use of CT scanners has exploded and so has the variation in available technologies. With the advent of multislice scanning technology, for example, the ability to perform faster imaging has opened new possibilities for procedures such as coronary imaging that could not have been done with a CT scanner a decade ago.

In the lingo of CT scanners, you can now buy 16-, 64-, 128-, 256- or 320-slice CT scanners. A slice refers to how many image slices can be acquired for each rotation of the X-ray tube around the patient—more slices mean faster imaging. There is even a CT scanner that has two X-ray beams—known as a dual-source CT scanner—to provide a potentially faster and better image.

Expanding use of CT also has meant trying to understand how many CT scanners are needed to meet growth and where they should be located (for example, the emergency room or only in radiology). So the real challenge is matching current and future utilization and demand (that is, how many and what specific kinds of CT images we are taking) with the overall number and capability of CT scanners at the enterprise level.

Further, the growing use of CT scanners has led to an increasing concern about X-ray dose, especially in children. Unlike MRI, CT scanners use X-rays, which are ionizing radiation capable of inducing cancer. Clinicians must take care to limit the radiation dose to only what is necessary to get high-quality images. Manufacturers have recognized the need to limit dose and have been working on methodologies in the newer scanners to reduce dose without compromising quality.

Given this, another important consideration in reviewing CT scanner alternatives should be the potential improvement in patient dose. So, the short lesson here is to ask not just about the individual purchase of a new proposed CT scanner, but to ask about whether a review of all CT scanners in an institution has been conducted to understand the existing CT fleet status, the current and future clinical demands, and any overall CT scanner patient-safety considerations rather than reviewing each CT scanner as a one-off acquisition.

As imaging continues to expand and grow in clinical value, the overall investment hospitals make will continue to increase. At the same time, the picture for imaging reimbursement remains cloudy and confusing. Asking the right questions may not solve this dilemma completely, but it should help keep the picture from getting fuzzy. In the end, imaging technology answers many questions but raises a few, too. **T**

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