

# Industry perspectives on the future of medical imaging

Mary Beth Massat

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According to the American Health Policy Institute (AHPI), a non-partisan 501(c)(3), the federal government is the single largest payer of healthcare in the U.S., accounting for 25.9% of national health expenditures.

The U.S. government, unsurprisingly, is also a major regulator of healthcare, with such agencies as the U.S. Food and Drug Administration, which regulates medical devices and pharmaceutical drugs, and the Agency for Healthcare Research and Quality (AHRQ), which oversees healthcare quality and safety standards, to name just two of many.

Even the U.S. Congress impacts healthcare: Passage of the Affordable Care Act (ACA) set standards for benefit packages throughout the health insurance market. Many industry experts believe the political volatility of the ACA, and other recently passed regulations will significantly impact healthcare in general, and medical imaging in particular, well into the foreseeable future.

“The outcome of the upcoming election and the political acceptance or rejection of healthcare reform will have the biggest impact on healthcare

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and medical imaging in the next year,” says Satrajit Misra, vice president, Marketing & Strategic Development, Toshiba Medical.

As the country’s healthcare system shifts from volume-based to value-based, providers want to know how new solutions and systems will benefit patient care. “Our customers and providers are all interested in how systems and solutions provide better healthcare outcomes,” says Michael Wendt, SVP of Diagnostic Imaging at Siemens Healthineers. “So the question being asked is: What contribution is imaging providing to these improvements and value based purchasing?”

Similarly, there is legislation requiring healthcare providers to achieve certain technological compliance and reimbursement levels or face reductions and/or penalties. Similar to Meaningful Use (the HITECH Act), the Consolidated Appropriations Act of 2016, also known as the Omnibus Bill, requires imaging providers to phase out film and computed radiography (CR) X-ray imaging and migrate to digital radiography (DR). If they don’t, they will face reductions in reimbursement for exams performed on analog X-ray systems starting in 2017 and on CR equipment starting in 2018.

“We all understand that new regulations and changes in reimbursement

impact technology utilization,” says Kirsten Doerfert, Senior Vice President Marketing, Konica Minolta Healthcare Americas, Inc. “There are still sites using film that will be impacted in 2017 with a 20% reimbursement reduction, so we’ve worked hard to help lead the way in educating the market about these pending changes.”

George Curley, Senior Marketing Manager, Imaging, Agfa adds, “The most impact will be felt due to reimbursement changes that are coming as a result of the Appropriations Act.”

Diku Mandavia, MD, FACEP, FRCPC, Chief Medical Officer, Senior Vice President, FUJIFILM Medical Systems U.S.A., Inc. and FUJIFILM SonoSite, Inc., also believes the Act will impact buying behavior. “In 2017, we will see a trend in providers transitioning from analog X-ray and CR systems to DR systems,” Dr. Mandavia says. “DR technology that delivers better image quality, better patient satisfaction, and lower patient dose will be in demand.”

## Workflow, accountability, transparency wanted

With continued reductions in reimbursement, Homer Pien, Chief Technology Officer, Philips Imaging, says workflow improvements, while not sexy, are what providers want. “We are seeing a heavy demand for solutions

that fit into an existing workflow, or that drastically improve workflow, while maintaining or improving quality of care. Workflow improvements save time not only for the clinician and health system, but also for the patient.”

On the regulatory side, there’s a significant trend toward increased accountability and transparency, says Denny Durmis, Head of Commercial Operations, Radiology Americas, Bayer. “For example, the FDA is considering how to address inequities in the regulatory oversight of hospital equipment maintenance and the consequences for patient safety and diagnostic outcomes. OEMs servicing equipment that they manufacture are regulated by the FDA, while third-party servicers lack such regulation.

In some instances, the solutions that provide value may not be the latest and greatest imaging devices. Charles Koontz, President and CEO of GE Healthcare Digital and Chief Digital Officer of GE Healthcare, explains, “Cloud technology and machine learning algorithms have the greatest potential to revolutionize medical imaging. As clinicians continue to face pressures to cut costs while also improving the quality of care, solutions that increase coordination and deliver efficiencies will be center stage. Deep learning will enable radiologists to improve diagnostic accuracy while also reducing examination time.”

“The greatest impact on medical imaging,” says Brandon Long, Director of Radiology and Clinical Imaging, Cerner, “will be the ability to extract quantitative information from the image so it can be used in downstream care decisions. In the future, radiologists will not simply be interpreters of imaging studies. They will be the curators of quantitative and descriptive information.”

Looking beyond imaging is critical, adds Siemens’ Wendt. “Enhancing the value of healthcare includes quantifying a specific stage of a disease or condition for longitudinal studies of patients so the clinician can follow their progression and success of the therapy.”

### Conquering the challenges of Big Data

While across healthcare excitement is building for the potential of “big data” to contribute to understanding the impact of technology on patient outcomes, the reality is that in radiology, data mining can be a difficult and costly proposition. One key factor is the lack of structured reporting.

“The radiology industry needs to create standards that provide structure and definition so that the same types of data can be located in any report regardless of the format that each facility uses,” says Keith Miller, Carestream Solutions Architect for Healthcare IT solutions. “Carestream is working on applying natural language processing as a tool to extract data from reports.”

The radiologists’ narrative report also needs to be transformed to a structured, synoptic report, explains Cerner’s Long. “Radiologists will no longer dictate quantifiable information generated on the image, but capture it directly from the image viewing solutions. Accuracy and efficiency improves when measurements, location, and anatomical findings are generated as a byproduct of a radiologist viewing workflow.”

Big Data is the means to an end, explains Wendt. “We need to translate this Big Data to the individual, and to do that we need to quantify it along with the cohort of individuals within the data.” To accomplish that, there is a tremendous need for uniformity in acquiring data.

### Coming attractions in modalities *Incredible, ever shrinking ultrasound*

Ultrasound is already experiencing a “renaissance” as it continues to prove its value, says FUJIFILM’s Mandavia. “Ultrasound technologies that integrate with medical IT will be of increasing importance as they help remote providers get immediate access to patient vitals and records as well as connect with specialists, giving them near- or real-time assessments and ultimately, improving patient outcomes.”

Philips expects wider adoption of contrast-enhanced ultrasound in 2017. “Earlier this year, the FDA issued a landmark decision to approve the first ultrasound contrast agent for diagnostic imaging of the liver in adult and pediatric patients,” says Vitor Rocha, Business Leader, Philips Ultrasound. Philips also remains committed to the focus on miniaturization of imaging modalities, including ultrasound.

Pairing ultrasound with ultrasound contrast agents can both benefit patients and enhance clinicians’ diagnostic capabilities, adds Lars Shaw, Global Product Director – General Imaging Ultrasound, GE Healthcare. “With the recent clearance for CEUS characterization of focal liver lesions, caregivers now have a powerful tool in the diagnostic workup of liver care patients.”

With the continued trend to make ultrasound smaller, lighter, and more portable, Andrew Hartmann, Vice President & General Manager, Global Ultrasound & CT Solutions at Carestream, says, “Compact devices continue to help expand the reach of ultrasound to emergency room and primary care settings. There is also potential for intravascular ultrasound to equip physicians with the information they need to determine

if additional imaging is needed and develop a diagnosis and treatment plan.”

The miniaturization of ultrasound devices will allow further development of intravenous ultrasound, with catheters to get smaller and at the same time packing more elements in it, says Paulo Ucio, senior manager, Market Development, UL Business Unit, Toshiba Medical. “Another trend is the development of advanced 3D tools with magnetic sensors and matrix array probes that can allow for volumetric visualization and measurement of vessels without the need to go intravenous, improving the safety of the procedure while reducing time and cost.”

### ***MRI gets faster, friendlier***

As Siemens’ Wendt sees it, MRI has entered the era of exam optimization, with the patient at the center. “MR magnets are becoming wider, shorter and less noisy—and that trend will continue,” he says. “Exam times are shorter, with fewer breath-holds or free breathing.”

MR imaging that is fast, consistent, user intuitive and patient friendly will be the key developments the industry will continue to see, adds Philips’ Pien. “MR needs to become more accessible in this era of value-based healthcare. Next to that, we want to make MR more definitive so it can provide personalized answers supported by quantitative data and deliver evidence-based outcomes.”

Automation will play an important role in reducing MR scan times. Jonathan Furuyama, product manager, MR Business Unit, Toshiba Medical, says that extreme cost pressures as reimbursements are falling requires clinicians to continue to do more with less. “Technology can help clinicians reduce exam times and provide more consistent results by automating the alignment and location of anatomy,” he says.

Shortening and simplifying exams that were historically time-consuming

and difficult to perform, such as cardiac MR, is a key focus at GE Healthcare. According to the company, cloud technology along with new algorithms can now process large datasets unimaginable before for evaluation by a clinician in near real-time.

Cloud processing could also help propel clinical utility of functional MRI (fMRI). “The growth of resting state fMRI field, where the patient is just lying in the scanner instead of performing tasks, also has the potential of making fMRI more clinical acceptable. The data analysis necessary for RS-fMRI is still rather complicated and laborious and confined to academic institutions. The introduction of cloud processing technology, however, could enable the expansion of RS-fMRI into clinical practice,” says Bryan Mock, MR Premium Segment General Manager, GE Healthcare.

### ***Finding more answers with spectral CT***

Dual energy, or spectral, imaging is opening up new opportunities for CT to help answer very specific questions for a specific disease. According to Sonia Sahney, Premium CT Global Product Marketing Manager at GE Healthcare, spectral imaging has the potential to go beyond anatomical imaging and into tissue characterization. “In spectral imaging, the biggest impact will be oncology related. This will bring an ability to characterize lesions without time consuming and costly biopsies and will allow clinicians the ability to monitor treatment response.”

Philips’ Pien believes that the industry will soon see the benefits of dual-energy, or spectral, CT, including, reduced time and costs by decreasing the number of patient findings that are indeterminate and the ability to treat a broader range of patient population,

such as those with a low tolerance for contrast or metal implants.

Dose management will continue to be an important conversation in 2017. “Over the next year, the industry will see significant development in new reconstruction algorithms that lower the dose and improve CT spatial resolution, as well as the introduction of new technologies that further improve the use of wide-detector CT,” says Dominic Smith, senior director, CT, Nuclear Med, & MR Business Units, Toshiba Medical.

“We also believe that in CT, we need to focus on workflow enhancements and on the technologists spending more time with their patients than optimizing the scanner,” says Siemens’ Wendt. “Automation and simplification of the workflow will represent a big step forward by helping remove variance across patients and exams.”

### ***Getting proactive about dose management***

Closely tied to CT and other ionizing radiation modalities is the continued development of dose monitoring and reporting solutions. As Dominic Siewko, CHP, Radiation Health and Safety Officer, Philips, points out, new standards from the Joint Commission, changes in reimbursement by the Centers for Medicare & Medicaid Services for hospitals based on low-dose equipment features, and the upcoming MACRA law are all spurring adoption of these technologies. Yet, a challenge remains, he says, in deciding how to use this information.

“We should be using this data to look for trends in the department’s performance,” Siewko says. “Using historic data you can see variance per procedure, per machine and even per technologist.”

The movement from retrospective to proactive dose management will be the

most significant development in the near future, adds Bayer's Durmis. The goal will be to detect and prevent inappropriate dosing before the patient is scanned, and to better correlate the image quality relationship between radiation and contrast dose. "Participation in global dose registries, where best practices can be shared and adjustments to protocol parameters can be suggested, may help facilitate proactive dose management," he says. "Additionally, artificial intelligence and machine learning will be integrated into the best-in-class dose management software solutions."

These solutions need to be comprehensive and track dose across the full spectrum of radiation-emitting devices to take the benefits of dose management beyond any specific department or modality, says Tanya Quiles-Moreno, General Manager, Dose Management, GE Healthcare Services. "Taking that to the next level, developments in analytics and dashboards will further support decision-making and reveal improvement opportunities. Education and advisory services will also continue to advance beyond proper use to increase productivity and value. Advancements in personalizing the data, such as size-specific dose estimates and organ dose information, will also be hugely impactful."

### ***Bringing intelligence to digital radiography***

With reimbursement changes looming as a result of the Appropriations Act, the industry expects to see increased investment in DR technology. Agfa's Curley says that healthcare providers want to leverage their existing imaging investments yet generate higher quality images with the potential for lower radiation dose.

Image analysis and processing will also undergo continued development,

adds Gregg R. Cretella, Director, Field Sales Support, FUJIFILM. "Advances in this area have recently yielded features that can identify and highlight patient motion in an image, remove obscuring anatomic structures and provide exposure surveillance tools to facilitate a department's dose reduction initiatives."

The next step is to add intelligence to the panel to help in other areas beyond the image quality and dose, says Konica Minolta's Guillermo Sander, Senior Product Manager, DR. "Rather than calibrate the panel based on how many times it has been exposed, we can build in intelligence that lets the technologist use it until it needs to be calibrated. If we add in remote diagnostics, we can further reduce downtime. This type of preventative maintenance takes the burden off the user and helps them focus on the patient."

Tomosynthesis in DR is also a potential emerging technology. Rob Fabrizio, Director of Strategic Marketing, FUJIFILM, says that digital tomosynthesis is included in the several of the company's DR systems, enabling a lower dose alternative to CT for similar imaging in their general x-ray room. "Tomosynthesis can great help visualize fine detail between joints and diminish effects of hardware in images."

Carestream believes cone-beam CT can also be utilized to generate sweeping 3D images in multiple areas of the body. "It offers the image quality of CT but at a lower dose than traditional room-based CT systems," says Marty Pesce, Carestream's Clinical Development Manager for Digital Medical Solutions. "This technology can help specialists treat orthopedic conditions that affect the biomechanical behavior of the joints such as arthritis, meniscus

loss, instability and malalignment syndromes. It's also an important tool for detecting sports-related injuries to knees, ankles and feet."

### ***Quantity and quality in molecular imaging***

The trend toward quantitative imaging is propelling new advancements in molecular imaging. "Physicians are looking for objective, number-based characterization of individual patient data. Better quantification will require both advances in imaging hardware as well as advanced reconstruction and image analysis algorithms," says Philips' Pien.

"The focus of quantitation is not just looking at the images, but associating them with events from biomarkers," says Siemens' Wendt. "Clinicians want quantifiable data that can be followed over time to see the progression of disease or successful treatment."

At GE Healthcare and GE Healthcare Life Sciences, Mike Barber, President and CEO, Molecular Imaging and Computed Tomography, says the organization is continuing to invest in the development of new imaging agents as well as focus on development in imaging technology that supports new agents. "Recent trends and opportunities, for example, in the neurological disease area, are Vizamyl for the visualization of amyloid plaques and GE-180 for the assessment of multiple sclerosis," he adds.

"Digital event detection and quantitative analysis go hand-in-hand to improve existing procedures with lower dose while delivering greater clinician insights. However, the greatest impact could be in how this new technology would allow molecular imaging to improve patient outcomes and answer clinical questions in ways not possible today."