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imaging choices hold key for reduced cost and improved quality of care

AT A GLANCE

- > Finance leaders should understand the drivers of cost and quality in their organizations, including how best to make cost-effective use of technologies.
- > Ultrasound, in particular, can provide a means to improve quality of care and reduce costs because it can help a hospital avoid costly mistakes, can sometimes serve as a substitute for more expensive scans, and can help reduce the risk of extra days in the hospital.
- > Optimum use of ultrasound can help to improve performance on measures that determine a hospital's eligibility to receive value-based incentive payments.

With the continuing transition from volume-based to value-based

payment, the nation's hospitals and health systems face an ongoing challenge in finding ways to improve quality of care while reducing costs. Financial incentives and penalties tied to the quality of outcomes and patient satisfaction are already in effect under Medicare's Hospital Value-Based Purchasing Program, putting many hospitals at risk for cuts in their Medicare payments.

In this environment, it is incumbent on finance leaders of hospitals and health systems to understand the drivers of cost and quality in their organizations. The cost-effective use of technologies, in particular, warrants finance leaders' attention. An important example is the use of ultrasound: Hospitals and health systems can achieve significant savings by using ultrasound at the point of care in lieu of other imaging approaches in appropriate medical situations.

Using Ultrasound to Improve Value

There are three particular ways in which ultrasound can be used at the point of care to improve quality of care and reduce costs. Finance professionals who are knowledgeable about ways ultrasound can be used to enhance value will be able to play a more meaningful role in helping their organizations effectively contain clinical costs and maintain care quality.

Ultrasound guidance can help avoid costly mistakes. More than 5 million central venous catheters (CVCs) are placed by clinicians in U.S. hospitals every year, with complication rates of more than 15 percent reported. In October 2012, one particularly dangerous—even life-threatening—adverse event, the accidental puncture and collapse of a patient's lung (iatrogenic pneumothorax) during a

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CVC placement, was added to Medicare's list of preventable hospital-acquired conditions (HACs) for which the Centers for Medicare & Medicaid Services (CMS) has determined it will no longer cover treatment costs.

Iatrogenic pneumothorax can be an expensive mistake, with the cost per incident ranging from \$17,000 to \$45,000, according to a study funded by the Agency for Healthcare Quality and Research. In the future, the financial impact could be even larger. Starting in October 2014, a hospital with HAC rates in the bottom quartile will face a 1 percent reduction in its Medicare market basket across all inpatient payments. In subsequent years, the penalty for high HAC rates will rise, ultimately reaching 2 percent in FY17 and beyond. These penalties make it increasingly urgent for finance leaders and clinicians to identify and implement best practices to reduce HACs.

This concern is one factor that has prompted many leading U.S. hospitals to adopt ultrasound-guided needle placement as a best practice for all CVC insertions. The goal is to ensure optimal outcomes, whether the patient is treated in an emergency department (ED), an operating room (OR), or a critical care unit (CCU). Cutting-edge medical schools, including University of California, Irvine, now teach students to use ultrasound at the point of care for a broad range of applications.

By promoting ultrasound guidance across its hospitals, Memorial Hermann Healthcare System in Texas recently achieved an unprecedented rate of zero pneumothorax complications during central line placement at many of its hospitals for one full year. Eight of Memorial Hermann's EDs also achieved this

exceptional level of safety—particularly impressive given that Memorial Hermann's EDs treat more than 411,000 patients a year.

Multiple studies also document that ultrasound visualization at the point of care can powerfully improve both the success and safety of central line placement. The reason is simple: Just as radar helps airline pilots navigate safely at night, ultrasound visualization allows clinicians to see the blood vessel they are targeting, instead of working blindly. Because patients' anatomy can vary, the standard anatomic-landmark-guided method is more likely to result in repeated attempts, with initial failure rates of up to 30 percent reported by researchers. Not only are placement failures uncomfortable or even scary for patients, but they also slow care delivery and clinician workflow.

A randomized study of 900 critical care patients highlights the benefits of using ultrasound-guided catheterization of the internal jugular vein, compared with the landmark-guided technique. The rate of collapsed lung was 0 percent in the ultrasound group, versus 2.4 percent for blind placement. The researchers also reported that ultrasound-guided insertions took less time, were more likely to succeed on the first try, and had a dramatically lower rate of serious complications.

Without ultrasound guidance, CVC placement errors not only seriously compromise patient safety and increase hospital costs, but also can lead to expensive lawsuits. When researchers analyzed more than 7,000 closed malpractice claims in the American Society of Anesthesiologists Closed Claim database, they found that those "related to central catheters had a high severity of injuries," with a median payment of \$143,250 for pneumothorax. Payments exceeding \$1.4 million were reported for hemothorax, \$1.7 million for blood vessel injury, and \$6.9 million for cardiac tamponade.

Ultrasound can sometimes be a substitute for more expensive scans. New research shows that using ultrasound as the first diagnostic test for certain common medical conditions, when appropriate, instead of more expensive imaging methods, such as

computed tomography (CT) or magnetic resonance imaging (MRI), could produce huge cost savings for the U.S. healthcare system while maintaining high standards of care. However, because all three imaging modalities play an essential role in medicine, it is incumbent upon finance leaders and clinicians to identify the best uses of each technology.

For example, MRI has become “the gold standard” for visualizing neurological tissues, including evaluating cases of acute spinal cord injury, according to a recent review of 113 scientific papers. Similarly, CT is the acknowledged gold standard for radiological assessment of cases of traumatic brain injury, as well as diagnosis of acute hemorrhagic stroke. MRI and CT scans are valuable for making many other differential diagnoses, but are also costly and therefore should be used judiciously.

Dramatic advancements in image quality in recent years, combined with changes in the design of ultrasound systems, have expanded the role of ultrasound at the bedside. As a recent review in the *New England Journal of Medicine* notes, “With appropriate use, point-of-care ultrasonography can decrease medical errors, provide more efficient real-time diagnosis, and supplement or replace more advanced imaging in appropriate situations.” Using ultrasound also spares patients the radiation burden associated with CT scans, amid growing public concern about the dangers of repeated exposure through diagnostic imaging, such as increased risk of cancer.

However, in comparison with CT and MRI, ultrasound remains underused due to a combination of factors, including higher payment rates for advanced imaging methods. Enthusiasm about such innovations as 3-D CT and other sophisticated capabilities has also contributed to a rapid rise in utilization, to the point that ultrasound has been overshadowed, even though it can safely answer many clinical questions at far lower cost.

How much money can hospitals save by opting for ultrasound in appropriate situations? A report by KNG Consulting, LLC, analyzed the potential cost reductions if diagnostic ultrasound at the point of care were used for renal colic, an excruciatingly

painful condition that affects 1.2 million Americans a year, accounting for about 1 percent of hospital admissions. Typically, CT is used in the United States to diagnose kidney stones in patients with renal colic. Yet the European Association of Urology in its 2011 Guidelines on Urolithiasis lists ultrasound as the first imaging option for this disorder.

Substituting ultrasound for CT to diagnose kidney stones in patients with renal colic could dramatically cut costs. KNG’s analysis of 2009 Medicare data found that if ultrasound had been substituted for CT in just 30 percent of renal colic cases, the savings to Medicare would have been \$21.6 million. If ultrasound had been used 70 percent of the time, the savings would have jumped to \$50.5 million per year.

Ultrasound also has impressive clinical and bottom-line benefits if it is used first to diagnose musculoskeletal (MSK) disorders. These advantages include non-invasive, real-time imaging at the point of care, without exposure to ionizing radiation. And unlike CT and MRI, which produce static images as the patient lies still, ultrasound also allows clinicians to examine joints and other musculoskeletal structures in motion, which may provide more accurate evaluation of MSK conditions, potentially enhancing outcomes.

Clinical evidence supports using ultrasound as the first diagnostic test for a wide range of MSK conditions. Yet the KNG Consulting analysis found that, in 2009 alone, CT and MRI accounted for 95 percent of Medicare-allowed charges for all extremity imaging, and ultrasound, only 5 percent. That represented a huge missed opportunity to curb costs. Looking at 2009 Medicare data regarding imaging used in diagnosis of ankle injuries, for example, KNG Consulting found that if ultrasound had been the imaging choice to diagnose 70 percent of ankle injuries and rotator cuff injuries, Medicare would have saved \$13.2 million, while using it first for 50 percent of rotator cuff injuries would have saved \$52.2 million. Had ultrasound been used as the first diagnostic test for both conditions in 70 percent of cases, the combined savings would have skyrocketed to more than \$91 million per year.

These numbers are only a small fraction of the healthcare savings that could be achieved by

substituting ultrasound for MRI, an imaging method that many patients find to be stressful or even claustrophobic. Researchers from Thomas Jefferson University Hospital analyzing actual and projected use over the period of 2006 to 2020 calculated that the cost of using ultrasound in place of MRI in appropriate MSK cases over that period would translate into Medicare savings of more than \$6.9 billion.

Ultrasound guidance reduces the risk of extra days in the hospital. One in seven Medicare beneficiaries suffers an adverse event while in the hospital. This high rate of medical harm cost the healthcare system \$17.1 billion in 2008, with procedural complications, such as hemorrhage and accidental punctures, ranking among the most common mistakes, according to a 2011 study published in *Health Affairs*.

Ultrasound guidance can significantly reduce both adverse events and costs of two commonly performed invasive procedures: thoracentesis (draining fluid from the chest) and paracentesis (draining fluid from the abdomen), according to two studies presented at the 2011 National Patient Safety Foundation annual meeting. Researchers from United BioSource Corporation's Center for Epidemiology and Database Analytics compared outcomes in patients who underwent these procedures between January 2007 and December 2008, using data from the national Premier Prospective automated hospital database, with the following results.

For the more than 61,000 patients who underwent a thoracentesis, ultrasound guidance reduced the rate of pneumothorax by 19 percent. When pneumothorax occurred, this error raised the patient's hospital cost to \$13,784, versus \$11,032 for a patient who didn't suffer a collapsed lung. Moreover, the mean length of hospital stay was 7.9 days for a patient with a pneumothorax, compared with 6.5 days for a patient without it.

For the 69,859 patients who underwent a paracentesis—often a challenging procedure to perform blindly—ultrasound guidance reduced bleeding complications, such as hemorrhage, hematoma, and hemoperitoneum, by 68 percent. A bleeding

complication boosted hospital costs to nearly \$30,000, about triple the cost for a patient without this complication (\$9,476), and nearly doubled length of hospital stay, from a mean of 5.2 days for a patient without a bleeding complication to a mean of 9.5 days for a patient with one.

As hospitals gear up for the pay-for-performance era, multiple studies demonstrate that ultrasound at the point of care delivers proven value by powerfully improving the safety and quality of care, while also reining in costs. This imaging modality also has a significant potential to enhance patient experience and satisfaction, leading to higher scores on the HCAHPS survey and the potential for greater profitability that follows from such indicators of performance excellence.

The Role of Finance

Senior finance leaders can take several steps to ensure their organizations make the wisest use of imaging resources:

- > Analyze the hospital's data to ascertain the imaging ordering practices of physicians, including the relative levels of usage for MRI, CT, and ultrasound and the relative cost-effectiveness of each technology.
- > Share findings with physician executives and discuss protocols to standardize practice patterns, such as making consistent use of ultrasound-guided CVC insertion to reduce risk of iatrogenic pneumothorax and avoiding unnecessary patient exposure to ionizing radiation through CT scans.
- > Create opportunities for medical staff to receive education and training about best practices in using and ordering imaging.
- > Recognize the importance of physician leadership in creating and sustaining improvements in quality and safety of care.
- > Set high standards and create a system of positive reinforcements. ●

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