

Medical Imaging & Healthcare Quality

Medical imaging innovation has facilitated more accurate and timely diagnosis and treatment of cancer and myriad other diseases, all but eliminated exploratory surgeries, and helped reduce hospital stays so patients can return to their lives and work more quickly.

REDUCED HOSPITAL STAY

By enabling physicians to accurately and quickly diagnose a patient and administer appropriate, targeted treatment, medical imaging allows patients to spend fewer days in the hospital. Data indicate that every additional \$385 spent on medical imaging correlates to an average reduction of one day in total length of hospital stay.¹ With an average cost of \$1,172 per day of standard hospital care, every dollar spent on medical imaging in turn saves approximately \$3 in total costs.²

TARGETED TREATMENT

The right scan at the right time improves health outcomes by allowing physicians to deliver targeted treatment.

- **Positron emission tomography (PET)** is one of the most powerful tools in the management of many cancers. In one study, PET imaging allowed physicians to avoid unnecessary tests or procedures 77 percent of the time, and in over 36 percent of cases, PET scanning resulted in a change in the decision to treat or not treat.³

- **Computed tomography (CT)** and **magnetic resonance imaging (MRI)** help improve outcomes for stroke patients by informing the choice of the right therapy at the right time.
- **Stereotactic radiosurgery (SRS)** and **Stereotactic body radiation therapy (SBRT)** use robotic positioning and real-time, continuous imaging to guide radiation therapy with sub-millimeter precision. Because it limits harm to nearby tissues and organs, noninvasive radiosurgery can be used to treat spinal tumors without causing paralysis.
- Advances in robotically controlled **ultrasound** transducers help bring greater accuracy to complex surgeries such as the removal of cancerous growths in the kidney.⁴
- Rather than going in “blind” to place a catheter, physicians today use **ultrasound** to guide them precisely to the right position to place a probe. This technique helps to avoid common complications, such as punctures, infection or blocked blood vessels. The Agency for Healthcare Research and Quality (AHRQ) strongly recommends use of real-time ultrasound for central line placement.⁵

Medical Imaging & Health care Quality (continued)

SMARTER SURGERY

With 250,000 surgeries per year, acute appendicitis is the most common indication for emergency abdominal surgery in the United States. Traditionally, it was also one of the most difficult to diagnose, with up to 50 percent of appendectomy patients historically undergoing unnecessary surgery. Now, abdominal **computed tomography (CT)** is used to improve accuracy in diagnosis and avoid unnecessary appendectomies. Abdominal CT scans have been shown to cut the rate of unnecessary appendix surgery among all adults by 88 percent.⁶

Each year, an estimated 95,000 people in the United States have their heart valves replaced.⁷ For inoperable or high-risk patients, a new, minimally invasive procedure called transcatheter aortic valve replacement can cut the odds of repeat hospitalization by 50 percent,⁸ but positioning the new valve can be difficult. Used during live fluoroscopy, **3D angiography** provides real-time 3D guidance to help the surgeon navigate an aortic valve to its intended location.

DETECTION & DIAGNOSIS

Advanced medical imaging provides an unprecedented glimpse inside the human body to diagnose and treat diseases that once confounded the medical community.

- Medical imaging technologies such as **computed tomography (CT)** and **magnetic resonance imaging (MRI)** help detect and diagnose breast, colon and lung cancers early, when they can be treated.
- Each year, more than 6 million people in the United States visit the **emergency department (ED)** because of acute chest pain. **Coronary computed tomographic angiography (CCTA)** has proven effective in ruling out—or confirming—heart attacks more quickly.⁹

- **Positron emission tomography (PET)** imaging aids in the differential diagnosis between Alzheimer's disease and other forms of dementia, allowing doctors to map out an appropriate treatment regimen for each patient.
- Parkinson's disease has no known cure, but treatments can slow its progression if patients receive a timely diagnosis. **Single photon emission computed tomography (SPECT)** plus an imaging agent provide an image of the brain that shows function, facilitating earlier detection and treatment of this degenerative disease.¹⁰

For more information, visit medicalimaging.org/imagingforward.

¹ Looking Back on the Millennium in Medicine." *New England Journal of Medicine*. 342.1 (2000): 42-49. <http://www.ncbi.nlm.nih.gov/pubmed/10620649>

² "Cost Benefits of Medical Imaging and Inpatient Care." *Radiology*. June 2005.

³ "Impact of Positron Emission Tomography/Computed Tomography and Positron Emission Tomography (PET) Alone on Expected Management of Patients with Cancer: Initial Results from the National Oncologic PET Registry." *Journal of Clinical Oncology*. Bruce E. Hillner et al. March 2008. <http://jco.ascopubs.org/content/26/13/2155.short>

⁴ Brown SA. Henry Ford Pioneers Robotically Controlled Ultrasound Detroit, Michigan (MI). *Henry Ford Hospital*. 2011.

⁵ <http://www.ahrq.gov/research/findings/evidence-based-reports/services/quality/ptsafetysum.html>

⁶ *New England Journal of Medicine*, Vol. 358, No. 9, February 28, 2008.

⁷ Thom T, Haase N, Rosamond W, et al. Heart disease and stroke statistics--2006 update: a report from the American Heart Association Statistics Committee and Stroke Statistics Subcommittee. *Circulation*. 2006;113(6):e85-151.

⁸ Holmes DR, Mack MJ, Kaul S, et al. 2012 ACCF/AATS/SCAI/STS expert consensus document on transcatheter aortic valve replacement. *Journal of the American College of Cardiology*. 2012;59(13):1200-54.

⁹ <http://www.ncbi.nlm.nih.gov/pubmed/21939822>

¹⁰ Kupsch A, Bajaj N, Weiland F, et al. Changes in clinical management and diagnosis following DaTscan SPECT imaging in patients with clinically uncertain parkinsonian syndromes: a 12-week follow-up study. *Neuro-degenerative diseases*. 2013;11(1):22-32.