

High-Technology Imaging: What Does the Picture Actually Reveal?

A Look at the Value and Quality of Diagnostic Imaging
Procedures that Threaten Health Care Affordability



*Part of a Series of Special Industry Reports
From BlueCross BlueShield of Tennessee*

Ken Patric, M.D., Chief Medical Officer
Commercial and Established Markets

Jeff Smokler and Scott Wilson
Office of Public Affairs

The High Cost of High-Technology Imaging

How to ensure health care quality without jeopardizing affordability is at the crux of the debate over the rapid development and use of high-tech imaging (CT Scans, MRI's, etc). The cost of diagnostic imaging is one of the fastest growing segments of medical cost, accounting for 10 – 15% total spending. But that's just a part of the story:

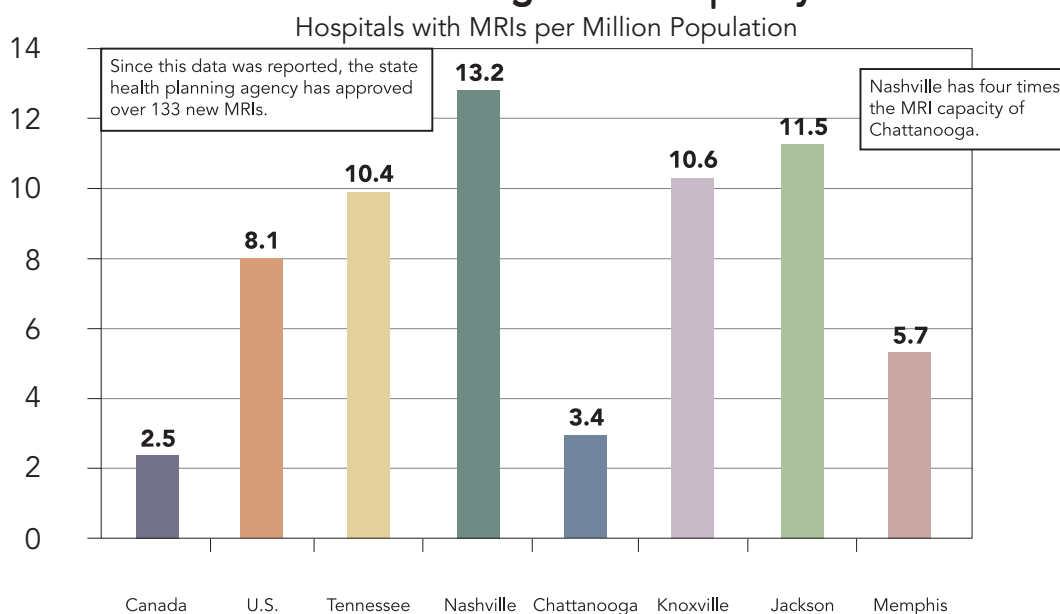
- \$100 billion worth of imaging exams are performed every year in America.¹
- Health plans' radiology costs are growing by 18% to 20% annually.² Meanwhile, health plans' prescription drug costs are increasing on average 10%.
- Within the practice of diagnostic imaging, high-technology devices account for just 20% of procedures yet account for 60% of total costs and 75% of medical inflation.
- The number of high-technology imaging procedures grew from 281 million in 2000 to 401 million in 2005—a 42% increase.³
- The number of outpatient diagnostic imaging centers increased 38% between 2001 and 2005.⁴

A Local Perspective

Trends in spending for high-technology imaging in Tennessee mirror what is taking place on the national stage. In some cases, radiology spending in the Volunteer State even exceeds national averages.

- Between 1999 and 2005, total imaging costs for BCBST members increased from \$4.18 per member per month (PMPM) to \$12.71 PMPM. This represents a total increase of 204%.⁵
- Meanwhile, medical inflation increased roughly 17.2%.⁶
- Average BlueCross BlueShield of Tennessee PMPM costs increased 26% annually between 2001 and 2004 as a direct result of high-technology imaging expenses. Low-tech imaging costs increased PMPM costs by 18% annually over the same period of time.⁷
- Tennessee has five times the per capita MRI capacity of Canada.⁸
- On average, the United States has fewer hospitals with MRIs per million people—8.1 facilities—than the state of Tennessee, which has 10.4 hospitals with MRIs per million people.⁹

Tennessee High-Tech Capacity



Source: 2001 Area Resource File; OECD Health Data 2001.

Does High Cost Mean High Quality in High-Tech Imaging?

Unlike hospitals, many outpatient imaging centers and medical offices do not have formal and comprehensive quality review programs. A recent review by a Massachusetts health plan found that of the more than 1000 outpatient imaging centers inspected:

- 31% failed to meet the criteria for privileging
- Of those that failed, 11% did so with “fundamental and serious deficiencies”
- Deficiencies included:
 - o Practicing without a state certificate of radiation control
 - o Failure to perform annual calibration of equipment
 - o Lack of basic radiation safety
- o Also troubling is data that show that, among a group of patients who had repeat whole-body CT scans because of positive findings, less than 2% had the suspected disease.¹⁰

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1. MedSolutions Web site. <http://www.medsolutionsinc.com>.
 2. MedSolutions Web site. <http://www.medsolutionsinc.com>.
 3. “Increasing Efficiency and Information-Sharing.” Medical Cost Reference Guide, BlueCross BlueShield Association, 2005, p. 46.
 4. “Increasing Efficiency and Information-Sharing.” Medical Cost Reference Guide, BlueCross BlueShield Association, 2005, p. 47; and Verispan, 2005.
 5. BCBST Data Warehouse.
 6. Bureau of Labor Statistics.
 7. Mark Austin. *Strategies for Managing High- Tech Imaging Costs*. BlueCross BlueShield of Tennessee, Presented February 2006.
 8. 2001 Area Resource File; OECD Health Data 2001.
 9. 2001 Area Resource File; OECD Health Data 2001.
 10. DK Verrilli. “Design of a Privileging Program for Diagnostic Imaging: Costs and Implications for a Large Insurer in Massachusetts.” *Radiology*, Vol. 208, 1998, pp. 385-392.

As the largest insurer in the state, covering nearly 3 million Tennesseans, BlueCross BlueShield of Tennessee (BCBST) takes very seriously its responsibility to provide prudent and constant stewardship of the state's medical dollar.

As our nation struggles with the ever-increasing costs of medical care—total health expenditures currently top \$1.9 trillion—the entire health care community continues to investigate the factors contributing to the escalating and ultimately unsustainable cost of care. The health community is casting a particular eye toward moderating delivery system inefficiencies and procedures whose high costs fail to correlate with positive outcomes.¹

For much of the last decade, a good deal of attention has been paid to the rising cost of prescription drugs, specifically the effect increased prescription dispensing has had on health care outcomes. In Tennessee, it has been clear for some time that higher drug spending does not necessarily equate to healthier populations. Consider, for example, that the Volunteer State is ranked 48th in overall health in America yet leads the nation in per capita drug spending.² Fortunately, efforts in recent years to foster responsible pharmaceutical spending—from encouraging the use of generic pharmaceuticals to establishing tiered formularies for prescription drug coverage—have been successful. Such efforts saved BlueCross BlueShield of Tennessee members \$51 million in 2005.

Although there is still much work to be done to contain prescription drug expenditures, other drivers are eclipsing drug spending as the leading causes of rising medical costs. One such driver is the skyrocketing cost associated with new and advanced medical technologies. Much attention has recently been paid to this growing expenditure. At a time when studies show that **as many as half of high-technology imaging procedures fail to add information to improve patient diagnosis and treatment**, stakeholders across the health care delivery system are increasingly concerned that costs of imaging are outpacing medical necessity.³

The High Cost of Going High-Tech

Low-technology imaging devices and procedures, like X-ray and ultrasound, have long been part of our medical vernacular. In recent years, however, there have been enormous advances in medical technology, and the use of high-technology imaging devices has expanded dramatically.

1. Mike Leavitt, Secretary of Health and Human Services. "Transparency in Healthcare a Priority." *The Hill*. May 11, 2006.

2. *America's Health Rankings: A Call to Action for People and their Communities*. United Health Foundation. 2005 Edition.

3. MedSolutions Web site. <http://www.medsolutionsinc.com>.

What is High-Technology Imaging?	
High-Tech Imaging	Low-Tech Imaging
Computerized Tomography (CT Scans)	X-rays
Computerized Tomography Angiography (CTA Scans)	Mammograms
Magnetic Resonance Imaging (MRI)	Bone-density Scans
Magnetic Resonance Angiography (MRA)	Echo Cardiograms
Magnetic Resonance Spectroscopy (MRS)	Ultrasound
Nuclear Cardiology	
Positron Emission Tomography (PET Scan)	

The advent of high-technology radiology devices has radically changed the face of medicine. These devices—when prescribed and used correctly—have limited the invasiveness of certain medical procedures, improved clinicians’ disease prevention and detection capabilities, and even saved lives. With so many clear benefits, it is easy to understand why clinicians are increasingly turning to these procedures and why consumers are demanding them.

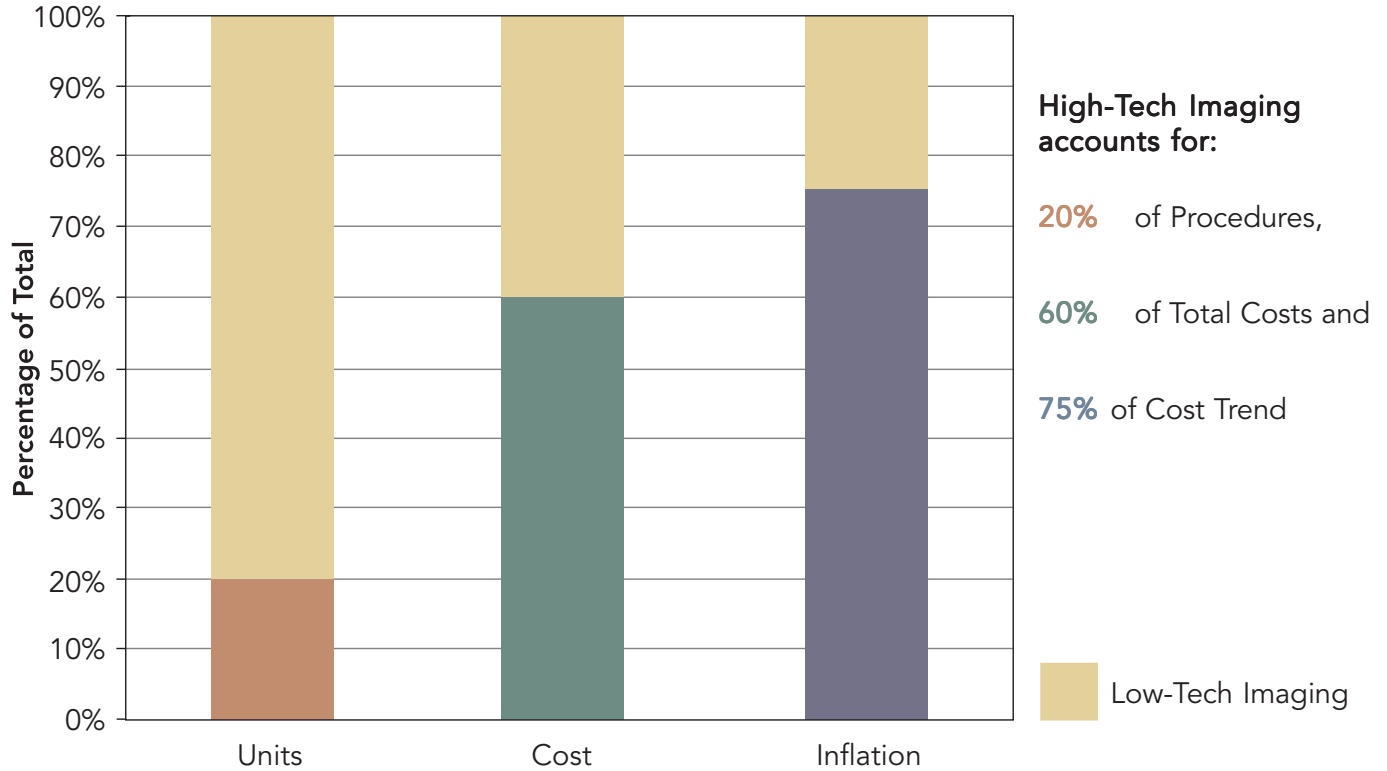
However, research also shows that there are factors beyond medical necessity contributing to the use of expensive high-technology imaging procedures, including a lack of understanding among clinicians about the appropriate use of imaging technology, inadequately trained staff, defensive medicine practices, direct-to-consumer advertising, and revenue subsidization.⁴

Both the appropriate and excessive reliance on high-technology imaging have created an unsustainable financial drain on the health care delivery system. Consider that nationally:

- \$100 billion worth of imaging exams are performed every year in America.⁵
- Health plans’ radiology costs are growing by 18% to 20% annually. Meanwhile, health plans’ prescription drug costs are increasing on average 10%.⁶
- Within the practice of diagnostic imaging, high-technology devices account for just 20% of procedures yet account for 60% of total costs and 75% of medical inflation.
- The number of high-technology imaging procedures grew from 281 million in 2000 to 401 million in 2005—a 42% increase.⁷
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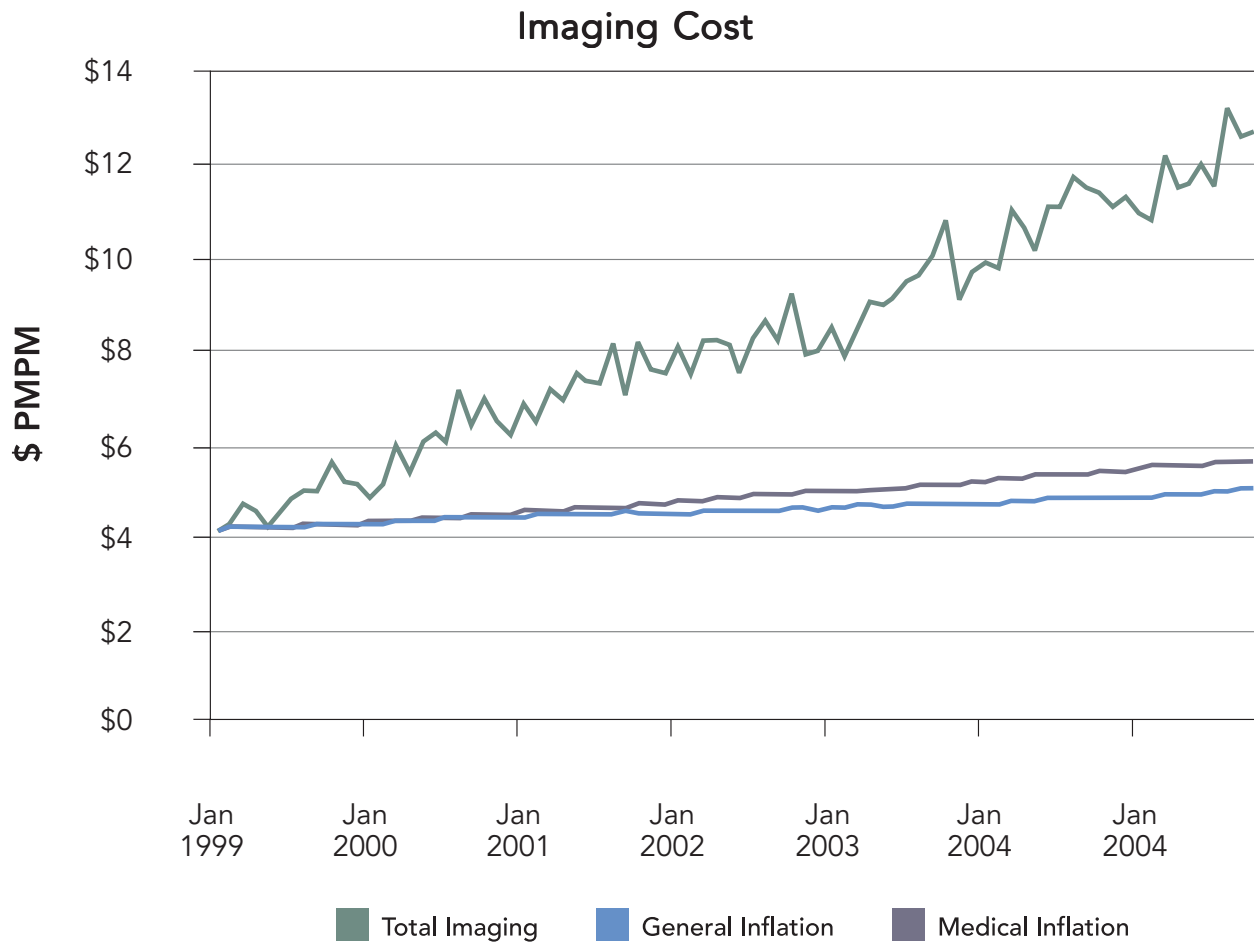
High-Tech vs. Low-Tech as share of Diagnostic Imaging



Source: Gregg Allen, M.D., "Radiology Data Insights –Developing Predictive Models," MedSolutions, 2006.

The rapid growth of and spending on medical technologies in America have had an adverse effect on health care affordability. Nationwide, health plans report that radiology expenses—more specifically, high-technology imaging—are driving premium increases.⁹ On average, health plan premiums increased 8.8% in 2005. Of that increase, nearly one-fourth was directly related to the use of higher-priced technologies and more intensive diagnostic testing.¹⁰

9. Alex Jablolkow. "Radiology Seen as Next Cost Battleground Between Health Plans and Physicians." *HealthLeaders/InterStudy*. April 11, 2006.
 10. *The Factors Fueling Rising Healthcare Costs 2006*. PriceWaterhouseCoopers, p. 2.



Source: BCBST Data Warehouse and Bureau of Labor Statistics.

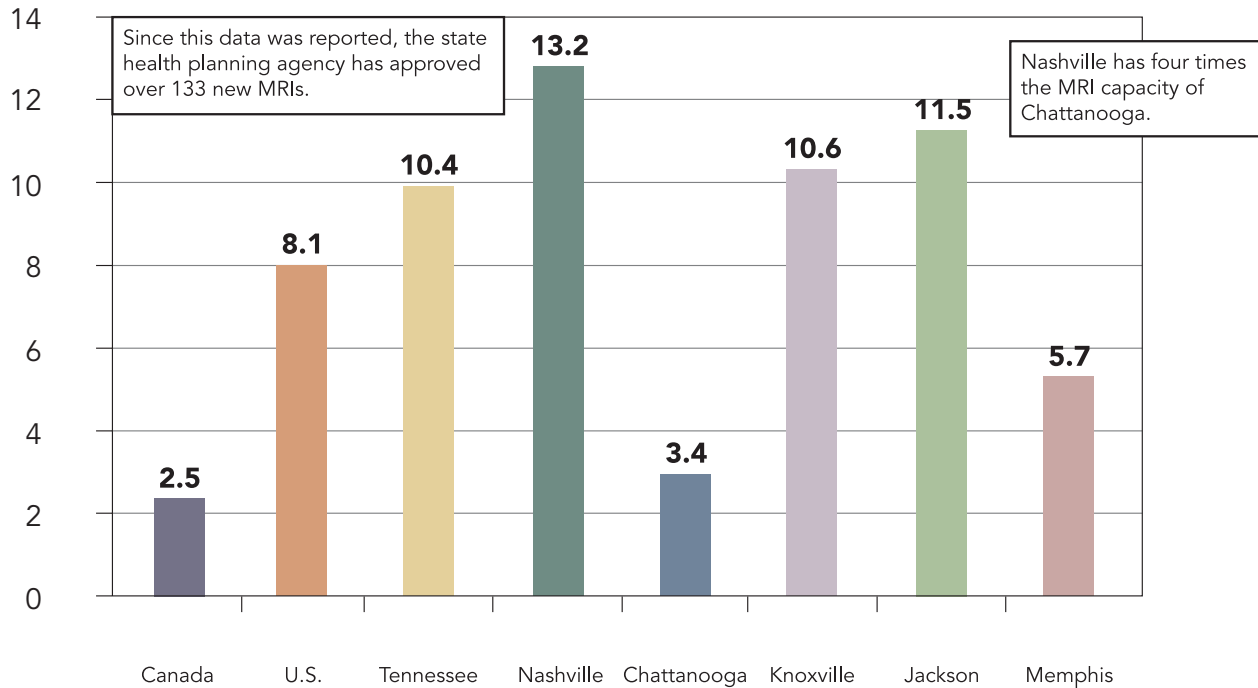
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11. BCBST Data Warehouse.
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 13. Mark Austin. *Strategies for Managing High-Tech Imaging Costs*. BlueCross BlueShield of Tennessee, Presented February 2006.
 14. 2001 Area Resource File; OECD Health Data 2001.
 15. 2001 Area Resource File; OECD Health Data 2001.

Tennessee High-Tech Capacity Hospitals with MRIs per Million Population



Source: 2001 Area Resource File; OECD Health Data 2001.

High Cost, High Value?

As the number of high-technology imaging procedures continues to rise and the overall share of medical expenses attributed to radiology grows, data show that there are serious quality control issues that both jeopardize care and increase costs. Unlike hospitals, which are subject to Joint Commission on Accreditation of Health Care Organizations (JCAHO) quality assessment and improvement guidelines, many outpatient imaging centers and medical offices have not established formal and comprehensive quality review programs. A lack of quality control in outpatient imaging has led to incorrect diagnoses, missed pathology, and the need for repeat imaging procedures.¹⁶

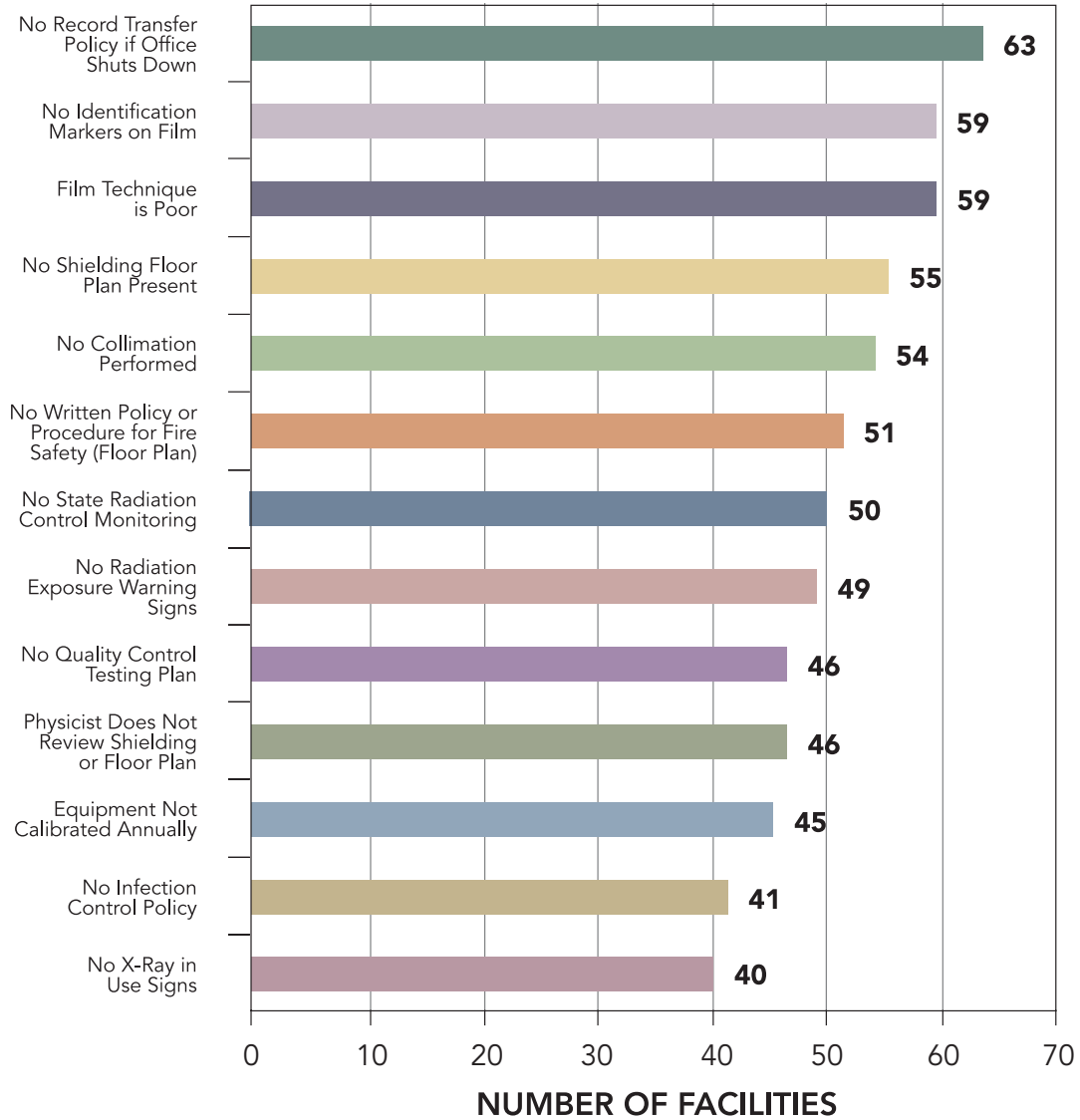
The results of a diagnostic privileging program for one Massachusetts health plan are illustrative of the quality problems that persist in outpatient imaging centers and medical offices. Of the 1,004 outpatient imaging centers inspected as part of the program, 31% failed to meet the criteria necessary for privileging. Of those that failed, 11% did so with "fundamental and serious deficiencies." Factors contributing to the failure to meet the privileging requirements included practicing without a state certificate of radiation control, poor patient positioning, chemical streaks on images, improper exposure, failure to perform annual calibration of imaging equipment, and lack of basic radiation safety.¹⁷

16. MedSolutions Web site. <http://www.medsolutionsinc.com>.

17. DK Verrilli. "Design of a Privileging Program for Diagnostic Imaging: Costs and Implications for a Large Insurer in Massachusetts." *Radiology*, Vol. 208, 1998, pp. 385-392.

Common Fundamental and Serious Deficiencies

Number of sites that failed site inspections due to specific deficiencies.
The number beside each bar is the number of sites.



Source: DK Verrilli, "Design of a Privileging Program for Diagnostic Imaging: Costs and Implications for a Large Insurer in Massachusetts," *Radiology*, 208, 1998, p. 385.

Similarly, the results of a study of high-technology imaging practices by non-radiologic physicians found that 10% had not had their equipment inspected within the previous 12 months, 16% did not have the images identified using right-sided or left-sided markers, and 62% failed to issue a formal radiology report of the procedure performed.¹⁸

Also troubling is data that show that, among a group of patients who had repeat whole-body CT scan imaging procedures because of positive findings, less than 2% actually had the suspected disease.¹⁹

18. Harold Moskowitz. "The Effect of Imaging Guidelines on the Number and Quality of Outpatient Radiographic Examinations." *American Journal of Roentgenology*, Vol. 175, 2000, pp. 9-15.

19. Molly T. Beinfeld. "Cost-effectiveness of Whole-Body CT Screening." *Radiology*, Vol. 234, 2005, pp. 415-422.

Beyond the Margin of Medical Necessity

Although quality is a major concern for those interested in studying the usefulness of high-technology imaging, other factors also must be considered when evaluating the cost to value equation. Specifically, health economists and policy experts are increasingly worried that, even when clinicians do meet quality benchmarks in their use of diagnostic imaging, many still may be over-using the technology and turning to high-technology imaging in unnecessary instances.

A June 2005 article in the *American Journal of Roentgenology*—a publication written by and for those interested in the science of radiology—addresses this theory:

“The speed and perceived noninvasiveness of the newer imaging technologies...facilitate a lack of critical evaluation of whether they are being used beyond the margin—the margin being the point where the use of medical resources is accompanied by an equivalent medical benefit to patients.”²⁰

Noted economist Paul Ginsburg, Ph.D., addresses this issue in a *New England Journal of Medicine* commentary, in which he notes that the growing reliance on advanced medical technology accounts for one half to two thirds of the increase in health care spending in excess of general inflation, and he suggests that improper use of these technologies contributes to the escalating price tag: “Perhaps the [spending estimates] would be different if these technologies were used more judiciously, with greater guidance from research on medical effectiveness,” he writes.²¹

Even physicians themselves acknowledge that it is not always medical necessity that drives high-technology imaging practices. Dr. Lawrence Muroff, past president of the Florida Radiological Society and a professor of radiology at the University of Florida, says that if a doctor owns an expensive piece of equipment it tends to get used more often and unnecessarily. “The data show over-utilization, so patients are getting unnecessary studies and it’s very costly,” Muroff says.²² Studies show that physicians who own their radiology equipment are two to seven times more likely to order an imaging test.²³

20. Ronald H. Gottlieb. “Imaging for Whom: Patient or Physician?” *American Journal of Roentgenology*, Vol. 185, December 2005, pp. 1399-1403.

21. Paul B. Ginsburg, Ph.D. “Controlling Health Care Costs.” *New England Journal of Medicine*, Vol. 351, October 14, 2004, Number 16.

22. Susan Lundine. “In-office Scans Pitting Docs, Big Insurers.” *Orlando Business Journal*. December 17, 2004.

23. Alex Jablolkow. “Radiology Seen as Next Cost Battleground Between Health Plans and Physicians.” *HealthLeaders/InterStudy*. April 11, 2006.

Potential Solutions

Health care providers, insurers, and consumers alike are in search of solutions to the rising costs of medical care. The measures one could take to contain high-technology imaging expenses are similar to those taken to control other system-wide cost drivers. Experts agree on four generally-accepted ways to slow drivers of health care spending like radiology: increase the efficiency of health care delivery; increase the financial incentives for patients to limit their use of medical services; increase the administrative controls on the use of these services; or limit the resources available to the health care system. Of these options, Ginsburg suggests that cost controls are appropriate in imaging procedures, but that “the success of their efforts depends in part on how vigorously cost-containment tools are applied.”²⁴

Health plans grappling with the impact that rising costs of technology are having on their members’ premiums are implementing such cost-containment strategies. One effective strategy has been to partner with third-party radiology management organizations that work to eliminate inappropriate utilization by educating clinicians on the most effective use of imaging procedures and providing consultative services on evidence-based clinical guidelines that direct them to optimal patient procedures. Radiology management programs direct clinicians to the most appropriate imaging procedures, weighing medical necessity, cost, and radiation exposure.

Case Study 1

- BlueCross BlueShield of Texas (BCBSTX) partnered with a radiology management organization to curb its growing high-technology outpatient imaging expenditures. By instituting a preferred network and other utilization management tools for its HMO members, BCBSTX successfully reduced its high-technology imaging utilization by 34% and its PMPM by 40%. BCBSTX intends to move its PPO enrollment of 2.4 million to the program at an estimated savings of \$178 million, or \$6.05 PMPM.²⁵

Case Study 2

- After three years of high-technology imaging cost increases of 20%, Highmark BlueCross BlueShield, Pennsylvania’s largest health insurance company, engaged an imaging utilization partner. The company established guidelines for diagnostic imaging centers, including limiting its network of imaging centers to those that were full-service only. Highmark expects a 25% reduction in high-technology imaging costs as a result of the changes.²⁶

Case Study 3

- UnitedHealth Group—the largest private insurance company in America—has partnered with the American College of Radiology (ACR) to combat the rising costs of imaging. Under the agreement, the ACR will supply UnitedHealth with software that provides criteria for determining the best diagnostic imaging procedures to use in more than 190 clinical conditions. The insurer will in turn provide that information to its participating clinicians.²⁷

24. Paul B. Ginsburg, Ph.D. “Controlling Health Care Costs.” *New England Journal of Medicine*, Vol. 351, October 14, 2004, Number 16.

25. “Outpatient Radiology: An Update on Cost and Utilization.” BlueCross BlueShield of Tennessee Data Source. August 26, 2005.

26. “Outpatient Radiology: An Update on Cost and Utilization.” BlueCross BlueShield of Tennessee Data Source. August 26, 2005.

27. Mark Tosczak. “UnitedHealth Trying to Limit Imaging Use.” *The Business Journal of the Greater Triad Area*. December 27, 2004; and Arati Murti. “United, ACR Push Appropriateness Criteria.” *Imaging Economics*. February 2005.

Another tool to control imaging costs has been the development of Centers of Excellence Programs, which measure and demonstrate superior performance in high-technology imaging outcomes by establishing quality metrics, implementing safety programs and clinical accuracy guidelines, and developing educational resources.

Walking A Tight Rope

How to ensure health care quality without jeopardizing affordability is at the crux of the debate over the rapid development and use of high-technology imaging. Radiology raises many important questions regarding cost and risk being worth the tradeoff for the critical care that many of these procedures facilitate.²⁸ It is the risk of radiology—the radiation dose from a full-body CT scan can be almost as high as the dose received by some of the survivors of the 1945 atomic bombings of Hiroshima and Nagasaki—and persistent questions about the integrity of diagnostic procedures and the quality of the tests themselves that make the equation particularly difficult to balance.

Adding to the complexity of the issue is the controversial nature of cost containment strategies in the health care delivery system.

Ginsburg addresses this challenge when he writes, “Success [containing costs] does not come easily. For one thing, all health care spending represents someone else’s income, and those who are facing a loss of income will work to block efforts to contain costs. In addition...[it] requires some people to get less medical care than they would like.”²⁹

But health plans nationwide are successfully working with clinicians, patients, and facilities to foster an environment that is efficient and effective, affordable, and driven by evidence-based medicine practices. Although striking the right balance between cost and quality often feels like walking a tight rope, effective collaborations have demonstrated time and again that fiscal prudence and quality care are not mutually exclusive, rather they work in conjunction to create positive outcomes in health care today.

28.Christopher Windham. “Study Cites Risks of Full-Body Scans.” *Wall Street Journal*. August 31, 2004; and David J. Brenner and Carl D. Elliston. “Estimated Radiation Risks Potentially Associated with Full-Body CT Screening.” *Annual Report 2003*. Center for Radiological Research, Columbia University.

29.Paul B. Ginsburg, Ph.D. “Controlling Health Care Costs.” *New England Journal of Medicine*, Vol. 351, October 14, 2004, Number 16, pp. 1591-1593.



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