



## Medical Imaging: Is the Growth Boom Over?

*Medical imaging has previously been identified as one of the fastest growing of all health care sectors. More recently, though, data from a variety of sources reveal a dramatic and sustained slowing—and now a decline—in both utilization and spending. The outcomes and cost implications on individual patients and the health care delivery system at large are not yet known.*

### Issue and Background

Health care spending in the United States is predicted to soon exceed 20 percent of the gross domestic product, placing it on what many policy makers consider an economically unsustainable trajectory. During the early part of the last decade, medical imaging expenditures rose at a much faster rate than those for most other medical services.

That rapid growth led to a variety of drastic reductions in Medicare payments for individual imaging services. At the same time, the use of radiology benefits managers (RBMs) by private payers grew dramatically while real-time order entry clinical decision support (CDS) was introduced and implemented in prestigious medical centers. CDS is now commercially available and is being increasingly incorporated into hospital and health system information platforms.

During that same period, advanced imaging technologies matured and both physician and patient awareness of radiation safety grew keenly. Professional societies have taken a leadership role in these efforts, increasingly promoting ever-expanding appropriateness criteria and clinical utilization guidelines.

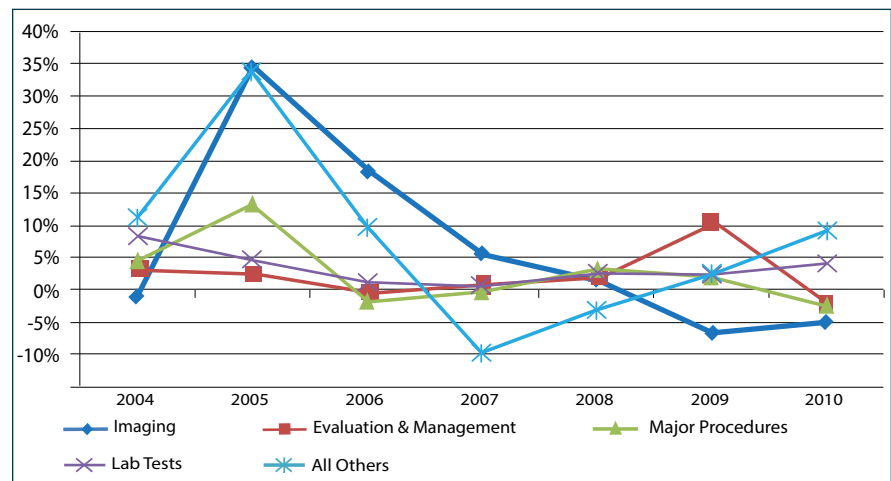
In total, these initiatives and events—each in isolation potentially decelerating previous growth in medical imaging—would be predicted to slow both the utilization of and spending on medical imaging. The degree to which this has occurred, and whether this represents a short-term or sustained phenomenon, has been the subject of a number of recent independent reports and analyses. Harvey L. Neiman Health Policy Institute researchers have reviewed these trends and their likely

causes and offer the following potential policy implications.

### Perspectives

#### Historical Growth

Although previously relatively flat, in the early part of the last decade, the use of medical imaging grew at a much faster rate than many other physician-ordered Medicare services (Figure 1). That growth was likely experienced by



**Figure 1. Medicare Part B annual rate of growth in assigned services by procedure category.**

Source: Analyses at the Neiman Health Policy Institute using data from the Medicare Physician/Supplier Procedure Summary (PSPS) annual master files 2003 to 2010; the enrollment data from CMS, Medicare & Medicaid Research Review; and the 2011 Statistical Supplement.

**Notes:**

- (1) Excludes all services by non-physicians and procedures in the Medicare managed care program.
- (2) Beneficiaries are aged and disabled enrollees of the Hospital Insurance and/or Supplementary Medical Insurance programs of Medicare.

private payers as well. In 2003, approximately 206 million imaging services were provided to a total of 34.8 million Part B Medicare beneficiaries. By 2006, that number increased 58.4 percent to 326 million services for 35.9 million beneficiaries. In contrast, evaluation and management services, major procedures, and laboratory tests grew 5.1 percent, 16.3 percent, and 14.2 percent during that same period.

### Drivers of Prior Growth

**Clinical.** Various studies have linked the use of imaging examinations to longer life expectancy, declines in mortality, less need for exploratory surgery, fewer hospital admissions, and shorter lengths of hospital stays. In the emergency department and other acute settings, advanced imaging has shortened patient wait times and facilitated the triage of both trauma and non-trauma patients. These associations all strongly suggest that the growth of medical imaging has in large part been the result of its clinical utility.

**Legal.** Medical liability considerations weigh heavily in many decisions by physicians to utilize medical imaging. Currently, no safe harbor tort protections exist even for physicians who rigorously follow accepted guidelines, such as those incorporated into CDS systems. A large majority of primary care physicians acknowledge that their own patients receive more care—and much of that includes imaging—than would otherwise be clinically warranted. Their stated dominant driver is fear of medical malpractice.

**Economic.** Economic factors have long been associated with at least some increases in the utilization of medical imaging. For providers without a personal financial incentive to order medical imaging (such as emergency department physicians who almost exclusively refer

to hospital radiology departments), patient clinical complexity (i.e., not physician personal gain) drives differential utilization of advanced imaging. In the outpatient setting, however, it is possible that some of the increase in utilization could have been due to financial conflict of interest, as data indicate a preferential increase in the use of medical imaging in a variety of otherwise identical clinical settings by ordering physicians owning their own equipment versus those who do not. Similar financial considerations also likely led to interest by non-physician investors in establishing independent centers providing CT, MRI, and PET services at a time when technical payments were considered lucrative.

### Historic Policy Reactions

Previous and ongoing efforts to reduce medical imaging expenditures have largely focused on unit cost reduction strategies. These have come through a variety of initiatives. The Deficit Reduction Act of 2007 reduced facility technical component payments to the lesser of either the Hospital Outpatient Prospective Payment System (HOPPS) or the Medicare Physician Fee Schedule (MPFS). Changes in practice expense data, equipment utilization estimations, and other calculation methodologies by CMS have similarly resulted in reductions in imaging payments, particularly at the technical component level. Both the professional and technical components of payment have been cut—by as much as 50 percent—through multiple procedure payment reductions (MPPR) for contiguous body part imaging. Similarly, ongoing changes in Current Procedural Terminology (CPT) descriptors have resulted in ever increasing bundled service codes for a variety of imaging procedures. During their subsequent evaluation in the Resource-Based Relative Value Scale (RBRVS)

process, these bundled codes have almost always been assigned values lower than the sum of their historic components. In total, these various cuts have resulted in quite dramatic overall unit cost reductions. These vary by modality, but for CT are estimated to be on the order of 20–23 percent for the professional component (i.e., physicians) and 40–55 percent for the technical component (i.e., office and imaging centers) of Medicare payments.

The total utilization of medical imaging in 2010 was 4.5 percent less than it was in 2006.

Increased attention has been directed to constraining the volume of medical imaging services rendered to patients. RBM programs have been increasingly implemented by private payers and Medicare Advantage programs to control utilization through pre-authorization processes. A recent report by MedPAC advocated for expansion of these programs to Part B Medicare for physicians who have been profiled as outliers with respect to their prior tracked medical imaging ordering behavior. Despite the fact that no such programs have been implemented for traditional fee-for-service Medicare, one group has speculated that RBM implementation for non-Medicare payers has somehow resulted in a sentinel effect behavioral change by ordering physicians, who now request medical imaging with more trepidation for both RBM-participating and non-participating patients alike.

Many stakeholders have challenged current payer-based utilization management programs, citing numerous

flaws with their pre-authorization tools, including hassle for patients and physicians, delays in care, vague and capricious pre-certification guidelines, and clinical decision making by individuals without medical training. A recent analysis additionally suggested that at least some of the “savings” enjoyed by payers through the use of RBMs actually comes at the expense of referring physicians through administrative cost shifting (i.e., from payers to providers). Many physician and information technology groups have thus increasingly advocated for the use of real-time CDS tools, wherein appropriate testing is facilitated in a real-time, interactive, educational manner. Although market penetration of radiology-focused CDS is currently much less than that of RBMs, these tools have demonstrated similar reductions in lower-yield imaging, but with fewer delays in patient care and less intrusion into complex and sometimes long-standing physician-patient relationships.

By 2010, total Medicare Part B expenditures on diagnostic imaging had declined 21 percent from their peak in 2006.

### Recent Medicare Trends

**Utilization.** A recent report examining the utilization of advanced medical imaging confirmed the aforementioned remote growth during imaging’s boom. It painted, however, a quite different picture in more recent years. During the 2000 through 2005 boom in advanced medical imaging, CT grew at an annual rate of 14.3 percent. That growth declined precipitously, howev-

er, in subsequent years—from 7.1 percent in 2006 to just 1.4 percent in 2009. This reflects overall trends for medical imaging (Figure 1). Our own analysis, in fact, revealed that on a unit count basis, the total Medicare Part B utilization of medical imaging in 2010 was 4.5 percent less than it was in 2006.

**Spending.** Another recent report indicated that the prior multi-year trend of ongoing growth in Medicare Part B spending on medical imaging reversed abruptly in 2007. By 2010, total Medicare Part B expenditures on diagnostic imaging had declined 21 percent from their peak in 2006. Emerging data now place medical imaging near the bottom of all categories of medical services contributing to the overall growth in Medicare spending. Although growth rates have varied, it is important to note that over this entire time, medical imaging has remained a relatively small portion

of total Medicare Part B spending on a per beneficiary basis (Figure 2).

### Recent Private Insurer Trends

Recent data from private payers parallels the trends in medical imaging more widely reported for Medicare. For privately insured Americans, medical imaging is now among the slowest growing of all physician services, and actually experienced a 5.4 percent decline from 2009 to 2010.

### Recent Integrated Health Care System Trends

Although the utilization for all imaging modalities from six large health care systems increased substantially between 1996 and 2010 on a per beneficiary basis, almost all of that growth occurred between 1996 and 2006. Since 2006, those same centers observed overall slowing (MRI), stabilization

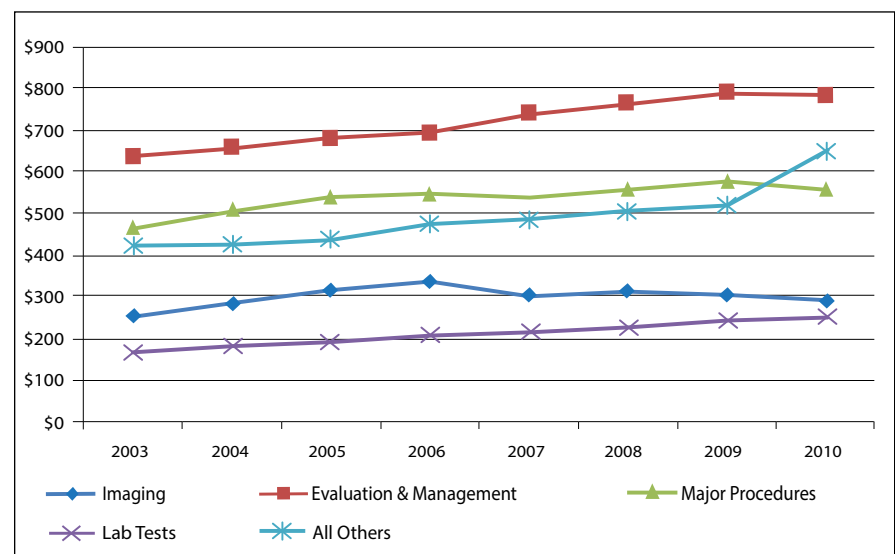


Figure 2. Medicare Part B annual program dollars spent per enrolled beneficiary by procedure category.

Source: Analyses at the Neiman Health Policy Institute using data from the Medicare Physician/Supplier Procedure Summary (PSPS) annual master files 2003 to 2010; the enrollment data from CMS, Medicare & Medicaid Research Review; and the 2011 Statistical Supplement.

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(CT), or declines (nuclear medicine) in their medical imaging utilization rates.

### Recent Manufacturer Trends

Between 1993 and 2006, as advanced medical imaging technology rapidly evolved, the annual unit sales of CT and MRI units nearly tripled, likely reflecting the market's response to demand for such services. That increased capacity also facilitated service growth. Between 2006 and 2008, however, sales for CT and MRI units declined by 27 percent and 36 percent, respectively. Although more recent manufacturer data are not publicly available, these trends will likely continue and suggest impending market saturation. In an environment in which increasing numbers of private imaging centers are closing or being sold off to hospital systems, such declines portend an overall declining market capacity for medical imaging for the foreseeable future.

### Drivers of Recent Slowdowns and Declines

In total, these various trends illustrate a sustained slowdown (and perhaps even a sustainable decline) in the utilization of and spending on medical imaging. Such data, however, do not themselves permit definitive explanations of causation. Nonetheless, a number of both interconnected and unrelated factors have likely been contributory and synergistic in effecting this change.

**Technological maturation.** Much of the growth in the utilization of advanced medical imaging during the early part of the last decade occurred simultaneously with rapid technological evolution in CT, MRI, and nuclear medicine. Those advancements led to a great expansion in the diagnostic utility of these services. That evolution continues, but appears to have slowed, which probably explains some of the current

plateaus in utilization. Future new technologies (e.g., molecular imaging), however, could once again yield rapid utilization changes if these provide the clinical value that has been attributed to traditional advanced imaging during its recent boom.

**Guidelines.** Best practice guidelines, such as the American College of Radiology's Appropriateness Criteria® program, continue to be developed and promoted. These authoritative resources are now increasingly accessible in real time during patient encounters. Their increasing use has helped direct ordering physicians more quickly to the highest yield examinations, thereby reducing the frequency of duplicative studies and unnecessary low-utility examinations.

**Radiation awareness.** A variety of patient safety initiatives have resulted in increased physician and patient awareness of radiation exposures associated with medical imaging. Although many of these efforts have been directed toward reducing doses for individual examinations, together they have promoted a developing culture of increasingly thoughtful and judicious use of medical imaging, which has begun to impact radiologists, referring physicians, and patients. The ongoing results have been a continued decrease in the frequency of lower utility imaging examinations, with associated cost savings.

**Clinical information availability and integration.** Increased rapid and remote access to electronic health records has improved the accessibility of clinical and imaging reports for many institutions, allowing radiologists to provide more meaningful interpretations based on individual clinical circumstances and referring physicians to more rapidly receive and act on radiologist interpretations. These improve-

ments in clinical communication have led to the delivery of more efficient imaging care, reducing the need for repeat imaging (e.g., image reports were previously re-ordered when old reports might have been inaccessible), and shotgun duplicative imaging (e.g., all studies were ordered together when referring physicians anticipated delays in interpretations and access to reports).

**Cost effectiveness awareness and initiatives.** Physicians are increasingly aware of the burden of expensive unnecessary testing and care on the health care enterprise. They are thus more likely to take heed of an increasing body of literature addressing the cost effectiveness of existing and emerging technologies. This has spurred the trend toward more judicious use of medical imaging.

**Widespread unit cost reductions.** Payments for imaging services have been repeatedly reduced through a variety of independent initiatives. In total, these reductions have been dramatic. Because unit price is a key component of overall spending (i.e., spending = volume x price), these reductions have clearly contributed to substantial declines in the spending growth rate—as well as overall total spending—on imaging services.

**Market saturation.** As with many emerging clinically useful services, appropriate utilization is often limited by patient access considerations. Although many rural markets remain underserved, the previous explosion in medical imaging has resulted in approaching full capacity in most large urban markets (i.e., enough scanners to meet population needs). In many big cities, modern medical imaging technology currently exists to meet regional patient needs, and this has

likely contributed to a close to steady-state balance between equipment supply and clinical demand in these high population centers.

**Utilization management tools.** Several studies have attributed slowdowns in imaging in selected populations to both RBMs and CDS, particularly with regard to lower utility examination indications. Given the fact that RBMs have not been implemented in fee-for-service Medicare programs and that radiology-focused CDS has only recently been implemented beyond early centers of excellence, neither provides a satisfactory explanation for the increasingly documented trends in declining Medicare Part B utilization and spending. The overall impact of either tool on the recent dramatic slowdown in imaging across the country is not entirely clear.

### Policy Implications

By implementing changes to slow or reverse the previous rapid growth of medical imaging, many policy makers and payers have, by their actions, made it clear that less medical imaging is

their intended goal. Although this may be appropriate in achieving short-term cost savings for medical imaging alone, the longer-term public health impact and the downstream total cost implications are uncertain.

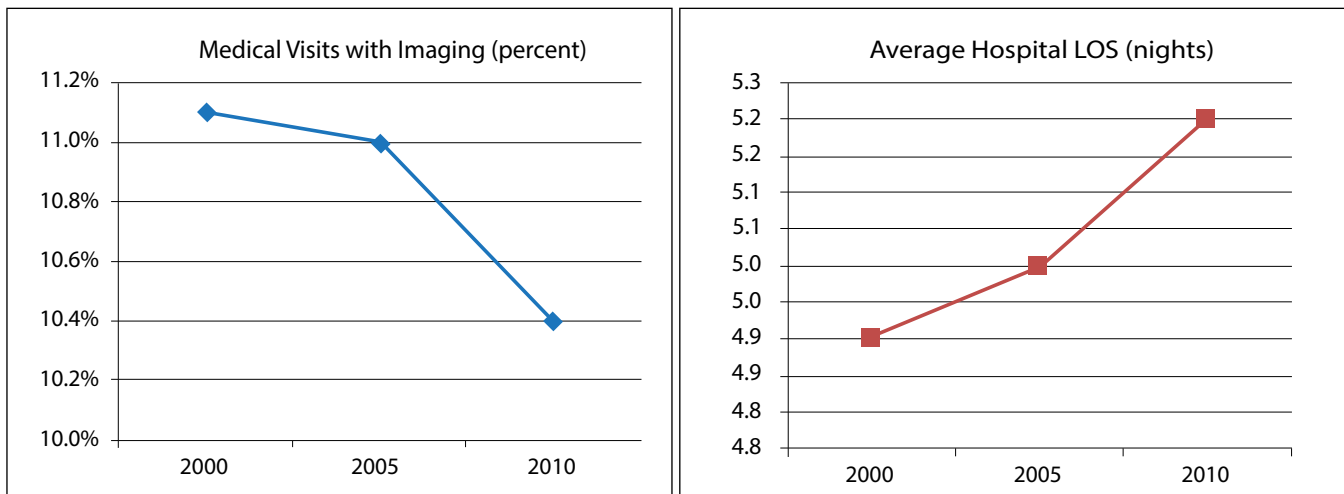
If the rapid growth of medical imaging in the early part of the last decade was related to its well-acknowledged favorable impact on patient care, will further attempts to suppress its growth result in a reversal of those positive clinical outcomes?

If the growth in medical imaging utilization witnessed in the early part of the last decade was truly related to its salutary effects on patient care, multiple, still ongoing synergistic efforts to suppress that growth might unintentionally reverse those improvements in outcomes. Coincident with recent national declines in the utilization of medical imaging, for example, average patient hospital length of stay has

increased (Figure 3). Although many factors unrelated to medical imaging could very likely be at play (since such an association alone does not indicate causation), even the potential of such inverse relationships should give policy makers pause in continuing to pursue downward pressures on imaging utilization and spending until the downstream clinical and cost consequences of such actions are better understood. Given the substantial lag between policy development and the identification of measurable outcomes, the true impact of aggressive policies may not be identifiable for many years. There are several potential issues and questions to consider.

**Clinical outcomes.** If the rapid growth of medical imaging in the early part of the last decade was related to its well-acknowledged favorable impact on patient care, will further attempts to suppress its growth result in a reversal of those positive clinical outcomes?

**Patient access.** The proliferation of private imaging centers years ago was partially attributed to their perceived profitability. With rapidly diminishing profit margins and the consequen-



**Figure 3.** Trends over the last decade from nationwide Medical Expenditure Panel Survey (MEPS) data for percentage of patient encounters involving medical imaging (blue line) and the average length of Medicare patient hospital stays (LOS; red line). These diverging trends merit additional investigation.

tial closure and sale of many of those facilities, what will happen to patient access, particularly with regard to the timeliness of necessary services and the availability of advanced imaging in underserved markets?

Without substantive tort reform...will the use of medical imaging ever be reducible to true medical necessity levels?

**Aging technology.** Facilities are more likely to make capital improvements in more favorable economic times. Will recent drastic and synergistic payment cuts now result in centers electing to extend the serviceable lives of outdated, expensive equipment, thereby slowing patient access to state-of-the-art technology?

**Site-of-service cost shifting.** Historic analyses of medical imaging utilization have focused on the MPFS. Will a further shift in services from private offices to traditionally more expensive hospital outpatient facilities (with payments under HOPPS) result in an illusory savings in office expenditures, perhaps even with a real increase in overall expenditures?

**Clinical cost shifting.** For many diseases, overall treatment costs are reduced when pathology can be identified with imaging before its late stages and before complications have occurred. With the impact of imaging cuts on patient outcomes uncertain, might savings in spending on medical imaging actually result in downstream increases?

**Tort considerations.** Physicians widely acknowledge their fear of malpractice

lawsuits as a significant driver of their ordering of marginally indicated medical imaging. Without substantive tort reform, including safe-harbor protections for physicians who utilize CDS tools or otherwise rigorously comply with guidelines, will the use of medical imaging ever be reducible to true medical necessity levels?

**Budgetary perspectives.** Spending on medical imaging has historically grown faster than that for other service categories, but constitutes only a relatively small portion of overall health care spending. With many other service categories now growing at much faster rates, would cost-cutting efforts not be more effectively targeted to areas of ongoing growth—where non-judicious utilization is more prevalent and the unfavorable consequences of cuts on patient care less likely?

**Market reaction to policy development.** Ongoing government and private payer policy development and implementation often lag behind evolving market trends. If future policy development does not consider and allow appropriate time for market reaction, might aggressive ongoing changes—without complete consideration of their impact—result in unintended overcorrections that may take years to detect?

### Summary

The recent marked slowing in growth of medical imaging appears to be sustained and multifactorial. Efforts directed toward further reductions in the utilization of medical imaging should be tempered and based on a thoughtful consideration of the impact of policies, both enacted and envisioned, on overall population health, individual patient care, and downstream costs.

### Resources

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