

Mr. Chairman and members, thank you very much for the opportunity to testify today. My name is Dr. David Levin; I'm a retired radiologist, the former chairman of the Department of Radiology at Thomas Jefferson University Hospital in Philadelphia. Over the course of my career, I've published 251 articles in the medical literature and for the past 10 years, most of my research publications have dealt with utilization patterns in imaging, including the issue of self-referral. I've also spoken before medical organizations in 18 states about this, as well as to both CMS and MedPAC. My colleague here is Dr. Richard Taxin, who is in community hospital practice at Crozer Chester Medical Center. He is former president of the Pennsylvania Radiological Society, as well as current president of his radiology group.

The Pennsylvania Radiological Society has been supportive of efforts to control the rapid growth in high tech imaging resulting from self-referral in the private offices of physicians who are not radiologists. We appreciate your efforts to do something about this problem. But today I am respectfully testifying in opposition to HB 2522 because in its present form, it falls short of that intent. In its present form, the bill reaffirms the exceptions to the Stark amendments to the Medicare Act, and this creates a problem.

When the federal Stark amendments (also called the Stark Laws) were enacted in the early 1990s, their purpose was to prohibit physicians from referring patients for designated health services (including imaging) to facilities in which they had a financial interest. But the laws created a safe harbor, the so-called in-office ancillary services exception (IOASE), under which doctors could self-refer patients for these services if performed in their own offices. Back then, the exception made sense for imaging because nonradiologist doctors in those days generally had only low end equipment like x-ray machines in their offices. They used the x-rays to solve immediate clinical problems that were truly ancillary to the office visit by the patient that day – for example, is there a fracture, is there a pneumonia? But over

the years, the original intent of the IOASE has been subverted, as nonradiologist doctors have increasingly put high tech equipment like MRI, CT, and PET scanners into their offices. The vast majority of these very expensive scans are elective in nature and are not ancillary to the office visit by that patient that day. Having those costly machines in their offices allows the doctor-owners to self-refer the patients instead of sending them to a hospital radiology department or freestanding private radiology office. It doesn't just *allow* them to heavily utilize, it literally *requires* them to do so because they have to cover the large purchase and operating costs. Moreover, it is a way for them to increase their practice revenues. The result is a conflict of interest and an increase in costs to our health care system. I can't look into the hearts and minds of these doctors and tell you whether they are doing this to make money or whether instead they honestly believe it is better for their patients. But what I *can* tell you is that there is extensive and indisputable evidence that self-referral invariably leads to higher and often unnecessary utilization of high tech imaging. I'm going to show you a few slides containing some of that evidence.

-----**Slide Presentation**-----

These slides have shown only a small portion of the published evidence indicating that self-referral leads to overutilization of high tech imaging. There is much more evidence, which we don't have time to cover right now, but which is summarized in 2 previously published papers of mine which I gave to Mr. McNulty a few weeks ago (extra copies are available).

The "Convenience Factor" – Is It Real?

Supporters of the IOASE (as contained in the Stark Laws and reaffirmed in HB 2522) will tell you that having MRI, CT, or PET scanners in their offices is more convenient for their patients because the patient can go right down the hall after the office visit and have the scan done immediately. This claim is simply not true, for at least 4 reasons: (1) Most commercial health insurance companies require

precertification before high tech imaging exams like these can be performed. Precertification can often take hours or even days to accomplish. (2) It is unlikely that the doctor's scanner will be sitting there empty, waiting for this patient. More likely, the scanner will already be booked up with other patients and no slots will be available right then. (3) Large specialty groups often have multiple offices, but the scanner will only be located at one of them. Thus, most patients would have to travel some distances to get their scans. (4) CT and MRI scans frequently require the IV injection of contrast material (dye) and this means the patient's stomach needs to be empty, with nothing having been taken in orally for 4 hours or more. Quite likely, the patient may have eaten breakfast or lunch and therefore will not be properly prepped for a contrast injection.

Ambulatory Surgery Centers (ASCs)

Concerns have been expressed that tightening the IOASE would prevent surgeons from owning and working in ASCs which they own. We believe it is perfectly acceptable for surgeons to own ASCs and perform surgical procedures there. There is a big difference between a doctor owning his/her own ASC and a doctor owning an MRI, CT, or PET scanner. When a surgeon performs operations in his own ASC, he is functioning within the proper scope of his practice. He is doing what he was trained to do. That is legitimate. But when a nonradiologist doctor purchases an MRI, CT, or PET scanner for her office, she is going outside the proper scope of her practice. She is acquiring complex equipment that she was never trained to use. Operating these scanners correctly requires expert knowledge, such as that gained by a radiologist who gets 5 years of training in imaging during his/her residency and fellowship. Just as you wouldn't want me, a radiologist, performing brain surgery on you or delivering your daughter's baby, you shouldn't want untrained physicians performing these complex scans on patients in their offices.

Quality and Safety Issues

There is increasing attention being paid to quality and safety issues in health care, and these concerns pertain to radiology as well as other fields. As noted above, operating MRI, CT, and PET scanners is complicated. There are different sequences that must be used, depending on the patient's clinical problem. The exam protocols and the technologists must be supervised by a physician who has expertise in the complex technology of these scanners. Radiologists all must spend 4 years in residency training learning how to do these things, and most also take an additional year of subspecialty fellowship training. Nonradiologist physicians get no training whatsoever in how to perform or interpret MRI, CT, or PET scans. Radiation safety is another important concern, which has received much attention in recent years. Understanding the interaction between radiation and human tissues and how to calculate and protect against overexposure is another important aspect of radiologists' training. Most nonradiologist physicians get no training in this at all (with the sole exception of cardiologists, who do get trained in operating certain types of nuclear scanners). Is it logical or appropriate or fair to patients to allow untrained doctors to own and operate complicated, radiation-emitting (CT and PET) pieces of imaging equipment like these and use them to scan patients in their offices? Surely the answer to this should be no.

Looking at Self-Referral From the Viewpoint of Other Physicians and Hospitals

Nonradiologist physicians who own MRI, CT, or PET scanners in their offices will be in favor of maintaining the IOASE, because it is in their economic interest to do so. However, we believe most physicians (including most members of the Pennsylvania Medical Society) should favor of excluding MRI, CT, and PET scanners from the IOASE – i.e. prohibiting nonradiologist physicians from owning

and billing for these units in their offices. The reason is that most doctors do *not* own them. Physician reimbursement these days is largely a zero sum game. If payments are increased to one group of doctors, they will be reduced to another group. Hence, if the minority who own high tech scanners in their offices overutilize them and drive up the costs of imaging, the majority who don't own these scanners will be disadvantaged because their reimbursements for things like evaluation & management, surgery, and other services will be reduced. We therefore believe the majority of physicians in the Commonwealth should favor excluding MRI, CT, and PET scanners from the IOASE.

Hospitals should also support excluding these 3 kinds of imaging from the IOASE. Self-referral in private physician offices siphons these tests away from hospital outpatient imaging facilities, thus depriving them of a needed source of revenue

In conclusion, the Pennsylvania Radiological Society opposes HB 2522 in its present form, and we think most of our medical colleagues and hospitals in Pennsylvania should agree with us if they think about it. We believe the bill should be amended to exclude MRI, CT, and PET from the safe harbor created by the IOASE. This would prohibit nonradiologist physicians from owning, operating, and billing for these units in their offices. If you want to take a meaningful step to limit costs and improve quality in high tech imaging, this is what you need to do.

Thank you very much for giving me the time to make these comments and for taking them into consideration.

Turf Wars in Radiology: The Overutilization of Imaging Resulting from Self-Referral

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A recent report by the Medicare Payment Advisory Commission to Congress indicated that the utilization of diagnostic imaging is growing more rapidly than that of any other type of physician service. This has engendered concern among those who pay for health care. In this article, the authors review the role of self-referral in driving up imaging utilization.

A number of studies of the self-referral factor in imaging have been conducted over the past three decades. These have consistently shown that when nonradiologist physicians operate their own imaging equipment and have the opportunity to self-refer, their utilization is substantially higher than among other physicians who refer their patients to radiologists. It has also been shown that the vast bulk of the recent increases in imaging utilization are attributable to nonradiologists who self-refer. The authors estimate that the cost to the American health care system of unnecessary imaging resulting from self-referral by nonradiologists is \$16 billion per year.

Key Words: Medical economics, diagnostic radiology, radiology, radiologists, departmental management, socioeconomic issues

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Turf wars in radiology are closely related to the issue of self-referral. When a radiology group loses a turf war to another specialty group, the encroaching group almost invariably creates a self-referral opportunity for itself. For example, assume that in hospital A, all cardiac nuclear imaging is done by the nuclear medicine division of the department of radiology. Self-referral does not occur under this arrangement, in that all of the cardiac imaging is referred from nonradiologist physicians to radiologists. A large cardiology group previously affiliated with hospital B approaches the administration of hospital A and proposes to move its entire practice to hospital A, with the proviso that it be given privileges to perform its own cardiac nuclear imaging. In an effort to recruit the cardiology group—and garner the revenue from patient admissions and outpatient services that will accompany it—the administration of hospital A agrees. Under this not uncommon scenario, the cardiology group now has the ability to self-refer all cardiac nuclear studies instead of referring them to the radiology department. In this article, we summarize the evidence that self-referral inevitably

leads to much higher utilization of imaging services and that much of this increased utilization is unnecessary and wasteful.

In March 2003, a report on medical service utilization was presented to Congress by the Medicare Payment Advisory Commission (MedPAC) [1]. MedPAC is an influential, federally appointed group of health policy experts that advises Congress and the Centers for Medicare and Medicaid Services on Medicare reimbursement policy. The report reviewed growth in Medicare services between 1999 and 2002 in four broad categories: evaluation and management (E&M), procedures, tests, and imaging. Average annual growth during that period was 1.8% for E&M services, 4.1% for procedures, and 5.6% for tests, but it was 9.0% for imaging. Anecdotal evidence from the commercial health care insurance sector suggests recent rapid growth in the utilization of imaging there as well (Mayes, Sullivan, and Ruane, personal communications). Needless to say, this has raised considerable concern among all who are responsible for paying for health care, and because radiologists are the physicians most closely identified with imaging, we are the ones often blamed for this cost escalation. However, as shown below, there is strong evidence in the literature that radiologists are not primarily responsible for the utilization increases; instead, the root cause is self-referral by nonradiologist physicians.

In the early 1990s, Hillman *et al.* [2,3] used an episode of care approach to compare the utilization of imaging among two groups of physicians: one group of physicians that owned and operated their own imaging equipment and self-referred their patients for imaging studies and another group of physicians that instead referred their patients to radiologists when they felt that imaging was needed. The episodes of care analyzed by Hillman *et al.* were common clinical conditions such

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Editor's note: This article is the second in a series of what is projected to be 14 articles dealing with the phenomenon of self-referral. The series is intended to both inform readers of the extent and impact of self-referral and advise them on how self-referral issues might be handled in their own practices. Although much of what you will read will be substantiated by published research, I have given the authors wide latitude to express their personal views and experiences.

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as chest pain, congestive heart failure, difficulty in urination, gastrointestinal bleeding, headache, knee pain, low back pain, transient cerebral ischemia, upper respiratory infection, urinary tract infection, and pregnancy. They found that depending on the clinical condition, the self-referring physicians used between 1.7 and 7.7 times the number of imaging studies as the physicians who referred their patients to radiologists. These statistics were rather startling, and some skepticism and suggestions of bias were expressed in subsequent letters to the editors of the journals in which the findings were published [4,5]. However, at about the same time that the data of Hillman *et al.* were being compiled and published, another study was being conducted by the U.S. General Accounting Office (GAO) [6]. The GAO is an arm of Congress and is hardly an organization with any bias favoring radiologists. The GAO report was based on medical claims covering 19.4 million office visits and 3.5 million imaging studies in Florida during 1990. The GAO compared the rates of utilization of imaging for physicians having their own in-practice imaging equipment with those rates for other physicians who referred their patients elsewhere for imaging (primarily to radiologists). They assessed utilization by modality, rather than by clinical condition, and found that self-referring physicians used between 1.95 and 5.13 times as much imaging (depending on modality) as those physicians who referred their patients elsewhere. This report, which essentially confirmed the findings of Hillman *et al.*, was presented to Congress in October 1994.

Each fiscal year, the Office of Inspector General of the U.S. Department of Health and Human Services develops a work plan that targets certain areas of Medicare expenditures for scrutiny. The work plan for fiscal year 2000 identified radionuclide myocardial perfusion imaging (RMPI) as a medical service warranting closer scrutiny because of rapid growth in its utilization among the Medicare population in recent previous years. In response to this concern, Levin *et al.* [7] investigated overall utilization rate changes in RMPI and compared the rate changes among radiologists (who almost never have the capacity to self-refer) and cardiologists (who, because they see patients for E&M services, do have the capacity to self-refer). They examined the four primary Current Procedural Terminology codes for RMPI, as well as the two "add-on" codes for the evaluation of left ventricular wall motion and ejection fraction. Between 1996 and 1998, Levin *et al.* found that the overall utilization rate of RMPI per thousand Medicare beneficiaries increased by 19.1%, a relatively sharp increase for only two years. However, closer analysis by specialty of the provider physicians revealed that the utilization rate increase was 36.3% among cardiologists compared with only 3.7% among radiologists. In other words, the growth in utilization rate was almost 10 times as high among cardiologists as among radiologists. In addition, cardiologists were almost twice as likely to perform the add-on studies as radiologists. One might have suspected (or at least hoped) that cardiologists were using more of these noninvasive imaging tests as substitutes for invasive procedures such as diagnostic cardiac catheterization and coronary angiography. However, the data showed that the utilization of cardiac catheterization and coronary angiography among cardiologists increased by 8.7% during those two years, so obviously there was little or no substitution occurring. Moreover, the utiliza-

tion rate among cardiologists of stress echocardiography, a procedure that competes with RMPI, increased by 24.2%. We have performed a preliminary follow-up assessment of RMPI utilization growth between 1998 and 2001 (unpublished data). This revealed that the utilization rate among cardiologists increased by another 49%, whereas it actually dropped slightly among radiologists.

Maitino *et al.* [8] recently studied utilization trends for all Medicare noninvasive diagnostic imaging between 1993 and 1999, comparing radiologists and nonradiologists. Among radiologists during that six-year interval, the procedure utilization rate per thousand Medicare beneficiaries dropped by 4%, whereas the relative value unit (RVU) rate per thousand increased by 7%. The RVU rate is a better measure of workload and the complexity of services. By comparison, among nonradiologists, the procedure utilization rate increased by 25%, and the RVU rate increased by 32%. In essence, this means that the vast bulk of the increases in imaging utilization rates, workload, and billings in recent years are attributable to nonradiologists.

Increased utilization due to self-referral is not a new phenomenon, and there are several older studies that antedate the more recent ones discussed above. Childs and Hunter [9] conducted a study in 1965 on 13,000 patients enrolled in an old-age assistance program in California. The study involved the review of approximately 7300 medical records from 153 nonradiologist primary care physicians who had their own x-ray units and self-referred and 610 other physicians who referred their patients to radiologists when x-rays were needed. The investigators found that 32.2% of patients of the self-referring physicians received x-rays, compared with 15.3% of the patients whose physicians referred to radiologists. The authors commented that

the data support the conclusion that nonradiologists having economic interest in radiographic equipment make heavier use of diagnostic x-ray than do other physicians, although their choices of examination methods suggest that their knowledge of radiology is less than that of radiologists.

Hemenway *et al.* [10] studied the test-ordering behavior of a group of 15 primary care physicians in a for-profit ambulatory care center in Boston before and after a financial incentive plan was introduced. Before the plan, the physicians were paid a straight salary; after the plan was instituted, they could earn bonuses based on revenues they generated for the center. The facility had on-site radiographic equipment, and referring patients to it was one way the physicians could generate more revenue. Their utilization of radiology was compared during a winter three-month period before the incentive plan was instituted and the same three-month period a year later, after it had gone into effect. During the latter period, 11 of the 15 physicians ordered more x-rays, and overall utilization by the entire group increased by 16%. Radecki and Steele [11] studied the effect of self-referral among 5407 physicians in 10 specialties from 1976 to 1978. They reviewed office logs to determine the use of imaging over a three-day recording period for each patient office visit, then calculated the odds ratio for obtaining imaging among physicians with their own on-site imaging equipment compared with those who referred their patients to

radiologists. For 9 of the 10 specialties, the odds ratios were between 1.2 and 1.7, indicating that self-referring physicians in those specialties used considerably more imaging.

Financial incentives are not the only motivating factors driving the increased utilization of imaging in a self-referral environment. For example, Strasser *et al.* [12] assessed the utilization of chest radiography in two facilities operated by a single family medicine department at the University of Western Ontario. All patients in the study had chest-related diagnoses. One of the two facilities had on-site x-ray equipment, whereas patients at the other facility were referred to an outside radiology office when chest radiography was needed. The family medicine physicians did not own the x-ray equipment or interpret the films and thus had no financial incentive to refer patients. Nevertheless, patients seen in the facility having the on-site x-ray equipment were 2.4 times more likely to have chest radiographs than patients seen in the facility with no x-ray equipment. In another study, Oguz *et al.* [13] examined the effect of the installation of a computed tomography (CT) scanner in their hospital's emergency department on the utilization of central nervous system (CNS) CT scans by the emergency medicine physicians. The scanner was owned by the hospital, and the studies were interpreted by the radiology department. In 1998, a year before the scanner was installed, 7.9% of all patients seen in the emergency department received CNS CT scans. In 2000, the year after installation, 13.0% of all patients received CNS CT scans. In addition to this sharp increase in utilization, the incidence of significant positive findings dropped from 22.1% the year before to 15.0% the year after the scanner was installed. It was clear that the installation of the CT unit in the emergency department had lowered the threshold for ordering a CNS CT scan among the emergency medicine physicians, and the authors speculated that the scanner was simply being used as a surrogate triage instrument. The latter two studies indicate that even in the absence of financial incentives, the mere availability of imaging technology in a nearby convenient location will lead to increased utilization.

As a group, the studies reviewed above clearly demonstrate that noninvasive diagnostic imaging will be used to a substantially greater extent when nonradiologist physicians have imaging equipment in their own practice settings instead of referring their patients to radiology facilities. There is also evidence that image-guided invasive procedures will be used at higher rates when the opportunity for self-referral exists, but that will be discussed in a later article in this series. How much of this increased utilization represents unnecessary care? The relationship is difficult to prove because of the ambiguity over what represents truly "appropriate care," but there is some literature to suggest that most of the incremental utilization of imaging accruing to self-referral is unnecessary. A recent study by Fisher *et al.* [14] assessed Medicare spending on patients with hip fractures, colorectal cancer, and acute myocardial infarctions in 306 hospital referral regions (HRRs) and correlated expenditures with clinical outcomes. They found that in the highest spending quintile of HRRs, patients received 60% more physician services than in the lowest spending quintile, including 65% more imaging. Despite this disparity, there was no difference in clinical outcome. A bit of quick math suggests,

therefore, that in some parts of the country, 40% or more of imaging studies may be unnecessary.

How much is self-referral for imaging costing our health care system? The 2001 Medicare Part B database showed that Part B payments (primarily the professional component) for noninvasive diagnostic imaging were approximately \$6.699 billion, of which \$2.686 billion went to nonradiologists. The data of Hillman *et al.* [2,3] suggest that self-referring nonradiologist physicians perform approximately two to eight times as many imaging studies in a given clinical circumstance as physicians who refer their patients to radiologists. Let us assume that the number of referrals to radiologists delineate the necessary and appropriate utilization rate of imaging and that the additional studies accruing to self-referral are largely unnecessary. Let us further take the most conservative estimate from the data of Hillman *et al.*, which is that self-referring nonradiologists do twice (rather than eight times) the amount of imaging that is truly necessary. This would mean that approximately half of all imaging by nonradiologists is unnecessary. Half of the \$2.686 billion paid by Medicare Part B for professional component imaging services to nonradiologists is \$1.343 billion. Because Medicare accounts for approximately one-third of all imaging in the United States, this suggests that approximately \$4 billion is paid by all payers to nonradiologists for the professional components of unnecessary imaging services. But of course, professional component reimbursement represents only about one quarter of the total cost of imaging services, with the technical component representing the remaining three quarters. This means that as much as \$16 billion per year is spent by our health care system to cover the cost of unnecessary self-referred noninvasive diagnostic imaging. Note that this does not include the costs of image-guided invasive procedures. The level of waste resulting from self-referral in imaging is indeed staggering.

CONCLUSIONS

What should you do with all this information? We suggest that you read the references, familiarize yourself with the data, make up your own PowerPoint presentation, and be prepared to give it at the appropriate time. You will probably be able find a number of audiences that will be quite receptive to your information, especially because it is evidence-based. Hospital officials, for one, are not anxious to relinquish the revenue they derive from their outpatient imaging facilities to the private offices of nonradiologist physicians. Health care insurers (and ultimately government and employers) are not anxious to pay the far higher costs resulting from self-referral in imaging. State and federal legislators and policy-making bodies such as MEDPAC are not anxious to see costs spiral out of control in health care programs for which they have responsibility. Many of these individuals are not aware how much self-referral is costing them. The data presented herein not only should be of interest to those audiences but can also serve as pertinent debating points in any confrontation with other specialists who try to encroach on diagnostic imaging in your practice setting.

The next article in this series will deal with other aspects of the overutilization of imaging: What are the other causes of it? What are the possible justifications for self-referral? What is the

extent of self-referral among radiologists? What steps might be taken to curb overutilization?

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Turf Wars in Radiology: Updated Evidence on the Relationship Between Self-Referral and the Overutilization of Imaging

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In a previous article in this series, published in 2004, the authors reviewed the medical literature for evidence on the relationship between self-referral and the utilization of imaging. That evidence demonstrated that self-referral led to substantially higher levels of utilization with its attendant increases in cost and the exposure of patients to unnecessary radiation. Since then, much new information has been published on this controversial subject. In this article, the authors update their previous article by summarizing all the recently published material. Once again, the evidence clearly indicates that self-referral results in the overutilization of imaging. Because radiologists have an important stake in the matter, it behooves them to be familiar with this recent evidence so they can bring it to the attention of policymakers in their areas.

Key Words: Medical economics, radiology and radiologists, department management, socioeconomic issues, self-referral, utilization of imaging

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I really worry about self-referral when doctors refer people for CT scans to facilities that they own. That's a conflict of interest that should be eliminated by law. It is unethical.

—Dr Timothy Johnson [1]

Matthew J. McMahon, a Las Vegas cardiologist, says his office also has a contract with [Integrated Diagnostic Centers Inc., a company that sells block leases in its imaging centers to referring physicians]. In an interview, Dr McMahon says the "benefit to the business is plain and simple: it is an economic advantage. Medical imaging is profitable. This is another revenue stream."

—*The Wall Street Journal* [2]

Similarly, a large majority [of physicians surveyed about professional standards] said they would refer patients to an imaging facility in which they had invested, and one-fourth of the doctors said they would not disclose their financial conflict of interest to patients.

—*The New York Times* [3]

The above quotations are just a few of many in the recent news media or medical literature attesting to the scope of the self-referral problem in imaging. In the second article in this series, written in late 2003 and published in this journal in March 2004 [4], we discussed the

evidence in the medical literature up till that time showing that self-referral inevitably leads to the overutilization of imaging. But a good deal more evidence has come to light in the more than 4 years since that earlier publication. In this article, we summarize the new evidence. It is important that radiologists who are interested in the self-referral problem, or who are confronted directly with it, be familiar with this evidence. State legislators, payers, and hospital credentials committees—the people who have the power to do something about it—will no longer accept the argument that radiologists have an inherent right to perform imaging just because they are the ones who are best trained or because they have exclusive services contracts with hospitals. They will want to see evidence, and you need to be prepared to give it to them.

THE RECENT EVIDENCE

- (1) In perhaps the most important of the recently published studies, Gazelle et al [5] compared imaging utilization among a group of physicians who referred their patients to radiologists when imaging was needed with that of another group who referred within their same specialties. The presumption was that the latter group was most likely engaging in self-referral, because their same-specialty referrals were likely to be to themselves, their partners, or

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others with whom they were engaged in joint practice arrangements. The study used an episode-of-care analysis and was very extensive, involving more than 18 million episodes of care among 4 million enrollees of a national employer-based health plan between 1999 and 2003.

The episodes of care and the types of imaging studied during those episodes were as follows: 1) cardiopulmonary disease chest radiography, 2) coronary disease-myocardial perfusion scans, 3) extremity fractures-radiography, 4) knee pain or injury-radiography and magnetic resonance imaging (MRI), 5) suspected abdominal malignancy-computed tomography (CT), and 6) suspected stroke-CT and MRI. Gazelle et al [5] used claims data to identify the physician specialties of the imaging providers and compared them with the specialties of the referring physicians. After adjusting for age and comorbidities, they found that patients being cared for by physicians who referred within their same specialties for imaging were 1.196 to 3.228 times more likely to receive imaging than patients cared for by physicians who referred to radiologists.

The study of Gazelle et al [5] was an interesting sequel to the classic self-referral studies by Hillman et al [6,7] in the early 1990s, which showed that self-referring physicians were between 2 and 8 times as likely to use imaging as physicians who instead referred their patients to radiologists when imaging was needed. The studies by Hillman et al focused primarily on the use of plain radiography, and it is therefore particularly interesting to observe the odds ratios for imaging by same-specialty referrers who used the more advanced modalities in the study by Gazelle et al: 3.004 for myocardial perfusion scans in coronary disease, 1.913 for MRI in knee pain, 1.494 for CT in suspected abdominal malignancy, and 1.260 and 1.196, respectively, for CT and MRI in suspected stroke. Gazelle et al postulated that the reason lower levels of increased utilization were seen among same-specialty referrers in their study compared with Hillman et al was the legislation and increased scrutiny that has come about in the past 15 years. Nevertheless, it is obvious that a significant problem still exists.

- (2) Mitchell [8] collected 2004 information on provider type for all owner-providers of MRI, CT, and PET services on the panel of a large commercial health plan in California. Information was obtained by personal phone calls to all sites. Dr Mitchell found that among 1,023 sites providing MRI, 33% were operated by nonradiologist physician groups and were therefore considered self-re-

ferrers. Of those, 61% did not actually own the equipment, which meant that they leased scanning slots or blocks of slots from facilities that did own it. Among 964 CT sites, 22% were nonradiologist physician groups, and of those, 64% did not own the scanners. Among 174 PET sites, 17% were nonradiologist physician groups, and 30% of those did not own the scanners. Mitchell concluded that self-referral for advanced imaging was widespread in California and pointed out that the lease arrangements frequently engaged in by these self-referring groups might well violate federal antikickback laws.

- (3) Our group, the Center for Research on Utilization of Imaging Services (CRUISE) at Thomas Jefferson University, has also recently studied ownership or leasing of MRI units by nonradiologist physicians, using the Medicare Part B database [9]. In the private-office setting in 2005, most MRI studies were performed by radiologists. However, between 2000 and 2005, ownership or leasing of MRI scans by nonradiologists grew by 254%, compared with 83% among radiologists. By 2005 in the Medicare population, nonradiologist physicians performed more than 384,000 MRI examinations on units they owned or leased, and their share of the private-office MRI market had increased from 11% in 2000 to 20% in 2005. Clearly, the in-office ancillary services exception of the Stark laws is being widely used by nonradiologist physicians to acquire high-end imaging equipment, which they can then use in a self-referral situation. It will be interesting to see whether the Deficit Reduction Act puts the brakes on this trend.
- (4) Another form of self-referral involves percutaneous coronary interventions (PCIs). Although these procedures almost never involve radiologists, they obviously are imaging based, and use of PCIs has grown rapidly, with more than 1 million performed annually in this country [10]. The results of a large randomized trial of PCI vs medical therapy in patients with stable angina (the Clinical Outcomes Utilizing Revascularization and Aggressive Drug Evaluation [COURAGE] trial) were published recently by Boden et al [10] and attracted widespread attention. The trial was carried out at 50 institutions throughout North America, and it randomized more than 1,100 patients to each of 2 arms, one receiving PCI followed by optimal medical therapy and the other receiving optimal medical therapy alone. The 2 groups were identical in virtually all respects and were followed up for a median interval of 4.6 years. With all the enthusiasm and attention that has accompanied the development of PCI in the past 2 decades, one might have

expected the PCI patients to do substantially better than the patients receiving medical therapy alone. Such was not the case, however. There was essentially no difference between the 2 groups in the occurrence of cardiac death, nonfatal myocardial infarction, or hospitalization for acute coronary syndrome during the follow-up period.

When these results were announced, many in the cardiology community expressed surprise and commented that they might have to rethink how they treat their patients with coronary disease. However, what is peculiar about such comments is that information of a very similar nature has been well known for years. For example, in 2004, an important study was published in the *Journal of the American College of Cardiology*, reporting on a randomized trial of PCI, medical therapy, or coronary artery bypass graft surgery in patients with multivessel coronary artery disease [11]. At 1-year follow-up, the probability of survival free of cardiac mortality, unstable angina requiring revascularization, or nonfatal myocardial infarction was approximately 94% in the coronary artery bypass graft group and 89% in the medical therapy group, but only 77% in the PCI group. One might therefore ask why, in the face of these sobering data, PCI use has continued to grow rapidly among interventional cardiologists in recent years. The answer would seem to be that self-referral plays an important role: cardiologists control the patients and the decisions as to how they are treated. It remains to be seen whether the recent growth in PCI will continue in the face of the new information from Boden et al [10].

- (5) Radionuclide myocardial perfusion imaging (RMPI) is a good model to study in trying to assess the effects of self-referral on utilization growth. This is because it is a high-cost, high-tech procedure that is commonly performed by both radiologists (who are not in a position to self-refer) and cardiologists (who are). Our group compared the changes in RMPI utilization rates per 1,000 Medicare beneficiaries among radiologists and cardiologists between 1998 and 2002 [12]. Among radiologists, the utilization rate increased by 2% over the entire 4-year period. Among cardiologists, the rate increased by 78%. The vast bulk of this large increase occurred in cardiologists' private offices rather than in hospital settings.

Given that RMPI is a mature technology and that there is no evidence (as discussed below) of any recent increase in the incidence of coronary artery disease, one can only conclude that the inordinate growth in the use of this technique in private cardiology offices is the result of self-referral and that

much of it may be unnecessary. In an effort to justify the large increase in the use of RMPI by cardiologists, Dr Kim Williams, [13] (then-president of the American Society of Nuclear Cardiology) claimed in 2004 that the increase was offset by a reduction in the use of invasive procedures such as coronary angiography. Dr Williams later repeated that claim in testimony before the US House of Representatives Committee on Ways and Means on March 17, 2005. In actual fact, Dr Williams's claim is incorrect. Our study [12] also examined the use of diagnostic cardiac catheterization and coronary angiography between 1998 and 2002. Rather than decreasing, the utilization rate of those procedures grew by 19% among cardiologists. Medicare data that are not yet published show that these same trends have continued beyond 2002.

- (6) In another study of trends in cardiac procedures, Lucas et al [14] examined Medicare data from 1993 to 2001 on nonimaging stress tests, imaging stress tests (primarily RMPI and stress echocardiography), diagnostic cardiac catheterization, PCI, and coronary artery bypass graft surgery. They used adjusted rates of acute myocardial infarction (AMI) as a surrogate measure of the prevalence of coronary artery disease. They found that the rate of AMI within the Medicare population remained essentially unchanged over the period of the study. However, imaging stress tests grew by 183%, cardiac catheterization by 69%, and PCI by 115%. These procedures are of course largely under the control of cardiologists, who have the ability to self-refer. Lucas et al [14] posed the question of why the use of these procedures was increasing so rapidly when the prevalence of the underlying disease was unchanged. Although they did not answer the question, they commented that these trends suggested that patients were being exposed to risk and cost without noticeable benefit. One could also pose the question somewhat differently: with all the additional diagnostic and therapeutic procedures being performed, why wasn't a reduction seen in the rate of acute myocardial infarction? The study by Lucas et al [14] suggests that although the self-referral of these procedures by cardiologists leads to much higher utilization and cost, it does not lead to better outcomes.

- (7) Some further interesting findings along these lines were reported by Hayes et al [15] in 2007. The authors are senior staffers with the Medicare Payment Advisory Commission. They studied volumes and growth rates for all cardiovascular procedural services within the Medicare population between 1999 and 2004. They found that cardiac

nuclear imaging grew at an average annual rate of 16.1%, while echocardiography grew at an average annual rate of 10.5%. Growth in these 2 types of examinations, which are largely self-referred by cardiologists, exceeded that for any other cardiovascular service. As a result of this very rapid growth, by 2004, these 2 examinations accounted for 43% of all cardiovascular relative value units within the Medicare population. That 2 diagnostic imaging procedures alone could grow so rapidly as to account for almost half of all relative value units of service in patients with cardiovascular disease raises concern about the ease and extensive permeation of self-referral within cardiovascular imaging.

- (8) Self-referral is not confined only to high-tech imaging. An interesting study by Litt et al [16] compared the use of extremity radiography among one group of physicians who performed the studies on their own x-ray machines with that among another group who referred their patients to radiologists. The referring physicians were all orthopedic surgeons, podiatrists, or rheumatologists. Data were collected from a New York City fee-for-service health maintenance organization that covered more than 1 million subscribers. For each referring physician, the investigators calculated a ratio of extremity radiographic examinations ordered per 100 office visits. They found that the group who routinely referred their patients to radiologists ordered 17 studies per 100 office visits, whereas the group who self-referred ordered 32 studies per 100 office visits, almost twice as many. They also evaluated the use of bilateral studies, which were reimbursed at twice the fee of unilateral studies, and found that the self-referring physicians ordered bilateral studies (presumably for comparison purposes) 40% more often than those who referred to radiologists. Ninety-two percent of all these extremity radiographic examinations were performed by orthopedic surgeons, podiatrists, or rheumatologists who had their own equipment and self-referred.
- (9) When a new and noninvasive diagnostic technique is developed that can replace an older, invasive, and more expensive technique, it's expected and hoped that substitution would occur, with the former increasing in use while the latter declines. We recently examined trends in the use of computed tomographic angiography (CTA) and magnetic resonance angiography (MRA) for diagnosing peripheral arterial disease and compared them with trends in the use of diagnostic catheter angiography (DCA) for the same purpose [17]. As is well known, cardiologists and surgeons have obtained privileges for peripheral DCA in many hospitals. We therefore also compared the use

of these procedures among radiologists on one hand and surgeons and cardiologists together on the other. In the Medicare population between 2000 and 2004, there was considerable growth in the use of MRA and CTA to diagnose peripheral arterial disease, almost all of it done by radiologists. During the same period, the utilization rate of peripheral DCA among radiologists decreased by 31%. Meanwhile, however, the utilization rate of peripheral DCA among cardiologists and surgeons increased by 70%. The numerical decline in the DCA rate among radiologists was offset by a slightly greater increase in the DCA rate among cardiologists and surgeons. The result was that overall, the rate of utilization of DCA remained essentially flat at a time when it should have been decreasing as non-invasive techniques such as CTA and MRA came into more widespread use. It is certainly hard to justify the increasing use of self-referred invasive DCA by cardiologists and surgeons at a time when noninvasive and less expensive alternatives are available.

- (10) As noted in several of the studies alluded to above, there was a sharp increase in the utilization of cardiac imaging in the Medicare population in recent years. This has been largely fueled by self-referral among cardiologists. We became interested in comparing this with trends in noncardiac thoracic imaging, and what we found was quite revealing [18]. Between 1996 and 2005, there was virtually no change in the overall utilization rate of noncardiac thoracic imaging. There was an increase in the use of CT and CTA, but this was balanced by decreases in the use of plain chest radiography and ventilation/perfusion lung scanning. The main reason for the absence of growth was that nonradiologist physicians have only a small share in noncardiac thoracic imaging (<10%). The contrast between what has happened in cardiac compared with noncardiac thoracic imaging in recent years is striking. In cardiac imaging, in which cardiologists have the dominant role and the ability to self-refer, utilization has risen sharply. In noncardiac thoracic imaging, in which radiologists predominate and where there are consequently fewer opportunities for self-referral, there has been no utilization growth. This suggests that imaging utilization could be kept under reasonable control by eliminating all or most self-referral by nonradiologist physicians.

THE INDUCEMENTS

It is troubling to see that despite all this evidence indicating that self-referral is bad for our health care system, some medical societies, companies, and individuals are doing all they can to promote it, in the interests of their bottom line. For example (this was brought to our attention by Dr Alan

Kaye), one company is working with the Association of Otolaryngology Administrators to encourage its members to introduce in-office mini-CT scanners. The extensive information on its Web site includes a financial pro forma showing how profitable it can be. A different and much larger equipment vendor is also marketing its CT scanners directly to otolaryngologists, stating that "offering CT imaging services can help your practice differentiate itself competitively and offset escalating costs and declining reimbursements. In-office imaging is easier and more affordable than you may think." Another company, which seems to be run by radiologists, offers referring physicians a "free multi-slice CT scanner," along with some sort of partnership to operate the scanner and provide the interpretations. Yet another company's marketing material leads off as follows:

Are you dissatisfied with declining reimbursement rates, escalating demands on your time and increased competition? You can counteract these prevailing trends by capturing new revenue opportunities through providing diagnostic imaging services, such as MRI and CT, in your own office. Instead of sending your patients—and revenue—to another provider, your patients will appreciate the convenience, while you increase your bottom line.

These are just a few of the things that are out there; we could go on with many more, but you get the idea. It is unfortunate that these supposedly responsible companies and physicians (including some radiologists) are so anxious for the almighty buck that they will go to these lengths to churn up even more self-referral than already exists in the system.

CONCLUSIONS

The evidence cited above has all come to light within the past 4 years. It shows clearly that self-referral leads to higher utilization of imaging. Population-based studies such as these cannot assess the appropriateness of the additional imaging tests, because they cannot evaluate individual patient records. However, the weight of evidence, in particular the episode-of-care analyses of Hillman et al [6,7] and Gazelle et al [5], strongly suggests that much of the additional imaging is unnecessary. Likewise, it is not possible to know the true motivation that leads nonradiologist physicians to install imaging equipment in their offices. Our purpose here is not to impugn their motives; it is conceivable that they may be driven not just by financial considerations but by enthusiasm for new technology, or a desire to make things more convenient for their patients, or a perceived need for quicker diagnoses. But regardless, the end result is more and more imaging and ever rising costs to our health care system. Many radiologists around the country are involved in the debate about self-referral in imaging. The debate is often conducted with colleagues in other medical specialties, hospital administrators or boards, credentials commit-

tees, state legislators, payers, or other policymakers. We hope the evidence summarized here will help radiologists convince others that self-referral in imaging is bad policy for our health care system and should be curbed.

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Self-Referral and Overutilization of Imaging

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**PA House Committee on Insurance
Harrisburg, June 8, 2010**

Frequency of imaging per episode of illness

Clinical presentation	Ratio of imaging frequency, self-referrers/radiologist-referrers
Chest pain	1.9
CHF	2.7
Difficulty urinating	2.2
GI bleeding	1.7
Headache	4.3
Knee pain	7.7
Low back pain	3.6
Transient cerebral ischemia	4.7
URI	2.3
UTI	2.4

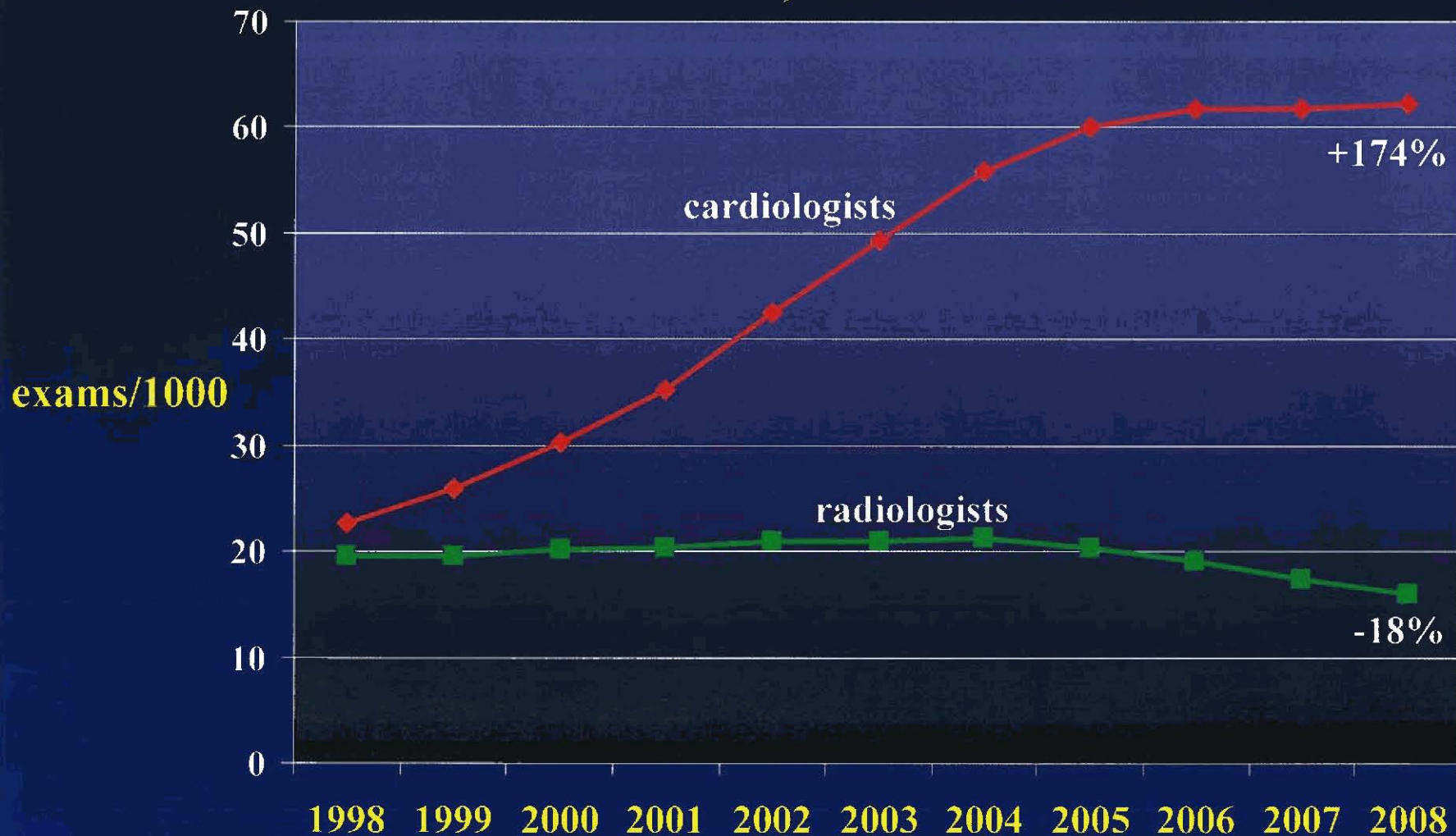
*Hillman et al, JAMA 1992; 268: 2050

U.S. GAO Report, “Referrals to Physician-Owned Imaging Facilities Warrant HCFA’s Scrutiny”, 10/94

- Compared rates of imaging for MDs having in-practice imaging equipment with rates for other MDs who referred elsewhere.
- Based on Medicare claims covering 19.4 million office visits & 3.5 million imaging studies in FL during 1990.
- Ratios of imaging rates, self-referrers/outside referrers:

MRI	3.06
CT	1.95
US	5.13
Nuc Med	4.52
X-ray	2.10

Nuclear Myocardial Perfusion Imaging (MPI) Utilization Rates, Radiologists & Cardiologists, Medicare 1998-2008, All Sites-of-Service



data through 2006 in Levin DC, Rao VM et al, JACR 2009;6:437

SELF-REFERRING PHYSICIANS

Doctors Reap Benefits By Doing Own Tests

By Shankar Vedantam

Washington Post Staff Writer

Friday, July 31, 2009

In August 2005, doctors at Urological Associates, a medical practice on the Iowa-Illinois border, ordered nine CT scans for patients covered by Wellmark Blue Cross and Blue Shield insurance. In September that year, they ordered eight. But then the numbers rose steeply. The urologists ordered 35 scans in October, 41 in November and 55 in December. Within seven months, they were ordering scans at a rate that had climbed more than 700 percent.

The increase came in the months after the urologists bought their own CT scanner, according to documents obtained by The Washington Post. Instead of referring patients to radiologists, the doctors started conducting their own imaging -- and drawing insurance reimbursements for each of those patients.

PHOTOS 

Washington Post

7/31/09



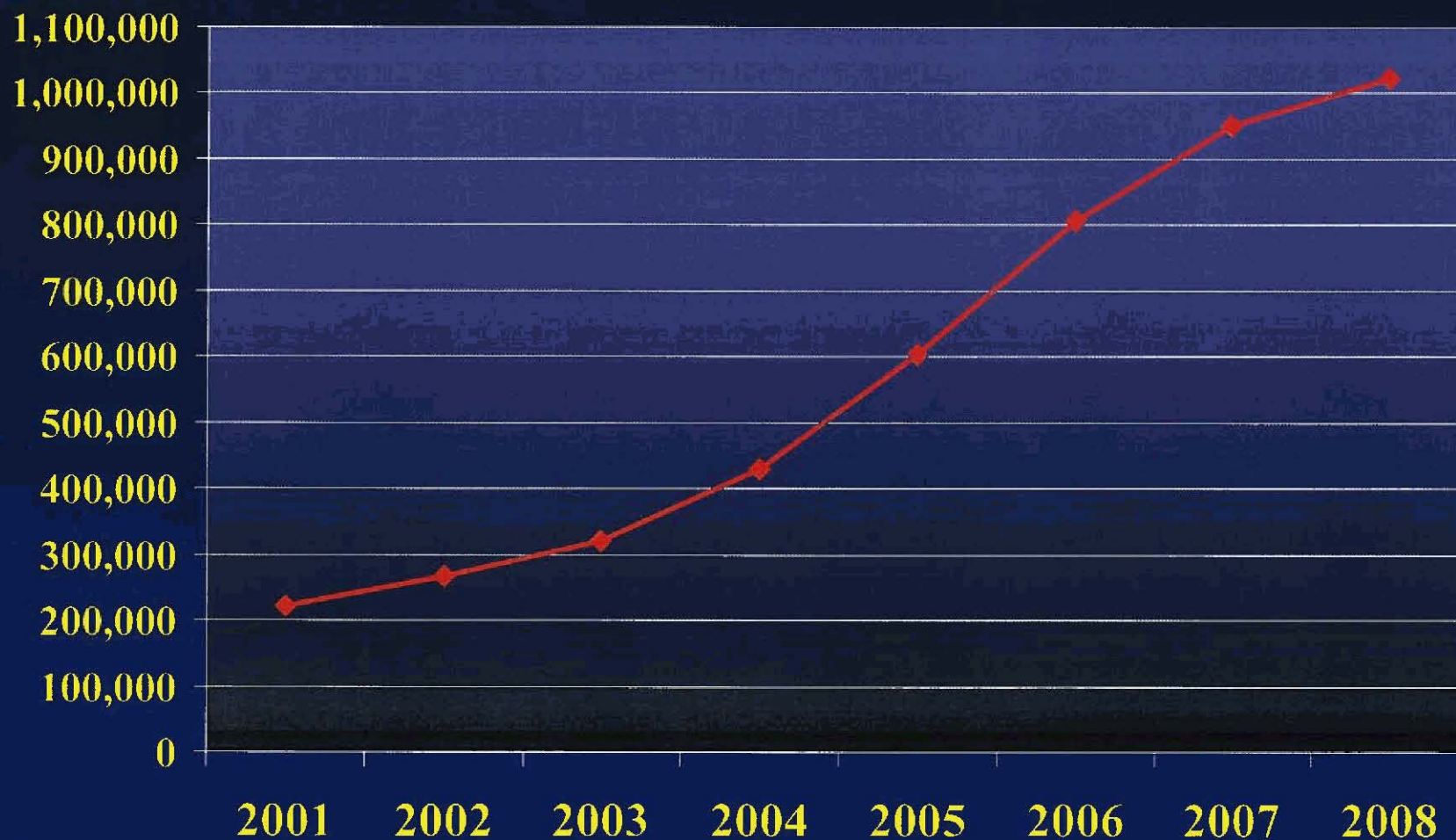
Lawmakers -- including Reps. Anthon Rogers (R-Mich.) and Janice Schakowsky work out details of health-care legislation that would prohibit doctors from profiting from their own tests. (Linda Davidson - The Washington Post)

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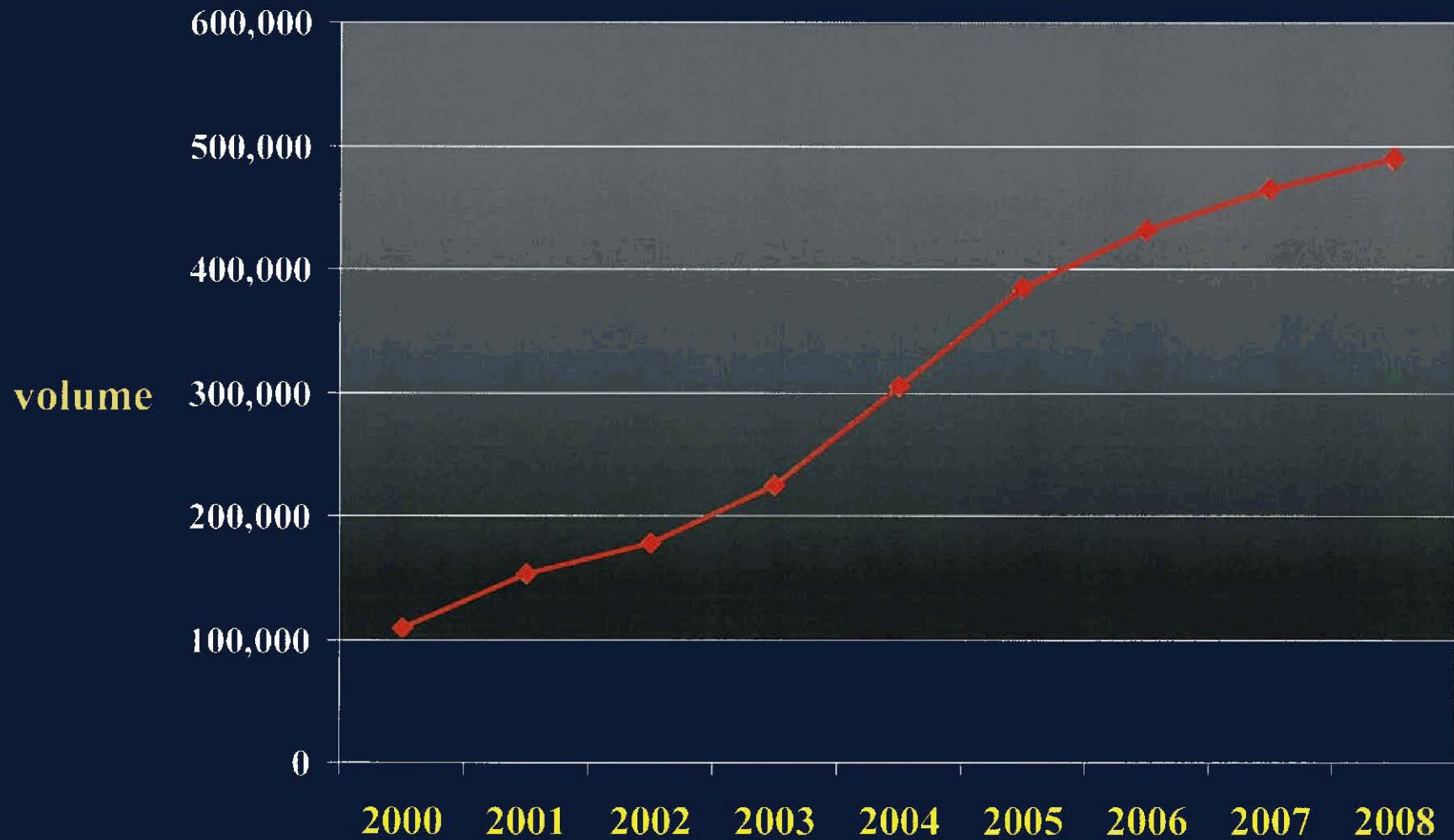
Yahoo

CTs Done in Facilities Owned or Leased by Nonradiologists, Medicare 2001-2008



*Levin DC, Rao VM et al, JACR 2008;5;1206
(data in paper through 2006)

MRI Done in Facilities Owned or Leased by Nonradiologists, Medicare, 2000-2008



Levin DC, Rao VM et al, JACR 2008;5:105
(data in paper through 2005)

J U N E 2 0 0 9

REPORT TO THE CONGRESS

Improving Incentives in
the Medicare Program

MEDPAC Medicare
Payment Advisory
Commission

MedPAC report to the Congress, June 2009:
contained a chapt titled
“Impact of Physician
Self-Referral on Use of
Imaging Services Within
an Episode”

Studied 493,000
episodes of care,
comparing use of
imaging among MDs
who self-referred &
those who instead
referred to hospitals or
imaging centers

MedPAC Report to the Congress, June 2009

- All episodes showed higher imaging use with self-referral; those pts were up to 2.3X as likely to receive at least 1 imaging study during the episode.
- Episodes with a self-referring MD had 5-104% higher imaging spending than those with a non-self-referring MD.
- Example: 14% of all migraine episodes with self-referring MDs had MRI vs 8% with non-self-referring MDs. Migraine episodes with self-referring MDs had 85% more spending on MRI.

Failure Rates

	# of sites	Failures
Chiropractors	144	69 (48%)
Podiatrists	49	22 (45%)
FPs/GPs	72	31 (43%)
Internists	20	8 (40%)
Urologists	14	5 (36%)
Surgeons	12	3 (25%)
Orthopedists	43	7 (16%)
Ob/gyns	41	3 (7%)
Radiologists	77	1 (1%)

MedPAC Report to the Congress, June 2004