OREGON HOUSE HEALTH CARE COMMITTEE HEARING MARCH 22,2013

PHYSICIAN SELF-REFERRAL, TESTIMONY OF CHRISTOPHER J. ALTENHOFEN, MD, RADIOLOGIST

- Self Referral – What Is It?
    - Radiologist vs Nonradiologist Practice
        - Classic conflict of interest, pitting physician financial self-interest against the true needs and best interests of the patient.
        - Physicians set up an advanced imaging shop and can then drive their own demand.
        - Radiologist owned practices cannot do this.

- Self-Referral – What It Does
    - **OVERUTILIZATION OF ADVANCED IMAGING AS A DIRECT EFFECT OF SELF-REFERRAL**
        - Several studies documenting how and to what extent self-referral induces overutilization anywhere from 54-700%
            - Several GAO studies, most recently Sept 2012
                - "Switchers:" 67% increase in utilization
                - Over 400,000 unnnecessary tests performed annually
                - Costing CMS hundreds of millions of dollars per year
        - Meta-Analysis in 2011: $3.6 billion in added costs to healthcare market
        - In these days of high deductibles, this means hundreds of dollars directly out of the patients' pockets
    - **ANTICOMPETITIVE**
        - Distortion of marketplace.
        - Self-referring practices are not competing in broader marketplace.
        - Essentially carving out their patient base from larger imaging market, denying patients referrals to better and lower cost imaging services.
        - **Diminished quality of examinations** because self-referring groups do not need to purchase the best equipment or provide the best services.
        - Inhibits natural entrepreneurship and innovation.
    - **PATIENT SAFETY ISSUES**
        - **Unnecessary exposure to CT scan and ionizing radiation.**
        - Incidental findings leading to unnecessary additional tests and sometimes invasive procedures.
        - According to a report from Medicare Payment Advisory Commission (MedPAC), a major private insurer evaluated 1,000 imaging providers on the quality of their staff and equipment and found that 78 percent of non-radiologist imaging facilities had at least one serious deficiency, many of which, the study noted, could have "tragic" consequences.

- Arguments You Will Hear For Non-action on Self-Referral
    - **"The Feds Are Working On It"** (from OMA)
        - Actually, the HHS and CMS are going backwards on this.
            - JACR paper of March 2013
        - HHS and CMS ignored 2 of 3 GAO recommendations from September report
            - GAO recommendation to cut reimbursements for self-referred imaging was ignored
            - Ironically, CMS preserved those self-referral reimbursement rates but cut reimbursements to non-self-referring radiologist owned OP practices 10-30%
            - Blue Cross Blue Shield also cut reimbursements across the board to radiology OP practices 29% but didn't touch OP self-referral rates
        - For these reasons, because these federal agencies have failed to act on this, most other states have enacted their own laws restricting physician self-referral:
            - See table outlining state-by-state comparisons of self-referral laws
                - Oregon is one of handful of states that has none, which is ironic since Oregon prides itself on its leadership in healthcare reform and Gov. Kitzhaber is a recognized leader in this area.
    - **Convenience**
        - In many instances simply not true. Many of these self-referring practices have offices scattered around their metropolitan areas with only one site doing the advanced imaging so patients still have to travel to get to these scanners, often times passing one, or sometimes two, of our imaging centers
        - Convenience itself is double edged sword
            - Leads itself to overutilization even without self-referral incentive with increased number of negative exams
    - **Radiology Benefits Managers (RBM'S) & The Affordable Care Act**
    - **Allows Physicians to Maintain Incomes**
        - These two are linked
        - RBM's are a tool used by insurance companies to deny payment for ordered exams based on whether the exam is deemed appropriate based on the provided clinical information.
        - Physicians quickly learn what clinical information is necessary to get an exam approved.
        - In the ACA , full reimbursement will depend on your rate of scanner utilization.
            - If your scanner is not fully utilized (ie, > 90% capacity) you will not get full reimbursement
        - In the self-referral world, these factors create an inducement to fraudulent ordering.
        - If the stated goal is to maintain physician incomes then overutilization is incentivized by these measures so that physicians can maintain their incomes.
- Current bill is an adaption of Maryland's self-referral law which is considered the model self-referral law in the nation.
    - **What this bill won't do:**
        - Won't prohibit offices from providing x-ray, mammography, or ultrasound services.
            - Directed only at advanced diagnostic imaging
        - Doesn't prohibit physicians from investing in OP imaging centers if they feel that is a good investment, but it does, sensibly, prevent these physicians from referring patients to those centers and inappropriately driving their own demand, which we know happens from the numerous past studies already mentioned, increasing utilization, *on average*, 67% according to the most recent GAO study).

September 2012

MEDICARE

Higher Use of Advanced Imaging Services by Providers Who Self-Refer Costing Medicare Millions

GAO Highlights

Accountability * Integrity * Reliability

Highlights of GAO-12-966, a report to congressional requesters

Why GAO Did This Study

Medicare Part B expenditures—which include payment for advanced imaging services—are expected to continue growing at an unsustainable rate. Questions have been raised about self-referral's role in this growth. Self-referral occurs when a provider refers patients to entities in which the provider or the provider's family members have a financial interest. GAO was asked to examine the prevalence of advanced imaging self-referral and its effect on Medicare spending. This report examines (1) trends in the number of and expenditures for self-referred and non-self-referred advanced imaging services, (2) how provision of these services differs among providers on the basis of whether they self-refer, and (3) implications of self-referral for Medicare spending. GAO analyzed Medicare Part B claims data from 2004 through 2010 and interviewed officials from the Centers for Medicare & Medicaid Services (CMS) and other stakeholders. Because Medicare claims lack an indicator identifying self-referred services, GAO developed a claims-based methodology to identify self-referred services and expenditures and to characterize providers as self-referring or not.

What GAO Recommends

GAO recommends that CMS improve its ability to identify self-referral of advanced imaging services and address increases in these services. The Department of Health and Human Services, which oversees CMS, stated it would consider one recommendation, but did not concur with the others. GAO maintains CMS should monitor these self-referred services and ensure they are appropriate.

View GAO-12-966. For more information, contact James C. Cosgrove at (202) 512-7114 or cosgrovej@gao.gov.

What GAO Found

From 2004 through 2010, the number of self-referred and non-self-referred advanced imaging services—magnetic resonance imaging (MRI) and computed tomography (CT) services—both increased, with the larger increase among self-referred services. For example, the number of self-referred MRI services increased over this period by more than 80 percent, compared with an increase of 12 percent for non-self-referred MRI services. Likewise, the growth rate of expenditures for self-referred MRI and CT services was also higher than for non-self-referred MRI and CT services.

GAO's analysis showed that providers' referrals of MRI and CT services substantially increased the year after they began to self-refer—that is, they purchased or leased imaging equipment, or joined a group practice that already self-referred. Providers that began self-referring in 2009—referred to as switchers—increased MRI and CT referrals on average by about 67 percent in 2010 compared to 2008. In the case of MRIs, the average number of referrals switchers made increased from 25.1 in 2008 to 42.0 in 2010. In contrast, the average number of referrals made by providers who remained self-referrers or non-self-referrers declined during this period. This comparison suggests that the increase in the average number of referrals for switchers was not due to a general increase in the use of imaging services among all providers. GAO's examination of all providers that referred an MRI or CT service in 2010 showed that self-referring providers referred about two times as many of these services as providers who did not self-refer. Differences persisted after accounting for practice size, specialty, geography, or patient characteristics. These two analyses suggest that financial incentives for self-referring providers were likely a major factor driving the increase in referrals.

Change in Average Number of MRI Services Referred, 2008 and 2010

	Average 2008 referred MRI services	Average 2010 referred MRI services	Percentage change
Switchers	25.1	42.0	67.3
Non-self-referrers	20.6	19.2	-6.8
Self-referrers	47.0	45.4	-3.4

Source: GAO analysis of Medicare data.

Note: Pattern observed for MRI services was similar for CT services. GAO defines switchers as those providers that did not self-refer in 2007 or 2008, but did self-refer in 2009 and 2010.

GAO estimates that in 2010, providers who self-referred likely made 400,000 more referrals for advanced imaging services than they would have if they were not self-referring. These additional referrals cost Medicare about $109 million. To the extent that these additional referrals were unnecessary, they pose unacceptable risks for beneficiaries, particularly in the case of CT services, which involve the use of ionizing radiation that has been linked to an increased risk of developing cancer.

American College of Radiology
State-by-State Comparison of Physician Self-Referral Laws

State	Physician Self-Referral Statute	Scope	Effective Date	Prohibited Activities (i.e. ownership, leasing, compensation arrangements)	References to Referrals By Radiologists/Radiation Oncologists	Disclosure Requirements	Exceptions	Enforcement Activity		Related Statutes
								Cases	AG Op.	
Alabama	None.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
Alaska	None.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
Arizona	Ariz. Rev. Stat. § 32-1401(25)(ff) [Licensing]	Doctors and surgeons.	1998	Makes it unprofessional conduct for doctor to knowingly fail to disclose direct financial interest when referring patients.	None.	Yes	Referrals within a group of doctors practicing together.	None.	None.	Ariz. Rev. Stat. § 32-1854(35): similar provision for osteopaths
Arkansas	None.	Arkansas' only self-referral law applies only for home intravenous drug therapy services. Ark. Code Ann. 20-77-804.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
California	Cal Bus. & Prof. Code § 650.01 - 02	Licensees in Healing Arts.	1993	Prohibits referrals if licensee or immediate family has financial interest.	Referrals for radiation oncology or diagnostic imaging specifically included.	None.	Numerous, including an exception for certain requests by radiologists and radiation oncologists, and for any service performed within, or for goods supplied by, a licensee's office or the office of a group practice. See Overview.	None.	Yes.	Cal. Bus. & Prof. Code § 2426: requires licensees to report interests to the Board.
	Cal. Bus. & Prof. Code § 654.2	Licensees in Healing Arts.	1984	Prohibits referrals unless licensee first discloses the interest in writing and advises that patient that s/he may choose another entity.	None.	Yes.	§ 654.2(f)(2) says this section does not apply to relationships governed by other provisions of this article.	None.	Yes.	
	Cal. Lab. Code § 139.3 - .31	Workers' compensation; applies to physicians.	1993	Prohibits referrals if physician or immediate family has financial interest.	Referrals for radiation oncology or diagnostic imaging specifically included; also, certain exceptions apply to diagnostic imaging services.	None.	Numerous, including exceptions that apply to diagnostic imaging services and for any service performed within, or goods supplied by, a physician's office, or the office of a group practice. See Overview.	Yes.	Yes.	

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	Cal. Health & Saf. Code § 1323(c)	Health facilities.	1985	Prohibits referrals to other health facilities in which the health facility has a significant beneficial interest unless written disclosure that patient may choose another facility.	None.	Yes.	Yes. See Overview.	None.	None	
	Cal. Wel. & Isnt. Code § 14022	Medi-Cal (Medicaid).	1980	Prohibits payments by Medi-Cal to providers for services rendered in connection with a referral.	None.	Yes, to qualify for an exception.	Exception for interests that have been disclosed to the Director and the Advisory Health Council.	None.	None.	
Colorado	Colo. Rev. Stat. § 26-4-410.5	Physicians enrolled in the Medical Assistance (Medicaid) program	1996	Prohibits referrals if physician or immediate family member has a financial relationship with the entity.	Subsection (2) lists "radiology and other diagnostic services" and "Radiation therapy services" as among the entities for which self-referrals are prohibited	Entities must disclose to state all physicians/family members who have an ownership or investment	Numerous, including for services provided by another physician in the same group practice as the referring physician, and for in-office ancillary services.	None.	None.	
Connecticut	Conn. Gen. Stat. § 20-7a(c)	Practitioners of the healing arts.	1973	Requires disclosure of ownership or investment interest prior to referring to entity for diagnostic or therapeutic services, and requires practitioner to provide reasonable referral alternatives	The definition of therapeutic services in § 20-7a(c) includes radiation therapy	Yes.	Does not apply to in-office ancillary services.	None.	None.	
Delaware	CDR 24-1700.15.1.11 [Licensing]	Licensed and unlicensed physicians and applicants practicing medicine in the state.	Not provided.	Makes it unprofessional and dishonorable conduct to willfully fail to disclose a financial interest in an ancillary testing or treatment facility outside of the physician's office.	None.	Yes.	None.	None.	None.	
District of Columbia	None.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	

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Florida	Fla. Stat. § 456.053	Health care providers.	1992	Prohibits referring a patient for health care services or items to an entity in which the provider is an investor or has an investment interest.	Numerous- see Overview.	Yes, pursuant to § 456.052	Many, including (1) referrals by a radiologist for diagnostic-imaging services; (2) referrals by a physician specializing in the provision of radiation therapy services for such services; and (3) referrals by a health care provider who is (a) a sole provider or member of a group practice (b) for designated health services that are prescribed solely for the referring provider's or group practice's own patients, and (c) that are provided by or under the direct supervision of the referring provider or group practice. However, there are conditions on the provider or group's acceptance of outside referrals for diagnostic imaging services. See Overview.	Yes.	None.	

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Georgia	O.C.G.A. § 42-1B-1 et seq.	Health care providers.	1993	Prohibits referring a patient for the provision of designated health services to an entity in which the health care provider has an investment interest.	The definition of "referral" in § 43-1B-3(10) states that referrals do not include orders, recommendations and plans of care made by a radiologist for diagnostic imaging services, or by a health care provider specializing in the provision of radiation therapy services.	Yes, pursuant to § 43-!b-5	Numerous. See "References to Referrals by Radiologists." There is also an exception for referrals within a group practice. See Overview.	None.	None.	
Hawaii	Haw. Rev. Stat. § 431:10C-308.7(c)	Health care providers for treatments paid for by a motor vehicle insurance policy.	1992	Prohibits self-referral without disclosure for any service or treatment authorized under the chapter.	None.	Yes.	Definition of "financial interest" does not include certain HMO arrangements. See Overview.	None.	None.	
Idaho	None.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
Illinois	225 I.L.C.S. 47/1 et seq.	Health care workers.	1992	Prohibits self-referrals and self-referral arrangements to an entity outside the health care worker's office or group practice	None.	Yes, to qualify for an exception.	Numerous, including for referrals within the health care worker’s office or group practice See Overview.	Yes.	None.	The provision is implemented by 77 Ill. Admin. Code 1235 et seq., and the Department of Professional Regulation is given disciplinary authority under 225 I.L.C.S. 60/22.
Indiana	None.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
Iowa	None.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
Kansas	Kan. Stat. Ann. § 65-2837(b)(29)	All persons with a license, permit or special permit issued under Kan. Stat. Ann. § 65-28.	1957	Makes it unprofessional conduct to self-refer when there is a significant interest, unless the licensee informs the patient in writing of the interest and that the patient may obtain such services elsewhere.	None.	Yes.	Self-referrals not prohibited if the referred services are provided in the physician’s office, or if the investment interest is less than 10%.	None.	None.	

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Kentucky	None.	Kentucky does not have a self-referral prohibition, but in the workers' compensation context Kentucky requires self-referrals to be disclosed to the patient, the workers' compensation commissioner and the employer's insurer . See K.R.S. § 342.020(9).	N/A	N/A	N/A	N/A	N/A	N/A	N/A	K.R.S. § 205.8477(1) requires Medicaid providers to annually report who holds a 5% or greater ownership interest, and to identify any other Medicaid-participating providers with which the provider conducts significant business.
Louisiana	La. Rev. Stat. Ann. § 37:1744	Health care providers.	1993	Self-referrals outside the same practice group as the referring provider, where the provider or a member of that provider's immediate family, has a financial interest that will be served by the referral.	None.	Yes.	This prohibition only applies to referrals outside the practitioner's group practice. An exception exists where the health care provider, in advance, informs the patient in writing of the financial interest.	None.	None.	
	La. Admin. Code tit. 46, § 4211	Physicians.	1994	Self-referrals outside the physician's group practice when there is a financial interest.	None.	Yes.	This prohibition only applies to referrals outside the practitioner's group practice. An exception exists for advance disclosure in writing. There is also an exception for ownership or investment interests that do not meet the definition of a "significant financial interest."	None.	None.	

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	La. Admin. Code tit. 46, § 4213	Physicians.	1994	Arrangements or schemes which the physician knows or should know have a principal purpose of inducing referrals in violation of La. Admin. Code tit. 46, § 4211.	None.	None.	None.	None.	None.	
Maine	Me. Rev. Stat. Ann. tit. 22, §§ 2081 *et seq*.	Health care practitioners.	1993	Self-referrals to an outside facility in which the referring practitioner is an investor.	None.	Yes.	This prohibition only applies to referrals outside the health care practitioner's office or group practice. Numerous exceptions are set forth within the statute.	None.	None.	
	Code Me. R. § 02-031-870	Health care practitioners.	1998	Self-referrals to an outside facility in which the referring practitioner is an investor.	None.	Yes.	This prohibition only applies to referrals outside the health care practitioner's office or group practice. In addition, there is an exception for facilities that meet requirements regarding community need, investment nondiscrimination, nonexclusivity, etc.	None.	None.	
Maryland	Md. Code Ann. §§ 1-301 *et seq.*	Health care practitioners.	1993	Referrals to a health care entity in which the practitioner or his/her immediate family owns a beneficial interest or has a compensation arrangement.	Yes. In-office ancillary services definition excludes imaging services unless provided by radiologists.	Yes.	Numerous exceptions are set forth within the statute, including group practice and in-office ancillary services exceptions.	None.	Yes.	

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Massachusetts	N/A	Massachusetts' self-referral law applies only to physical therapy services.	N/A	N/A	N/A	N/A (physical therapy only)	N/A	N/A	N/A	Mass. Ann. Laws ch. 111 § 70E entitles hospital patients to an explanation, upon request, of a treating physician's financial interest in other health care facilities to which the patient is referred.
Michigan	Mich. Comp. Laws § 333.16221(e)	Physicians	1986	Stark and its regulations are specifically incorporated into Michigan law, making a physician subject to discipline if he or she self-refers in violation of Stark. Unprofessional conduct also includes directing or requiring an individual to purchase or secure a drug, device, treatment, procedure, or service from another person, place, facility or business in which the licensee has a financial interest.	None.	None.	The exceptions in 42 U.S.C. § 1395nn, including the group practice and in-office ancillary services exceptions, are incorporated by reference.	None.	Yes.	

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Minnesota	Minn. Stat. § 147.091	Physicians.	1971	Referrals to a health care provider in which the referring physician has a significant financial interest.	None.	Yes.	An exception exists where the physician has disclosed his or her own financial interest. In addition, a financial interest does not include (1) the ownership of a building by a physician where space is leased to an individual or organization at the prevailing rate in a straight lease agreement; or (2) any interest held by a physician in a publicly traded stock.	None.	None.	
	2004 Minn. ALS 198 (S.B. 2080)	Health care providers.	2004	No health care provider with a financial or economic interest in an outpatient surgical center or diagnostic imaging center may refer a patient to that facility unless, prior to the self-referral, the provider discloses the financial interest in writing. Employment or contractual arrangements that limit referrals to outpatient surgical centers, diagnostic imaging facilities, or hospitals must also be disclosed to patients in writing. A financial interest includes membership, a proprietary interest, or co-ownership with an individual, group, or organization to which patients, clients, or customers are referred.	Yes--references to diagnostic imaging facilities.	Yes.	Exceptions exist where health care providers disclose financial interests or employment/contractual arrangements in writing, in advance.	None.	None.	
Mississippi	None.	N/A	N/A	N/A	None.	None.	None.	None.	None.	
Missouri	N/A	Missouri's self-referral law applies only to physical therapy services.	N/A	N/A	N/A	N/A (physical therapy only)	N/A	N/A	N/A	

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Montana	Mont. Code Ann. § 39-71-315	Workers' compensation	1993	Referring a workers' compensation eligible patient to a facility owned by the provider.	None.	Yes.	This provision does not apply if the provider informs the worker of the ownership interest and provides the name and address of alternate facilities, if any exist. There is also an exception where medical services are provided to an injured worker by a treating physician with an ownership interest in a managed care organization that has been certified by the Montana Department of Labor and Industry.	None.	None.	
	Mont. Code Ann. § 39-71-1108	Workers' compensation	1993	Referring a workers' compensation eligible patient to a facility where the provider has an investment interest.	None.	None.	Where there is a demonstrated need in the community and alternative financing is not available. In addition, this provision does not apply to care or services provided directly to an injured worker by a treating physician with a certified ownership interest in a managed care organization.	None.	None.	
	Mont. Code Ann. § 37-2-103	Montana also has a pharmacy ownership law which prohibits medical practitioners from owning a community pharmacy.	N/A	N/A	None.	None.	N/A	N/A	N/A	
Nebraska	None.	N/A	N/A	N/A	None.	None.	None.	None.	None.	

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Nevada	Nev. Rev. Stat. 429B.425	Health care practitioners.	1993	Referrals for services or goods in which the practitioner has a financial interest.	Yes.	None.	There are numerous exceptions set forth within the statute, including a group practice exception.	None.	None.	
	Nev. Rev. Stat. 630.305	Physicians.	1983	Referrals to facilities in which the licensee has a financial interest.	None.	Yes.	None.	None.	None.	
New Hampshire	N.H. Rev. Stat. Ann. § 125:25b	Health care practitioners.	1993	Referrals to diagnostic or therapeutic entities in which the practitioner has an	Yes.	Yes.	Self-referral is permitted if the health care practitioner	None.	None.	
	N.H. Rev. Stat. Ann. § 125:25c	Health care practitioners.	1993	Referrals to diagnostic or therapeutic entities in which the practitioner has an ownership interest or from which the practitioner receives remuneration.	Yes.	Yes.	Self-referral is permitted if the health care practitioner discloses his or her financial interest. The disclosure requirement does not apply to in-office ancillary services.	None.	None.	
	N.H. Rev. Stat. Ann. § 281-A:23	Workers' compensation.	1988	Referrals of injured workers to providers or entities in which the referring provider has a financial or ownership interest.	None.	None.	Exceptions for emergency situations, referrals from a specialist to a subspecialist, referrals from a health care provider to a specialist in another field, or referrals from a primary care practitioner to a specialist. There is also an exception where the referral is ethically appropriate and medically indicated.	None.	None.	

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New Jersey	N.J. Stat. Ann. §§ 45:9-22.4 *et seq* .	Practitioners.	1989	Referrals to a health care service in which the practitioner has a significant beneficial interest.	Yes.	Yes.	Exceptions exist for services provided at the practitioner's medical office and billed directly by the practitioner, and for radiation therapy pursuant to oncological protocol, lithotripsy and renal dialysis.	Yes.	None.	
	N.J. Admin. Code § 13:35-6.17	Practitioners	1992	Referrals to a health care service in which the practitioner has a significant beneficial interest.	Yes.	Yes.	Exceptions exist for services provided at the practitioner's medical office and billed directly by the practitioner, and for radiation therapy pursuant to oncological protocol, lithotripsy and renal dialysis.	Yes.	None.	
New Mexico	N.M. Stat. Ann. § 24-1-5.8	Physician owners of hospitals and health care providers with financial interests in hospitals.	2003	Referrals by a physician owner of an acute-care hospital, a general hospital or a limited services hospital to the hospital in which he or she has a financial interest. Health care providers with a financial interest in such hospitals must also disclose the financial interest before referring a patient to the hospital.	None.	Yes.	Self-referrals are permitted so long as the physician or health care provider discloses his or her financial interest to the patient.	None.	None.	

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New York	N.Y. Soc. Serv. Law § 238-a	Health care practitioners.	1992	Referrals for clinical laboratory, pharmacy, radiation therapy, x-ray, imaging, or physical therapy services where the referring practitioner has a financial relationship with the provider or entity.	Yes.	Yes.	Numerous exceptions are set forth within the statute, including group practice and in-office ancillary services exceptions.	Yes.	None.	
	10 NYCRR § 34.1 *et seq*.	Health care practitioners.	1993	Referrals for clinical laboratory, pharmacy, radiation therapy, x-ray, imaging, or physical therapy services where the referring practitioner has a financial relationship with the provider or entity.	Yes.	Yes.	A referral does not include an arrangement whereby a treating practitioner makes arrangements with another covering practitioner's patients for services routinely provided by the treating practitioner when the treating practitioner is unavailable to treat patients.	None.	None.	
North Carolina	N.C. Gen. Stat. Sec. § 90-405 - 409	Health care providers.	1993	Prohibits health care providers from making any referral of any patient to an entity in which the health care provider or group practice or any member of the group practice is an investor.	None.	Yes.	• Self-referral is permitted for any designated health care service provided by, or provided under the personal supervision of, a sole health care provider or by a member of a group practice to the patients of that health care provider or group practice. • Exception exists when a referral is made in a medically underserved area.	None.	Yes.	
North Dakota	None.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	

American College of Radiology
State-by-State Comparison of Physician Self-Referral Laws

State	Physician Self-Referral Statute	Scope	Effective Date	Prohibited Activities (i.e. ownership, leasing, compensation arrangements)	References to Referrals By Radiologists/Radiation Oncologists	Disclosure Requirements	Exceptions	Enforcement Activity		Related Statutes
								Cases	AG Op.	
Ohio	ORC Ann. § 4731.66	Physicians.	1977	Ownership, investment interest, or compensation arrangement with the person to whom the patient is referred.	None.	None.	Various, including services performed by physicians in the same group practice and in-office ancillary services.	None.	None.	ORC Ann. §§ 4731.67 and 68
Oklahoma	59 Okl. St. Ann. §725.4	Healing Arts.	1992	Non-disclosure of financial interest or remuneration.	None.	Yes.	When referred service is ancillary, where provider supervises referred services, or where referred facility is not a separate entity.	None.	None.	
Oregon	None.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
Pennsylvania	35 Pa. Stat. § 449.22	Healing Arts.	1988	Non-disclosure of financial interest or ownership interest in referred facility.	None.	Yes.	None.	None.	None.	
	77 Pa. Stat. § 531	Workers' Compensation.	1996	Financial interest in referred facility.	Specifically includes referrals for radiation oncology and diagnostic imaging.	None.	None.	None.	None.	
	34 Pa. Code § 127.301	Workers' Compensation.	Unknown	Financial Interest in referred entity.	Referrals for radiation oncology and diagnostic imaging.	None.	Arrangements permitted by 42 U.S.C.A. § 1320-a-7(b)(1), 42 CFR 1001.952, and 42 U.S.C.A. § 1395nn.	None.	None.	77 Pa. Stat. § 531
Rhode Island	None.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
South Carolina	S.C. Code Ann. § 44-113-30	Health Care Providers.	1993	Investment or having an investment interest in the referred entity.	None.	Yes.	Various, including where the referring physician directly provides services in the referred entity.	None.	Yes.	
South Dakota	S.D. Codified Laws § 36-2-19	Practitioners of Healing Arts.	1994	Financial interest in referred unaffiliated health care facility.	Definition of "unaffiliated health care facility" includes imaging centers.	Yes.	None.	None.	None.	S.D. Codified Laws § 36-2-18
	Tenn. Code Ann. § 63-6-502	Medicine and Surgery.	1991	Non-disclosure of ownership interest in referred facility.	None.	Yes.	When there is no significant conflict of interest	None.	Yes.	

American College of Radiology
State-by-State Comparison of Physician Self-Referral Laws

State	Physician Self-Referral Statute	Scope	Effective Date	Prohibited Activities (i.e. ownership, leasing, compensation arrangements)	References to Referrals By Radiologists/Radiation Oncologists	Disclosure Requirements	Exceptions	Enforcement Activity		Related Statutes
								Cases	AG Op.	
Tennessee	Tenn. Code Ann. § 63-6-602	Medicine and Surgery.	1993	Ownership Interest in referred entity.	None.	Yes; pursuant to § 63-6-502	When the physician performs the services, when the referrals are made to health care facilities that rent premises or equipment leased by the physician, when there is a demonstrated community need.	None.	None.	Tenn. Code Ann. § 63-6-502
	Tenn. Code Ann. § 63-6-604	Medicine and Surgery.	1993	Cross-referral arrangements that would violate § 63-6-602.	None.	Yes; pursuant to § 63-6-502	None.	None.	None.	Tenn. Code Ann. § 63-6-502
Texas	Tex. Health & Saf. Code § 142.019	Physicians	1999	Referrals to home and community support services that would violate 42 U.S.C. § 1395nn.	None.	None.	None.	None.	None.	42 U.S.C. § 1395nn
Utah	Utah Code Ann. § 58-67-801	Health Professions.	1996	Financial relationship in a defined facility, as defined and described by 42 U.S.C. § 1395nn.	Specifically includes referrals to radiology services	Yes.	None.	None.	None.	
Vermont	None.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
Virginia	Va. Code Ann. § 54.1-2410 through 2414	Practitioners.	1993	Personal or family investment in the referred entity.	None.	No.	Virginia Board of Health Professions may grant an exception if there is demonstrated need and it conforms to other requirements, or it is a publicly traded entity; practitioner directly provides health services; or referral made pursuant to HMO contract.	None.	Yes.	18 VAC 75-20-60 through 18 VAC 75-20-100; Va. Code Ann. §54.1-2964 (Disclosure requirement)
	Rev. Code Wash. § 19.68.010(2)	Healing Professions	2004	Ownership of a financial interest in an referred diagnostic entity.	None.	Yes.	Physician partnerships and employment arrangements.	Yes.	Yes.	

American College of Radiology
State-by-State Comparison of Physician Self-Referral Laws

State	Physician Self-Referral Statute	Scope	Effective Date	Prohibited Activities (i.e. ownership, leasing, compensation arrangements)	References to Referrals By Radiologists/Radiation Oncologists	Disclosure Requirements	Exceptions	Enforcement Activity		Related Statutes
								Cases	AG Op.	
Washington	Rev. Code Wash. § 74.09.240(3)	Medicaid Program.	1979	Financial relationship in the referred entity.	None.	No.	42 U.S.C.A. § 1395nn arrangements, and discounts that are reflected in charges to Medicaid	None.	None.	
West Virginia	W. Va. Code § 30-3-14(7)	Physicians.	1980	Proprietary Interest in the referred pharmacy or laboratory.	None.	Yes.	None.	None.	None.	
Wisconsin	None.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
Wyoming	None.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	

EZEQUIEL SILVA III, MD

How Medicare Views Self-Referral

INTRODUCTION

The US Government Accountability Office (GAO) recently presented Congress with a report titled "Higher Use of Advanced Imaging Services by Providers Who Self-Refer Costing Medicare Millions [1]."

The GAO found that financially motivated self-referral is common, costs the Medicare program millions in unnecessary costs, and is harmful to Medicare beneficiaries. What is especially interesting about the GAO report is not its findings, but rather the response from the US Department of Health and Human Services (HHS) to the report's findings. The HHS's response provides a glimpse into the low priority HHS places on the problem. In this column, I discuss the GAO's findings and HHS's reasons for ignoring these findings and for rejecting the GAO's specific recommendations. I then present flaws in HHS's arguments for rejecting the GAO report.

WHAT THE GAO FOUND

The GAO [1] report concludes that (1) some factor or factors other than the health status of patients, provider practice size, or specialty or geographic location (ie, rural or urban) helped drive the higher advanced imaging referral rates among self-referring providers compared with non–self-referring providers; (2) providers who began to self-refer advanced imaging services, after purchasing or leasing imaging equipment or joining practices that self-referred, substantially increased their referrals for MRI and CT services relative to other providers; (3) this suggests that financial incentives for self-referring providers may be a major factor driving the increase in referrals; and (4) to the extent that these additional referrals are unnecessary, they pose an unacceptable risk for beneficiaries, particularly in the case of CT services, which involve the use of ionizing radiation.

GAO RECOMMENDATIONS FOR EXECUTIVE ACTION

The GAO [1] recommended that the administrator of the CMS take the following actions:

- Insert a self-referral flag on its Medicare Part B claims form and require providers to indicate whether the advanced imaging services for which a provider bills Medicare are self-referred.
- Determine and implement a payment reduction for self-referred advanced imaging services to recognize efficiencies when the same provider refers and performs a service.
- Determine and implement an approach to ensure the appropriateness of advanced imaging services referred by self-referring providers.

HHS'S RESPONSE TO THE GAO REPORT

HHS was provided the opportunity to respond to the GAO report before its formal publication. The GAO report notes that HHS

> did not comment on our findings that self-referring providers referred substantially more advanced imaging services than non–self-referring providers or our conclusion that financial incentives for self-referring providers may be a major factor driving the increase in referrals for advanced imaging services. [1, pp25-26]

The GAO further stated,

> we are concerned that neither [the Department of Health and Human Services] nor CMS appears to recognize the need to monitor the self-referral of advanced imaging services on an ongoing basis and determine those services that may be inappropriate, unnecessary, or potentially harmful to beneficiaries. [1, p27]

Of the 3 GAO recommendations for executive action, HHS agreed only to "consider" GAO recommendation 3 but did not concur with the other 2 recommendations.

Four Reasons CMS Provided for Not Taking Action and Why Those Reasons Are Flawed

Reason 1. Other Payment Reforms Will Address the Problem. HHS "believes other payment reforms such as accountable care organizations and value-based purchasing programs such as the physician value-based modifier will better address overutilization" [1, p44].

Response. It is logical that physicians will more appropriately order advanced medical imaging when they are held accountable to a larger entity, but this is the case largely because personal financial incentives are removed in such models. Do we really want to wait years for payment reform to become commonplace before removing that financial incentive?

Addressing the self-referral problem now will benefit future payment models for several reasons:

- The appropriate ordering of studies is important to the success of future payment models. Because financially motivated ordering is inappropriate ordering, such ordering is counter to the core values of accountable care organizations and similar models.
- We do not want future multispecialty groups of physicians to absorb the downstream costs associated with the current self-referral trend. These costs include unnecessary advanced imaging equipment and, importantly, the downstream costs of the inappropriate studies themselves. For example, inappropriate self-referred studies will result in, at best, working up incidental findings and the like and, at worst,

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treating the small percentage of patients who may be injured by unnecessary radiation.

- Do we want an isolated health care sector practicing self-referral shielded from regulatory oversight ordering studies for cash, competing with networks of physicians, and referring their patients back to hospitals for treatment of positive findings or, worse, for repeat imaging?

Reason 2. The Multiple Procedure Payment Reduction (MPPR). HHS mentions the TC and PC MPPR as having already addressed the self-referral problem [1, p43].

Response. In response, the GAO notes that "these are not the efficiencies targeted by our recommendation."

Further flaws in using the MPPR as a justification to ignore the problem of self-referral includes the following:

- As the ACR has shown, the MPPR as a policy is inherently flawed [2].
- Blanket across-the-board reductions are an inappropriate means of controlling utilization. Overpricing is simply not at the core of the self-referral problem because any allowable payments to self-referrers will result in more self-referral. In fact, CMS acknowledges this self-referral paradox, stating that "a payment reduction would merely reduce, but not eliminate, the financial incentive to refer for these services; at worst, it would incentivize physicians to maintain their income from such services by referring for even more imaging services, resulting in little or no change in program costs and possibly reduced quality of care" [1, p44].

Reason 3. HHS Lacks Statutory Authority to Act. HHS indicates that reducing payment for self-referred studies is somehow statutorily prohibited because the "Medicare statute prohibits paying a differential by physician specialty for the same service" [1, p44].

Response. This argument is flawed for the following reasons:

- The GAO showed that "differences in advanced imaging referrals between self-referring and non–self-referring providers persisted after accounting for differences in practice size, specialty, geography, or patient characteristics" [1, p17].
- There is precedent for targeted reductions disproportionately affecting one specialty over another. As an example, consider the MPPR. The MPPR makes differential payments to one specialty, radiology, because radiology's practice structure and clinical workflow result in its being disproportionately affected by the MPPR practice-wide expansion.

Reason 4. Complexity of Administration. HHS "believes that a new checkbox on the claim form identifying self-referral would be complex to administer" [1, p44].

Response. This assertion is interesting because CMS has implemented numerous policies in the past that have proved difficult for all parties to administer. Examples include such policies as those related to billing place of service, date of service, and even the MPPR. Having been privileged to represent the ACR in discussions on many of these policies with CMS headquarters, I can share that the response from CMS is often an acknowledgment of the problem followed by a direct indication that it is "your problem" to overcome. Now that the self-referral problem has become CMS's problem, the administrative burden is somehow insurmountable.

CONCLUSIONS

It is surprising that HHS would ignore a report by the GAO, an agency of Congress charged with investigating and evaluating the use of public funds, showing not only increased costs to the system but proven harm to patients arising from the self-referral of imaging services. As demonstrated above, HHS's arguments for ignoring the GAO's findings and recommendations are flawed and inconsistent. Given HHS's refusal to act, the only potential solution to the problems of self-referral seems legislative, and initial reaction from the members of Congress requesting the GAO study suggests that such a solution may become a reality. As Representative Pete Stark (D, Calif) notes, self-referral "is costing taxpayers millions of dollars, increasing costs on beneficiaries, and exposing patients to radiation that has real health consequences"[3].

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Self-Referral in Medical Imaging: A Meta-Analysis of the Literature

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Purpose: In the current political and economic climate, there is a desire to reduce health care costs; diagnostic imaging expenditure is one area of particular interest. The authors present a meta-analysis of the relative frequency of imaging utilization in the setting of self-referral compared with that of non–self-referral and a simulation of increased cost to Medicare Part B on the basis of this relative frequency.

Methods: The MEDLINE database was searched systematically. Specific inclusion criteria for relative frequency calculations were a numerator (number of patients imaged) and denominator (number of total patients seen) in each group (self-referrers and radiologist referrers). The relative risk of self-referral was determined for each group and is defined by the "relative frequency" of imaging utilization for the self-referrers divided by the frequency for the radiologist referrers. Relative frequency represents the increased (if >1) or decreased (if <1) chance of imaging by self-referrers over radiologist referrers. The meta-analysis was used to combine imaging frequencies for each referral condition of the individual studies that met inclusion criteria for an overall estimate of relative frequency, using a random-effects model to account for the variations among the studies. Relative frequency data were then used to perform a cost simulation to Medicare Part B using 2006 data.

Results: The initial search yielded 334 articles, 5 of which met the threshold for inclusion. In these 5 studies, 76,905,162 total episodes of care were analyzed. The individual relative frequency of imaging in the setting of self-referral ranged from 1.60 to 4.50. The combined relative frequency was 2.16 (95% confidence interval, 2.15-2.16) using the fixed-effects model and 2.48 (95% confidence interval, 1.90-3.24) using the random-effects model. For 2006 Government Accountability Office (GAO) data, the estimated cost of increased imaging in the setting of self-referral was $3.6 billion, but a range of costs was also provided to account for potential inaccuracies in the GAO data.

Conclusions: The existing literature yields a combined relative frequency of imaging of 2.48 (95% confidence interval, 1.90-3.24) for self-referrers compared with non–self-referrers. Precise extrapolation of Medicare Part B costs attributable to self-referral would require changes in reporting requirements for imaging equipment ownership. Cost simulation results total billions of dollars annually and may be irrespective of potential inaccuracies in the GAO data as a result of Current Procedural Terminology® coding ambiguity and nontransparent reporting of equipment ownership.

Key Words: Self-referral, medical imaging utilization

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INTRODUCTION

From 1990 to 2006, national health expenditures grew from $714 billion to $2.1 trillion, outpacing gross domestic product growth and constituting 12% and 16% of gross domestic product in those years, respectively. Over the same period, Medicare expenditures grew from $110 billion to $401 billion. Forecasted estimates for total national health and Medicare expenditures in 2017 are $4.3 trillion and $884 billion, respectively [1]. The

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US Department of Health and Human Services identified imaging services as one area that poses a risk to the Medicare trust fund [2,3]. Diagnostic imaging is the fastest growing component of medical expenditures, increasing at an annual rate of 9% in recent years [4], and is a frequent target for cuts to reduce health care spending, as evidenced by President Obama's recent budget, which asks Congress to "ensure that Medicare makes appropriate payments for imaging services" [5].

An estimated 662 million imaging studies were performed in 2007, with 229 million Medicare imaging studies accounting for one-third of this total; furthermore, total imaging workload was growing annually by 8% that year [6,7]. Since 2008, however, there is anecdotal evidence to suggest that the total imaging workload has stabilized or even declined. This may be due in part to the economic recession during these years and the associated rise in unemployment, declining numbers of medically insured patients, and decrease in elective medical utilization. Nonetheless, from 2000 to 2006, Medicare Part B imaging expenditures increased from $6.8 billion to $14.1 billion [3]. Many factors underlie this trend: population growth, population aging, evolving technology and diagnostic capability, patient-driven demand, and defensive medicine, among others [8]. Technology proliferation and utilization in the setting of physician self-referral has also been cited as a driver of imaging cost growth [9]. This practice has been cited as a contributing factor to rising imaging expenditures [9], and the literature [10-16], private sector [3], Government Accountability Office (GAO) [3], Medicare Payment Advisory Commission [17], Office of Inspector General of the Department of Health and Human Services [18], and journalists [19-21] have all raised concerns about this potential conflict of interest. A 2008 GAO report states that the Medicare Payment Advisory Commission "has expressed concerns that such arrangements create financial incentives that could influence physicians' clinical judgment leading to unnecessary services" [3].

Self-referred imaging is defined as (1) physicians (or nonphysician providers) who are not radiologists directing their patients to their own on-site imaging services or (2) the referral of patients to outside facilities in which the referring physicians have financial interest. This practice has been identified as a potential means for nonradiologists to augment practice revenues [3,4,20,22]. The Medicare Payment Advisory Commission and private insurers believe that these self-referral arrangements may account for a significant share of increased utilization and cost [23,24]. Prior studies have found that imaging self-referral may be increasing, and physicians who own diagnostic imaging equipment or facilities may be more likely to order imaging studies for their patients compared with their peers who do not own diagnostic imaging equipment [25-31].

The aims of this study were to (1) calculate the relative frequency of imaging utilization attributable to physician self-referral via a systematic meta-analysis of the medical literature and (2) provide a cost estimate of imaging utilization.

METHODS

Study Design

A systematic MEDLINE review of the published literature was performed to identify the relative risk of physicians' referring patients for imaging to facilities in which the physicians have financial interest (self-referrers) compared with physicians' referring patients for imaging to facilities in which they have no financial interest (radiologist referrers).

The search strategy was designed to capture as many studies as possible containing information pertinent to this risk. Inclusion criteria were as follows: (1) identify a relative frequency or odds ratio for the rate of imaging self-referral or (2) identify the numerator (number of patients imaged) and denominator (number of total patients seen) in each group (self-referrers and radiologist referrers) to be used in the calculation of the relative frequency or odds ratio, and (3) the self-referrer and radiologist referrer patient groups must be otherwise indistinguishable demographically.

Search Methodology

The Ovid MEDLINE database was searched on June 29, 2010, using the following strategy:

1. ("radiology" OR "radiography") OR "radiologist" OR "diagnostic imaging" OR "medical imaging" OR "imaging"
2. "self-referral" OR "self-referring" OR "self refer" OR "physician self-referral" OR "same-specialty" OR ("referral and consultation" AND ["self" or "same"])
3. Items 1 AND 2
4. Limited to studies in humans written in English

All studies in the database were included in the evaluation regardless of publication date. The reference lists of included studies were hand searched to identify additional relevant articles.

Statistical Analysis

A meta-analysis of the results of the published studies that satisfied the inclusion criteria was carried out using Comprehensive Meta-Analysis version 2 (Biostat, Inc, Englewood, New Jersey) and SAS version 9.1.3 (SAS Institute Inc, Cary, North Carolina). The source of data, the number of patients, the physician specialties, and the type of imaging modality varied among studies. For each published study, one summary measure of the risk of imaging for self-referrers and for radiologist referrers was obtained, whereby patients were combined across physician specialties and imaging modalities within the study.

The risk of imaging was defined as the number of patients imaged divided by the total number of patients seen. Then, the relative frequency of imaging was defined as the risk for the self-referrers divided by the risk for the radiologist referrers. This relative frequency represents the increased (if >1) or decreased (if <1) chance of imaging by self-referrers over radiologist referrers. The meta-analysis was used to combine the relative frequencies of the individual studies for an overall estimate of relative frequency, accounting for the variations of the studies.

Two methods were used to obtain the estimates of overall relative frequency and the corresponding 95% confidence intervals, as described by Borenstein et al [32]. In the fixed-effects model, we assumed that there was one true effect size underlying all the studies in the analysis and that all differences in observed effects were due to sampling error. This means that all factors that could influence the effect size were the same in all studies, and therefore the true (unknown) effect would be the same. The overall log relative frequency was computed as a weighted mean, whereby the weight assigned to each study was the inverse of the variance of the study's log relative frequency. The corresponding variance was computed as the sum of the inverses of the variances of the study's log relative frequencies. Exponentiation was then used to obtain the overall relative frequency and the corresponding 95% confidence interval.

In the random-effects model, we assumed that the log relative frequency could vary from study to study depending on the nature of the participants. Therefore, there may have been different log relative frequencies underlying different studies. These log relative frequencies were assumed to be distributed around an overall relative frequency, and the random-effects model was used to estimate this overall relative frequency and its corresponding variance. In summary, a relatively large study would tend to dominate the overall estimate in the fixed-effects model approach, in which only the sampling error within the study was accounted for. In contrast, in the random-effects model approach, a relatively large study would still have more weight than a small study but would be less likely to dominate the overall estimate, while it accounts for both sampling error within the study and the variation of relative frequency from study to study.

The results from both approaches are presented for comparison. The random-effects model approach is preferred if there is large variation in sample size across the studies.

Cost Simulation

By definition, the medically appropriate relative frequency of imaging is 1.0, as defined by the imaging utilization rate of physicians without financial interest in imaging and the resultant incentives to utilize. Thus, any utilization frequency higher than this for an identical patient population can be considered unnecessary when the sample size is sufficiently large. Using the determined relative frequency ratio (RF) for self-referred imaging vs radiologist-referred imaging, the utilization fraction exceeding that expected of radiologist-referred imaging was calculated as

$$\text{fraction attributable to self-referred imaging} = [(RF_{self} - RF_{nonself})/RF_{self}].$$

This fraction was then multiplied by GAO-reported 2006 Medicare Part B imaging spending to nonradiologist physician offices, to estimate the potential increased cost of imaging attributable to self-referral. This calculation was performed over a range of theoretical self-referral spending fractions to illustrate the range of associated cost of additional imaging attributable to self-referral.

RESULTS

The MEDLINE search identified 334 studies. On review of the abstracts, 327 were rejected for not satisfying the inclusion criteria. The remaining 7 studies, including studies in which satisfaction of the inclusion criteria was unclear on the basis of abstract review, were submitted to full-text review. Of these studies, 5 met all criteria.

The 5 studies included in the meta-analysis are summarized in Table 1. The summary measures from each study and the overall estimates of the relative frequency of imaging of self-referrers compared with radiologist referrers are shown in Table 2. The estimate of relative frequency based on the random-effects model (most appropriate for these data) is 2.48 (95% confidence interval, 1.90-3.24). The results of both models indicate that self-referrers are >2 times more likely to obtain images than are radiologist referrers. The results are presented graphically in Figure 1.

The utilization fraction of imaging attributable to self-referral in our study was calculated as [(2.48 − 1.00)/2.48] = 0.597 = 59.7%. According to the 2008 GAO report [3], $14.1 billion was spent on diagnostic imaging in 2006; of this amount, 64% ($9.0 billion) was to physician offices (Figure 2). Of that $9.0 billion, 68% ($6.1 billion) went to nonradiologists (Figure 2). Using the 59.7% utilization fraction attributable to self-referral, a theoretical associated cost was calculated at $3.6 billion. To illustrate the potential cost associated with a range of increased utilization, and account for potential errors and assumptions in the figures used to perform the calculation, a simulation table (Table 3) was generated for a range of self-referred imaging fractions for Medicare Part B.

DISCUSSION

This meta-analysis of existing literature yields a combined relative frequency of imaging of 2.48 (95% confidence interval, 1.90-3.24) for self-referrers compared with radiologist referrers. On the basis of the 2008 GAO

Table 1. Summary of studies used in the meta-analysis

Study	Year	Data Sources	Time of Study	Selection Criteria	Conditions Imaged	Imaging Modalities	Categories Reported	Total Sample Size
Hillman et al [26]	1990	Health insurance claims of 403,458 employees of large American corporations	January 1986 to June 1988	• Nonmissing data • Known physician specialty • Physicians other than radiologists • Relevant ICD-9 codes	• Upper respiratory • Pregnancy • Low back pain • Difficulty urinating	• CXR • Obstetric ultrasonography • Lumbar spine films • Urography • Crystallography • Ultrasonography	4	55,255
Hillman et al [27]	1992	Insurance claims data base of United Mine Workers health and claims data	Jan 1988 to December 1989	• Nonmissing data • Known physician specialty • Physicians other than radiologists • Relevant ICD-9 codes	• Upper respiratory • Low back pain • Difficulty urinating • Headache • Transient cerebral ischemia • Upper GI bleeding • UTIs • Chest pain • CHF	• CXR • Fluoroscopy • Lumbar spine films • Myelography • CT • MR • Urography • Cystourethrography • Ultrasonography • Angiography	10	175,800
GAO [29]	1994	Medicare claims for Florida physicians	1990	• Physician-patient encounters that provide physicians an opportunity to refer their patients for imaging services • CPT and HCFA codes for outpatient medical services, consultations, preventive medicine, and case management, psychiatry, ophthalmology, and critical care	A "wide variety of primary care and specialty practices"	A "full range of diagnostic imaging services"	6	71,669,459
Litt et al [25]	2005	HMO/IPA	January 2001 to June 2002	Only outpatient examinations	• Orthopedics • Podiatry • Rheumatology	Extremity plain radiography	1 (overall measure used)	234,591
Gazelle et al [28]	2007	Insurance claims database for large employer-based national health plan	1999-2003	• Episodes of care • Outpatient claims only, 1 referring physician/episode	• Cardiopulmonary • Cardiac disease • Extremity fracture • Knee pain • Intra-abdominal malignancy • Stroke	• CXR • Nuclear imaging • Radiography • MR • CT	4	4,770,057

Note: CHF = congestive heart failure; CXR = chest x-ray; GI = gastrointestinal; GAO = US Government Accountability Office; HCFA = Health Care Financing Administration; HMO = health maintenance organization; *ICD-9* = *International Classification of Diseases*, 9th reved.; IPA = independent practice association; UTI = urinary tract infection.

Table 2. Relative risk of imaging of self-referrers and radiologist-referrers

Study	Year	Self-Referrers		Radiologist Referrers		Risk		Relative Risk	95% Confidence Interval
		Number of Images	Number of Episodes	Number of Images	Number of Episodes	Self-Referrers	Radiologist Referrers		
Hillman et al [26]	1990	15,723	33,703	2,234	21,552	0.46652	0.10366	4.50	4.32-4.69
Hillman et al [27]	1992	11,563	43,647	12,204	131,153	0.26492	0.09305	2.85	2.78-2.91
GAO [29]	1994	129,288	13,183,492	359232	58,485,967	0.00981	0.00614	1.60	1.59-1.61
Litt et al [25]	2005	68,905	212,674	3,822	21,927	0.32399	0.17431	1.86	1.80-1.90
Gazelle et al [28]	2007	314,187	1,307,845	338,387	3,462,212	0.24023	0.09774	2.46	2.45-2.47
Fixed-effects model								2.16	2.15-2.16
Random-effects model								2.48	1.90-3.24

Note: GAO = US Government Accountability Office.

report [3], we attempted to estimate the cost to Medicare Part B of this utilization over the expected rate for physicians without financial incentive to be on the order of billions of dollars annually. This level of spending on potentially unnecessary medical imaging is concerning in light of the growing emphasis on reducing health care expenditures.

The proportion of nonradiologists billing for in-office imaging has more than doubled from 2000 to 2006, from 2.9 to 6.3 per 100 physicians, with much higher rates in certain specialties [3]. From 1996 to 2006, total outpatient imaging rates (hospital and in-office) increased by 45%, with private office imaging utilization rates by nonradiologists who determine patient referral increasing by 71% compared with 44% for radiologists over that time period [33]. A recent study by Levin et al [34] reported that the growth in fee-for-service payments to nonradiologists for noninvasive diagnostic imaging was considerably more rapid than for radiologists from 1996 to 2006 and that by 2008, overall Medicare fee-for-service payments for noninvasive diagnostic imaging were higher to nonradiologist physicians than they were to radiologists. Addressing the potential costs of medical imaging self-referral may be one way to address the seemingly unsustainable growth of medical imaging spending.

There are several arguments made by supporters of self-referral, one being that of patient convenience. In other words, the practice of self-referral for imaging studies offers convenient same-day imaging for patients, which then allows treatment to begin sooner. Convenience in this case may also parallel a trend of increased imaging utilization, as reported by Baker [35] in a recent study investigating the ordering practices of orthopedic surgeons and neurologists that concluded that acquiring the ability to bill for MRI led to a 38% increase in the number of MRI studies subsequently ordered. The justification of convenience may be misleading, as suggested by an investigation by Sunshine and Bhargavan [36] of 2006 to 2007 Medicare data, which found instead that same-day imaging occurred in only 15% of CT and MRI studies. One explanation for this may be that the extraordinary expense of advanced imaging equipment dictates scheduling patients separately for their imaging studies to maximize the use of equipment and recover equipment capital and maintenance costs. Furthermore, the latter component of the convenience argument suggests that self-referred imaging can reduce the impact of illness by allowing faster treatment via earlier and more accurate imaging-based diagnosis. However, Hughes et al [37] found that of 13 medical condition-illness combinations studied, self-referral was not associated with shorter illness duration but rather with significantly higher overall costs.

Another argument suggests that sufficient legislation is already effective in curbing the practice of inappropriate self-referral in medical imaging. Proponents point to the

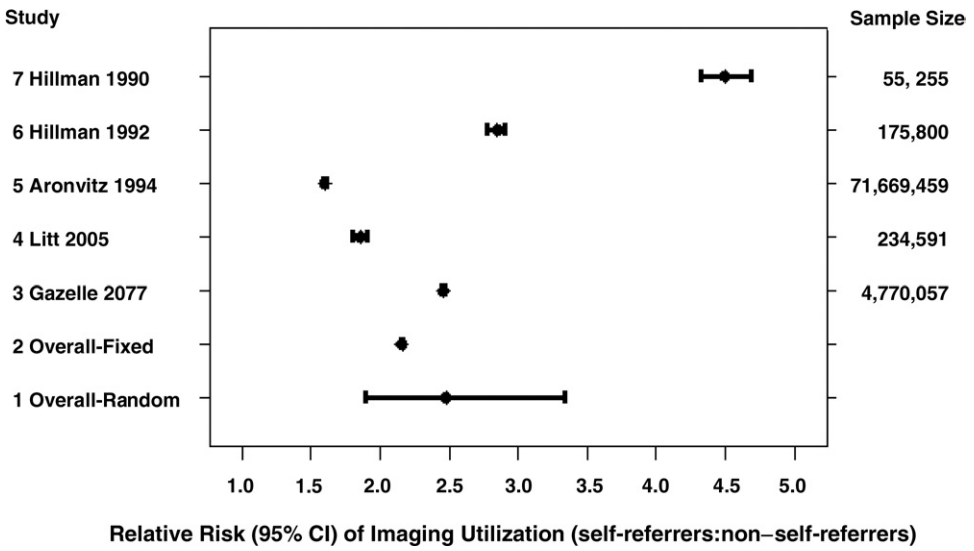

Figure 1. Relative risk of imaging of self-referrers: radiologist referrers.

2007 Deficit Reduction Act, which made large-scale, across-the-board cuts in imaging reimbursement and led to a 12.7% reduction in Medicare imaging expenditures. Paradoxically, however, utilization instead increased, as physicians with the capacity to self-refer were able to order more imaging to meet internal billing targets, otherwise known as "behavioral offset" [38]. Levin et al [34] reported that by 2 years after the implementation of the Deficit Reduction Act, overall Medicare payments for imaging were 4% higher to nonradiologists than they were to radiologists. The association is that much of imaging by nonradiologists is self-referred, whereas radiologists generally do not have the opportunity to self-refer, and has implications supporting the conclusion that the payment cuts have done little to curb self-referral. Further cuts in imaging payments were levied by the Patient Protection and Affordable Care Act of 2010, when payments for contiguous body parts were reduced by 25% and reimbursement was readjusted on the basis

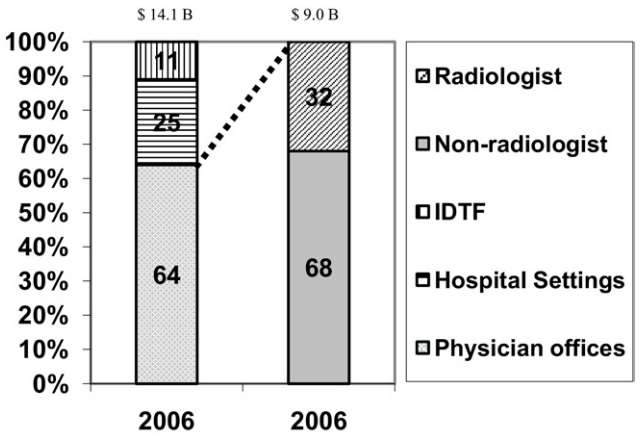

Figure 2. Components of Medicare part B image spending.

of the percentage of time the equipment was expected to be in use; ultimately, further analysis of the full impact of the Deficit Reduction Act and the Patient Protection and Affordable Care Act on imaging self-referral is ongoing and will be needed to understand the impact of this and other proposed legislation, as all attempts thus far have been ineffective unit cost solutions to what is ostensibly a volume problem. Analysis of the GAO fractionated imaging spending data is problematic because of inappropriately included Current Procedural Terminology® codes for the 2006 report on medical imaging, as well as the exclusion of the large fraction of spending on independent diagnostic testing facilities (IDTFs), for which the ownership was not discernable to Medicare and other payers [3]. Independent diagnostic testing facilities represent a diverse group of providers with variable structures and ownership. In 2006, IDTFs accounted for 11% ($1.6 billion) of total Medicare Part B imaging spending. A significant fraction of these IDTFs may be involved in various self-referral arrangements, and this same problem was a limitation of many of the studies included in this meta-analysis. For example, one researcher studying self-referral could not ascertain whether such agreements existed on the basis of review of insurance claims and thus labeled IDTFs as "indeterminate" for self-referral [15].

To comprehensively define the costs associated with medical imaging services, including a specific financial analysis of self-referral arrangements, changes in reporting requirements of Medicare providers would be necessary. Some of these changes may include mandatory disclosure of all financial relationships between individual ordering physicians and imaging equipment their patients are referred to, documentation of patient referral source by imaging facilities, and registration of equipment to allow payment data collection. Failure to comply would necessarily be considered a serious infraction with

Table 3. Cost simulation: 2006 Medicare Part B self-referred imaging

Self-Referral Fraction of Medicare Part B Spending	10%	20%	30%	40%	43.3% (GAO)	50%	60%
2006 total self-referral spending (×$1 billion)	1.4	2.8	4.2	5.6	6.1	7.1	8.5
2006 spending portion exceeding expected for radiologist referral (×$1 billion)	0.84	1.68	2.52	3.37	3.64	4.21	5.05
10-year cost attributable to self-referral	8.41	16.83	25.24	33.66	36.43	42.07	50.49

Note: Using 59.7% as the utilization fraction exceeding expected radiologist referral, a theoretical cost attributable to self-referral was calculated as $3.6 billion. A range of self-referred imaging fractions for Medicare Part B is calculated and presented. The 10-year cost of imaging attributable to self-referral is also calculated and presented.

commensurate penalties, to make these changes effectual. With a robust payment database including reliable payee data, Medicare could then accurately evaluate the relationship between imaging equipment ownership and utilization rates.

A limitation of this meta-analysis is the small number of studies meeting the inclusion criteria; however, the total episodes of care were just under 76 million, which is statistically powerful. Furthermore, among the included studies, there was variability in the size, modalities analyzed, and year of publication, although the effects of these variables are adequately addressed by using the random-effects model to calculate cumulative relative frequency of imaging. Another potential source of error is that all studies that met the inclusion criteria were performed by radiologists. The systematic nature of this literature meta-analysis does alleviate much of the potential for this selection bias, however, as studies authored by other medical specialties would have been included had any provided the appropriate data to meet the inclusion criteria. These same criteria effectively excluded studies on this topic in the radiology literature. These limitations of data availability, which prevent a more comprehensive analysis of imaging self-referral and its impact on health care expenditure, serve to highlight the need for changes in the Medicare payment system and database.

In summary, additional studies are needed to more accurately determine the estimated future costs of self-referred imaging both to Medicare and to the private sector; these data have important health policy implications as broader efforts are being made to control costs. Stricter and more transparent reporting requirements of medical imaging equipment ownership and patient referral may be needed to comprehensively analyze the true costs associated with medical imaging self-referral.

CONCLUSIONS

Self-referral in medical imaging may be a significant contributing factor in diagnostic imaging growth. This meta-analysis of the available medical literature estimates that nonradiologist self-referrers of medical imaging are approximately 2.48 (95% confidence interval, 1.90-3.24) times more likely to order imaging than clinicians with no financial interest in imaging, which translates to an increased imaging utilization rate of 59.7%. The cost of this excess imaging to Medicare Part B is likely to be in the billions of dollars annually, on the basis of the best available data. Stricter and more transparent reporting requirements of medical imaging equipment ownership would be needed to provide the accurate and complete data necessary to comprehensively determine the current and future costs of physician self-referred imaging both to Medicare and to the private sector.

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