

Anticipating the Unintended Consequences of Closing the Door on Physician Self-Referral



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Abbreviations and Acronyms

CT = computerized tomography
E&M = evaluation and management

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Purpose: While physician self-referral has been associated with increased health care use, the downstream effects of the practice remain poorly characterized. Accordingly we identified the relationship between urologist self-referral and downstream health care use in patients with urinary stone disease.

Materials and Methods: With urologist self-referral status as the exposure of interest, we performed a retrospective cohort study of Medicare beneficiaries from 2008 to 2010 to evaluate the relationship between self-referral and imaging intensity, risk of surgical treatment and time to surgical treatment for urinary stone disease.

Results: We identified dose dependent increases in computerized tomography use with increasing stratum of urologist self-referral. Compared to nonself-referring urologists, computerized tomography use was 1.19 times higher (95% CI 1.07–1.34) in episodes ascribed to intermediate frequency (5 to 9) and 1.32 times higher (95% CI 1.16–1.50) in episodes ascribed to high frequency (10+) self-referring urologists. Self-referral was inversely associated with risk of surgical treatment for stone disease. Specifically, patients treated by intermediate and high frequency self-referring urologists were less likely to undergo surgical treatment than those treated by nonself-referring urologists, with HR 0.84 (95% CI 0.71–0.99) and HR 0.81 (95% CI 0.66–0.99), respectively. We identified no statistically significant between-group differences in time to surgical treatment.

Conclusions: Self-referral is associated with increased use of computerized tomography and with decreased use of surgery for stone disease. While policy efforts to further restrict physician self-referral may reduce the use of computerized tomography, they may also result in unintended consequences with respect to patterns of surgical care.

Key Words: physician self-referral; reimbursement, incentive; medical overuse; urolithiasis; diagnostic imaging

HEALTH care spending in the United States continues to escalate, with the U.S. spending nearly 2.5 times more per capita on health care than any other developed country.¹ Nonetheless, care in the U.S. fails to produce superior outcomes with regard to life expectancy and disease specific

mortality.² Overuse is frequently implicated in the observed disparity between spending and outcomes,³ and medical imaging represents one of the most common targets for reduction in overuse.^{4,5}

Self-referral is the practice by which a physician refers a patient for

a procedure or test in which that same physician has a financial interest in providing that service. The U.S. government recognized this potential conflict of interest and passed the Stark Laws in the 1980s and 1990s, prohibiting physicians from referring patients for services at entities in which they had a financial interest.^{6,7} Physicians may still circumvent these regulations through the In-Office Ancillary Services Exception. This clause was initially meant to enable physicians to perform simple x-rays and tests to facilitate patient care. However, as the cost of ownership of CT and magnetic resonance imaging began to decrease during the 1990s and early 2000s, office based imaging became commonplace. In recent years the growth rate in acquisition of magnetic resonance imaging and CT among nonradiologists has outpaced the growth rate among radiologists,^{8,9} and increases in office based imaging have been implicated in the Medicare spending boom during the same period.¹⁰

The issue of physician self-referral is particularly germane in the management of urinary stone disease. Cross-sectional imaging with CT has emerged as the preferred radiographic study for the management of urolithiasis.^{11,12} Given the considerable public health impact of the disease and the gaps in knowledge surrounding the downstream effects of physician self-referral, we characterize the relationship between urologist self-referral and CT use, the risk of surgical treatment for urinary stone disease and the time to surgical treatment.

MATERIALS AND METHODS

Cohort and Data Source

The study cohort was built from a random 5% sample of the Medicare Inpatient, Outpatient, Carrier and Denominator files from 2008 to 2010, restricted to continuously enrolled, nondisabled Medicare beneficiaries without end stage renal disease.

Episode Definition

We defined episodes of care attributed to urinary stone disease that were 6 months in duration. Given the recurrent nature of stone disease, we attempted to isolate incident stone episodes by defining an index E&M claim for stone disease. We restricted the universe of E&M claims to those in which there was no other claim submitted by a urologist for the same group of diagnosis codes within the prior 6 months. Consequently, each episode of care was defined as the 6-month period immediately following the index E&M claim.

After identifying episodes of care related to urinary stone disease, we identified the number of abdominopelvic CT scans performed during each episode. Claims from services rendered within a 2-day period were collapsed into 1 observation to avoid double counting. In addition, we identified claims for surgical procedures associated with stone disease within each episode of care

(supplementary Appendix, <http://jurology.com/>). Time to first surgical treatment was calculated by subtracting the date of the index E&M claim from the date of the first claim for surgical treatment.

Definition of Primary Exposure

The encrypted National Provider Identifier (NPI) number identified the provider associated with each index E&M claim. We identified all of the claims for abdominopelvic CT during the study period that listed one of the previously identified urologists as the referring physician. We then derived the total number of scans referred by each urologist during the study period, and we were able to assign a number of self-referred CT scans to each urologist by identifying claims on which the particular urologist's NPI populated the referring and performing field, an approach used in prior studies.⁸ Our exposure of interest was treated as an ordinal variable with the categories of nonself-referring (0 self-referred CT scans during the study period), low frequency self-referring (1 to 4 self-referred CT scans during the study period), intermediate frequency self-referring (5 to 9 self-referred CT scans during the study period) and high frequency self-referring (10+ self-referred CT scans during the study period). Prior studies required 5 instances of self-referral per year to designate a physician as self-referring to mitigate the risk of misclassification.¹³⁻¹⁶ We modified this definition given the sampling of our study cohort and to evaluate for the presence of dose response with respect to our outcomes of interest.

Definition of Outcomes

The 3 principal outcomes of interest included 1) number of CT scans per episode of care, 2) risk of surgical treatment for urinary stone disease and 3) time to first surgical treatment among patients treated for urinary stone disease.

Definition of Covariates

All covariates were chosen a priori based on clinical judgment, and plausible association with CT use, risk of surgical treatment and time to surgical treatment, and, thus, their potential to confound relationships between these outcomes and self-referral, our exposure of interest. Covariates in our adjusted models included age, gender, race, Charlson comorbidity score,^{17,18} median household income of census block, rural/urban continuum code, region, urologist density per 10,000 population, density of academic affiliated hospitals and penetration of ambulatory surgery centers.

Statistical Analysis

To investigate the relationship between urologist self-referral group and count of CT scans in a stone episode we fit a multivariable Poisson generalized linear mixed model with a random intercept for physician to account for physician level clustering. To ascertain the relationship between urologist self-referral and risk of surgical treatment for stone disease, we performed Kaplan-Meier analysis and fit a multivariable frailty model incorporating a Cox proportional hazards model with a random intercept for physician level clustering. Finally, to investigate the relationship between physician self-referral and

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