Cardiac CT and Coronary CTA: Early Medicare Claims Analysis of National and Regional Utilization and Coverage

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Purpose: The aim of this study was to assess trends in utilization and Medicare coverage of cardiac CT and coronary CT angiography (CCTA).

Methods: Medicare claims for cardiac CT and CCTA were identified for the first 3 complete years for which Current Procedural Terminology ® tracking codes existed (2006-2008). The frequencies of billed and denied services were extracted on national and regional bases, along with reporting physician specialty and site of service.

Results: Total annual claims for cardiac CT and CCTA services for Medicare fee-for-service beneficiaries increased from 58,124 to 95,269 (+64%) between 2006 and 2008. The overall percentage of denied claims decreased from 34% to 21% (20,014 of 58,124 to 20,062 of 95,269, $P < .001$), with the highest denial rate for calcium scoring studies (declining from 82% to 61%) and the lowest rate for CCTA (29% to 14%). Annual overall regional denial rates ranged from 8.9% to 80.6%. Of all 254,672 base services, 138,136 claims (54%) were submitted by cardiologists, 90,767 (36%) by radiologists, and 13,445 (5%) by others. In 12,324 cases (5%), provider specialty was undetermined. Two-thirds (67%) of services were reported in the office setting (170,511), followed by the outpatient hospital (64,008 [25%]), inpatient hospital (15,922 [6%]), ER (1,577 [1%]), and all other (2,654 [1%]) settings.

Conclusion: Most cardiac CT and CCTA services are reported by cardiologists and most takes place in private office and outpatient hospital settings. During the first 3 years of Current Procedural Terminology tracking codes, the utilization of cardiac CT and CCTA by Medicare fee-for-service beneficiaries increased by 64%. Despite perceptions that new technology tracking codes are rarely payable, a large majority of all examinations are reimbursed by Medicare. Coverage varies regionally but overall has improved, setting the stage for expanded patient access.

Key Words: Radiology and radiologists, cardiology and cardiologists, Medicare utilization and coverage, cardiac CT, cardiac CT angiography, socioeconomic trends

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INTRODUCTION

Cardiac CT and coronary CT angiography (CCTA) have emerged over the past decade as valuable tools in the assessment of coronary artery disease. Coronary calcium scoring was the first validated cardiac CT application in widespread clinical use and has been demonstrated to further risk-stratify asymptomatic patients at intermediate risk by traditional criteria [1-6]. Further improvements in technology have allowed the development of angiographic techniques, and CCTA has now gained broad acceptance in a variety of clinical scenarios.

In a number of settings, barriers to physician payment have been shown to impede patient access to medical services [7-12]. Medical imaging in general [13] and new technology in particular [14-16] have faced ever increasing hurdles for coverage, and that convergence has targeted cardiac CT and CCTA. Although several Medicare contractors initially covered these services for a number

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of indications, CMS recently attempted to implement a national noncoverage determination policy. In response to intense educational and advocacy efforts by numerous cardiology and radiology organizations, this proposal was eventually withdrawn, and coverage decisions for cardiac CT and CCTA remain at the discretion of local Medicare carriers [17,18].

Since the assignment of dedicated Category III Current Procedural Terminology® (CPT®) codes for these procedures, the utilization of both cardiac CT and CCTA has seemingly increased, and, although variable, successful provider reimbursement has anecdotally improved. However, we are aware of no formal validation of those impressions. Accordingly, the purpose of this analysis was to assess early national and regional trends in utilization and Medicare coverage of cardiac CT and CCTA.

Table 1. Base cardiac CT and CCTA category III CPT® codes in effect during the period of analysis (2006-2008)

Code	Description
0144T	CT, without contrast, including calcium scoring
0145T	CT, with contrast, for structure and morphology
0146T	CTA, without calcium scoring
0147T	CTA, with calcium scoring
0148T	CT, with contrast, for structure and morphology, and CTA, without calcium scoring
0149T	CT, with contrast, for structure and morphology, and CTA, with calcium scoring
0150T	CT, with contrast, for congenital heart disease

Note: CCTA = coronary CT angiography; CTA = CT angiography.

METHODS

This study was performed using methodology similar to that previously described for other medical imaging procedure analyses [19-22]. Annual Medicare Physician Supplier Procedure Summary (PSPS) master files from 2006 through 2008 were acquired from CMS. These files aggregate Part B Medicare fee-for-service billing claims filed by physicians and other providers. Those summary claims data are classified by codes for procedure, reporting physician specialty, place of service, and region and include numbers of procedures billed and denied. These files are compiled for public use, without individual patient, physician, diagnosis, or other encounter-specific information, and their analysis is thus exempt from institutional review board oversight.

The PSPS data files include claims for all beneficiaries in Medicare's traditional fee-for-service program. Medicare currently insures individuals aged ≥65 years, some disabled individuals aged <65 years, and persons of all ages with end-stage renal disease. Between 2006 and 2008, Medicare fee-for-service enrollment was approximately 33 million [23], making its public-use claims data set the largest available for national physician service analysis.

CPT codes 0144T through 0150T were implemented in 2006 to describe cardiac CT and CCTA examinations during the entire period of this study [24]. Alphanumeric Category III CPT tracking codes such as these are assigned to report new and emerging technologies [25]. The PSPS data files for these codes (Table 1) were specifically targeted for evaluation. Because add-on code 0151T (for cardiac functional evaluation) is always reported in conjunction with one of these base codes, claims for this code were excluded from our analysis to avoid double counting. Only professional component and global service claims were examined (ie, technical-only claims were excluded) to similarly avoid double counting of services.

Claims for bundled services (nominally the result of incorrect CPT coding) are administratively denied and excluded by CMS in its PSPS claims data. Denials in the PSPS files therefore refer to those claims which have been disallowed because of coverage or medical necessity determinations. Using the annual number of submissions and denials, denial rates could be calculated. National changes in denial rates were evaluated for statistical significance using Pearson's χ^2 test.

Geographic analysis of cardiac CT and CCTA denials was performed by CMS region. Regional codes are assigned to the established CMS regional offices: Boston, New York, Philadelphia, Atlanta, Chicago, Dallas, Kansas City (Missouri), Denver, San Francisco, and Seattle. These 10 regions include all states and United States territories. An additional code, for "Travelers Railroad," also exists but applies to only a small number of Medicare beneficiaries classified by nongeographic miscellaneous criteria (such as railroad workers).

Physicians are identified within the PSPS files with self-designated specialty codes. Cardiology has its own specialty provider code (06) and for this study was considered a distinct category. Those physicians with codes for diagnostic radiology (30), interventional radiology (94), and nuclear medicine (36) were grouped together as radiologists. All other identifiable specialties were aggregated. For some providers (such as those servicing independent diagnostic testing facilities or employed by multispecialty groups), claims are submitted using a code for the practice type (rather than physician specialty), and thus specialty information could not be extracted. These were grouped in an undetermined category.

The PSPS files also identify procedures by site of service, using a variety of different code groups. Place-of-service information could thus be extracted in a similar fashion, and we specifically targeted the highest volume location codes for physician office (11), outpatient hospital (22), inpatient hospital (21), and hospital emer-