# Thoughts on Coding and Reimbursement

18

Adefolakemi Babatunde and Pamela K. Woodard

Accurate Current Procedural Terminology (CPT) [1] and International Classification of Diseases (ICD) coding [2] along with documentation within the report are critical parts of the reporting and billing processes. Errors in coding ultimately lead to denial of claims from Medicaid and Medicare and insurance payers. CPT codes provide third-party payers with information about the procedure that was performed, while ICD codes provide them with the indication for the procedure.

In reporting cardiac computed tomography (CT) examinations, as with any imaging study, the report should clearly document the examination performed and the volume of contrast, and the title of the study performed in the report should match the CPT code. In addition, information on any 3D processing that was performed on a dedicated workstation (apart from standard 3D reconstructions at the scanner) should be reported. Documenting processing performed is important in reporting cardiac CT scans as the processing component of the examination is included within the CPT code description. It is important to note that no additional 3D processing code should be added to the cardiac CT codes. Other information important to include is the indication for the examination, for the purposes of ICD-10 coding.

It is also important to note whether or not the insurance provider requires precertification or preauthorization for the study. For cardiac CT studies, most insurance providers do require preauthorization. Ensuring that the referring physician's office has obtained insurance company preauthorization prior to the examination and not afterwards significantly increases the likelihood of reimbursement for the procedure.

## CPT Codes

In late 2009 four cardiac CPT codes were released by the American Medical Association (AMA) as category I codes to be used for all cardiac CT billing purposes. CPT codes are standardized codes published by the AMA for medical procedures [1]. There are four CPT codes for cardiac CT:

- 75571: computed tomography, heart, without contrast material, with quantitative evaluation of coronary calcium
- 75572: computed tomography, heart, with contrast material, for evaluation of cardiac structure and morphology (this includes 3D image post-processing, assessment of cardiac function, and evaluation of venous structures, if performed)
- 75573: computed tomography, heart, with contrast material, for evaluation of cardiac structure and morphology in the setting of congenital heart disease (this includes 3D image post-processing, assessment of LV cardiac function, RV structure and function and evaluation of venous structures, if performed)
- 75574: computed tomographic angiography, heart, coronary arteries, and bypass grafts (when present), with contrast material, including 3D image post-processing (including evaluation of cardiac structure and morphology, assessment of cardiac function, and evaluation of venous structures, if performed) [1]

These codes are used with ICD-9 codes for indications for scan use.

## Indications for Calcium Scoring

The coronary artery calcium (CAC) scan is a non-contrast prospectively gated cardiac CT scan used to define coronary calcium in the epicardial coronary arteries. Its indications are coronary artery disease screening and further patient risk

A. Babatunde
Cardiovascular Division, Department of Medicine, Washington University School of Medicine, St. Louis, MO, USA

P. K. Woodard (✉)
Mallinckrodt Institute of Radiology, Washington University School of Medicine, St. Louis, MO, USA
e-mail: woodardp@wustl.edu



U. J. Schoepf (ed.), *CT of the Heart*, Contemporary Medical Imaging, https://doi.org/10.1007/978-1-60327-237-7_18

stratification in asymptomatic patients of intermediate risk [3]. It is rarely if ever appropriate for asymptomatic patients with low global risk for CAD and for symptomatic patients. The code 75571 should be billed alone and should not be billed with either codes 75572 or 75574.

The first coronary calcium score was developed by Arthur Agatston and is defined as the product of calcified plaque area and weighted density score given to the highest attenuation value (HU) in the area of calcium [4]. The threshold for selection of calcium for Agatston scoring is any coronary calcium that is greater than 130 Hounsfield units (HU) [4].

Calcium score ranges from 0 for absence of calcium, 1–10 for minimal plaque, 11–100 for mild plaque, 101–400 for moderate plaque, and >400 for severe plaque [5]. The calcium volume score, defined as volume of calcium greater than 130 HU in the epicardial coronary system, may also be reported and is thought to be more reproducible than the Agatston score and thus a better indicator to be followed in patients to determine disease progression [6].

CAC score is currently a class of recommendation (COR) IIb with the principal indication for CAC scoring further risk stratification of individuals that are at intermediate risk after formal risk assessment [2].

The CAC scan (CPT code 75571), as a screening tool, initially was not covered by either the Center for Medicaid and Medicare Services (CMS) or private insurance companies, and most patients who underwent the examination paid out of pocket. Currently some CMS carriers and insurance companies cover the cost of this examination.

## Indications for Coronary CTA

Indications for coronary CT angiography include both acute and chronic angina as well as newly diagnosed heart failure in order to determine whether the etiology is ischemic or nonischemic. It is important to note that coronary CT angiography is not a screening examination. The CPT code 75574, at present, is used whether or not the study is performed alone as a dedicated coronary CT angiogram, or with a stress agent such as adenosine or regadenoson for perfusion, and whether or not the CT data is sent for fractional flow reserve (FFR) calculation. The single code of 75574 should also be billed if the study is performed with calcium scoring (the code 75571 should not also be billed). The code 75574 should also be billed alone in the performance of a "triple rule-out" for coronary CTA, aortic dissection, and pulmonary embolism assessment, although the entirety of the chest is covered. If billing for coronary CTA rest/stress perfusion, the 75574 code should be billed only once (*not* twice – once for coronary assessment/rest and once for stress). It is possible, depending upon the insurance company, to bill for the stress supervision component of a CT perfusion examination and the adenosine and/or regadenoson stress agent separately using a J code. The dose of stress agent, along with the dose of iodinated contrast agent, should be reported.

### Acute Chest Pain

Because of its high negative predictive value, use of coronary CT angiography (CTA) (CPT code 75574) has shown to be useful in the emergency department. Several studies have supported the early use of cardiac CT in the emergency department in patients that present with acute chest pain concerning for acute coronary syndrome [7–9]. The Rule Out Myocardial Infarction using Computer-Assisted Tomography (ROMICAT) trial was an observational cohort study of patients with chest pain that demonstrated low-to-intermediate risk patients with a negative CCTA were unlikely to be diagnosed with ACS [9]. These findings resulted in a follow-up trial, ROMICAT II, which randomized patients who presented with symptoms of ACS to the emergency department to either early coronary CTA or standard of care. This study further supported the use of early coronary CTA in chest pain evaluation. Early coronary CTA led to decreased length of stay with no missed ACS events [7]. Also supporting the use of coronary CTA in the emergency department for early acute chest pain triage in low-to-intermediate risk patients is the ACRIN 4005 trial (CT Angiography for Safe Discharge of Patients with Possible Acute Coronary Syndromes) [8]. This study was a similar study of patients presenting to the emergency department with possible ACS but with the primary end point of safety. In ACRIN 4005, there was a higher rate of detection of CAD than in ROMICAT II; however, the high negative predictive value of CCTA still allowed patients to be safely discharged from the ED [8].

### Chronic Stable Chest Pain

While there is less evidence for use of coronary CT angiography in patients with chronic stable angina, there are studies that suggest its utility [10].

The Prospective Multicenter Imaging Study for Evaluation of Chest Pain (PROMISE) trial evaluated ambulatory patients with stable chest pain using coronary CTA compared to functional testing. Patients who received coronary CTA had a better correlation with cardiac catheterization results. Coronary CTA again demonstrated excellent negative predictive value and, unlike functional testing, led to fewer invasive coronary angiograms (ICAs) that showed no obstructive CAD. This led to the finding of less radiation exposure with coronary CTA, if the comparative functional testing included radiation because there would be an elimination of many unnecessary cardiac catheterizations. Coronary CTA has the advantage over other functional testing, in that it provides anatomy. Although coronary CTA does not change clinical

outcomes, it appears to reduce the number of unnecessary invasive studies [10].

In addition, investigators in the Randomized Evaluation of patients with Stable angina Comparing Utilization of non-invasive Examinations (RESCUE) trial sought to use coronary CTA to specifically determine which patients had left main disease and which did not, directing patients without left main disease to optimal medical therapy (OMT) alone and those with left main disease to OMT plus ICA and intervention [11]. This trial design was based on the results of the Clinical Outcomes Utilizing Revascularization and Aggressive Drug Evaluation (COURAGE) trial which showed that in stable coronary artery disease percutaneous coronary intervention does not reduce the risk of death, MI, or other major cardiovascular events when compared to OMT [12]. Whether CCTA will ultimately be used to triage patients to ICA and intervention, or OMT alone, will depend upon the results of larger CCTA trials designed in the manner of the COURAGE and RESCUE trials.

### Other Indications

Coronary CTA is appropriate for assessing newly diagnosed systolic heart failure in determining whether its etiology is ischemic or nonischemic and may be appropriate in newly diagnosed diastolic heart failure and syncope with intermediate for high global CAD risk. Coronary CTA can be used in patients with arrhythmia, especially in diagnosing the etiology of sustained ventricular tachycardia (VT), ventricular fibrillation, exercised induced VT, or nonsustained VT, and prior to initiation of anti-arrhythmia therapy in high global CAD risk patients [3].

Coronary CTA can be used as follow-up imaging procedure to further assess a prior abnormal test or uncertain prior results. This might include abnormal imaging studies such as an abnormal echocardiogram or nuclear medicine stress test but may also be used to further assess abnormal rest ECG findings in patients with low, intermediate, or high global CAD risk. Lastly, coronary CTA may be appropriate for assessing symptomatic patients post revascularization. Coronary CTA is rarely appropriate for follow-up testing in asymptomatic patients [3].

## Indications for Anatomic Assessment

The code 75572 should be used for routine anatomic assessment, such as in pulmonary vein anatomy assessment for radiofrequency (RF) ablation, whereas 75573 should be used in patients being assessed for congenital heart disease.

### Pulmonary Vein Assessment Pre-RF Ablation

Atrial fibrillation is the most common arrhythmia and is associated with significant morbidity. Prevalence increases with age. In the United States, an estimated 5% of patients over the age of 65 are affected by atrial fibrillation [13]. One important mechanism described in the initiation and maintenance of atrial fibrillation is the rapidly discharging triggers that arise in the smooth muscle of the pulmonary veins. Electrophysiologists try to isolate the pulmonary veins to prevent propagation of the rapid discharge from the musculature lining the pulmonary veins to the endocardium [14]. An indication for cardiac CT is the mapping of pulmonary vein anatomy prior to pulmonary vein isolation during atrial fibrillation RF ablation as it can be time consuming when done with traditional angiography. In addition to mapping, cardiac CT can be used to assess for the presence of pulmonary stenosis as a complication of RF ablation [15].

### Assessment of Prosthetic Valves

The two main types of prosthetic heart valves (PHVs) are biologic and mechanical. Biological valves have the advantage of not requiring anticoagulation but over time deteriorate. Multiple imaging modalities exist to monitor the integrity of PHVs. ACC/AHA guidelines recommend TTE for the initial evaluation of bioprosthetic valve hemodynamics and then an annual TTE after the first 10 years, even in the absence of a change in clinical status [16].

Mechanical PHV dysfunction is rare but should be suspected if there is a change in a patient's clinical status. The estimated prevalence of mechanical valve dysfunction is 0.01%–6% [17–20]. Because there are limitations in anatomical visualization with TTE, cardiac CT provides an attractive alternative as it is quick and can allow for multiple cardiac phase reconstruction to assess for valve leaflet mobility. Mechanical valves have reference guides that describe opening and closing angles and the interpreting physician can consult these to determine if there is a change in the opening or closing leaflet angle. Moreover, contrast-enhanced cardiac CT can help to diagnose pannus formation, thrombus, paravalvular leak, endocarditis, or mycotic aneurysm [21–23] as well as provide information about adjacent structures including coronary arteries, distance from the sternum, and involvement of the aorta, all of which may be important for surgical planning [24].

### Congenital Heart Disease

CT can play a role in the assessment of congenital heart disease. When used for this purpose, cardiac CT has its own CPT code, 75563. This study can be performed with prospective gating to define anatomy or retrospective gating in order to diagnose functionality (ventricular function and valve mobility), realizing retrospective gating techniques will provide the patient with greater radiation dose exposure. Regardless of the gating technique, the same CPT code is used.

Some centers provide 3D printing services as part of pre-surgical planning for congenital heart patients. At present there is no code to cover the added costs associated with 3D printing.

### Transcatheter Aortic Valve Replacement: A New Indication

Aortic stenosis leads to progressive left ventricular outflow obstruction. Symptoms include angina, dyspnea, syncope, and heart failure. Transcatheter aortic valve replacement (TAVR) is an alternative to surgical aortic valve replacement for patients with severe aortic stenosis and high surgical risk because of age and comorbidities. Significant pre-procedural planning must occur, and computed tomographic angiography is becoming a more central piece in planning. Information is needed regarding aortic root anatomy, aortic valve annulus (measured in systole), coronary arteries, deployment angle, abdominal aorta and iliofemoral artery diameters, tortuosity, and extent of calcification [25, 26]. Patient eligibility for TAVR depends upon annular size, location of coronary arteries, and peripheral access. Precise and accurate deployment of the valve is crucial for safety [25]. If the valve is too low, there is increased risk of heart block, paravalvular regurgitation, and mitral valve regurgitation. If deployment is too high, risks of valve embolization, aortic root injury, and paravalvular regurgitation are increased. CT when used with 2D echo reduces paravalvular regurgitation, as more information can be gathered regarding aortic annulus size, geometry, and anatomy. Specific protocols have been designed for TAVR assessment. Heart rate is marginally less important in data acquisition for TAVR and beta blockers can be detrimental in severe AS given the risk of low cardiac output in these patients with a fixed left ventricular outflow tract obstruction [26]. The cardiac CT CPT code usually used for this purpose is 75572 rather than 75574 since the goal of this study is not coronary atherosclerosis assessment but rather anatomic evaluation. An additional CPT code of 74174 is required when this study is performed along with CTA of the abdomen and pelvis for aorta and iliofemoral artery assessment.

## Summary

In short, following the above rules when coding for cardiac CT examinations will increase accuracy in coding and increase likelihood of reimbursement.

## References


1. American Medical Association Current Procedural Technology Professional Edition; 2013.
2. International Classification of Diseases (ICD), 11th Revision (ICD-11) [Cited 2018 October 30]. Available from: http://www.who.int/classifications/icd/en/
3. Wolk MJ, Bailey SR, Doherty JU, Douglas PS, Hendel RC, Kramer CM, et al. ACCF/AHA/ASE/ASNC/HFSA/HRS/SCAI/SCCT/SCMR/STS 2013 multimodality appropriate use criteria for the detection and risk assessment of stable ischemic heart disease: a report of the American College of Cardiology Foundation Appropriate Use Criteria Task Force, American Heart Association, American Society of Echocardiography, American Society of Nuclear Cardiology, Heart Failure Society of America, Heart Rhythm Society, Society for Cardiovascular Angiography and Interventions, Society of Cardiovascular Computed Tomography, Society for Cardiovascular Magnetic Resonance, and Society of Thoracic Surgeons. J Am Coll Cardiol. 2014;63(4):380–406.
4. Agatston AS, Janowitz WR, Hildner FJ, Zusmer NR, Viamonte M Jr, Detrano R. Quantification of coronary artery calcium using ultrafast computed tomography. J Am Coll Cardiol. 1990;15(4):827–32.
5. Hecht HS. Coronary artery calcium scanning: past, present, and future. J Am Coll Cardiol Img. 2015;8(5):579–96.
6. Kopp AF, Ohnesorge B, Becker C, Schroder S, Heuschmid M, Kuttner A, et al. Reproducibility and accuracy of coronary calcium measurements with multi-detector row versus electron-beam CT. Radiology. 2002;225(1):113–9.
7. Hoffmann U, Truong QA, Schoenfeld DA, Chou ET, Woodard PK, Nagurney JT, et al. Coronary CT angiography versus standard evaluation in acute chest pain. N Engl J Med. 2012;367(4):299–308.
8. Litt HI, Gatsonis C, Snyder B, Singh H, Miller CD, Entrikin DW, et al. CT angiography for safe discharge of patients with possible acute coronary syndromes. N Engl J Med. 2012;366(15):1393–403.
9. Hoffmann U, Bamberg F, Chae CU, Nichols JH, Rogers IS, Seneviratne SK, et al. Coronary computed tomography angiography for early triage of patients with acute chest pain: the ROMICAT (Rule Out Myocardial Infarction using Computer Assisted Tomography) trial. J Am Coll Cardiol. 2009;53(18):1642–50.
10. Douglas PS, Hoffmann U, Patel MR, Mark DB, Al-Khalidi HR, Cavanaugh B, et al. Outcomes of anatomical versus functional testing for coronary artery disease. N Engl J Med. 2015;372(14):1291–300.
11. Stillman AE, Gatsonis C, Lima JA, Black WC, Cormack J, Gareen I, et al. Rationale and design of the Randomized Evaluation of patients with Stable angina Comparing Utilization of noninvasive Examinations (RESCUE) trial. Am Heart J. 2016;179:19–28.
12. Boden WE, O'Rourke RA, Teo KK, Hartigan PM, Maron DJ, Kostuk WJ, et al. Optimal medical therapy with or without PCI for stable coronary disease. N Engl J Med. 2007;356(15):1503–16.
13. Sellers MB, Newby LK. Atrial fibrillation, anticoagulation, fall risk, and outcomes in elderly patients. Am Heart J. 2011;161(2):241–6.
14. Friedman PA, Asirvatham SJ, Grice S, Glikson M, Munger TM, Rea RF, et al. Noncontact mapping to guide ablation of right ventricular outflow tract tachycardia. J Am Coll Cardiol. 2002;39(11):1808–12.
15. Cronin P, Sneider MB, Kazerooni EA, Kelly AM, Scharf C, Oral H, et al. MDCT of the left atrium and pulmonary veins in planning radiofrequency ablation for atrial fibrillation: a how-to guide. AJR Am J Roentgenol. 2004;183(3):767–78.
16. Nishimura RA, Otto C. 2014 ACC/AHA valve guidelines: earlier intervention for chronic mitral regurgitation. Heart. 2014;100(12):905–7.
17. Khan S. Long-term outcomes with mechanical and tissue valves. J Heart Valve Dis. 2002;11(Suppl 1):S8–14.
18. Hammermeister K, Sethi GK, Henderson WG, Grover FL, Oprian C, Rahimtoola SH. Outcomes 15 years after valve replacement with a mechanical versus a bioprosthetic valve: final report of the veterans affairs randomized trial. J Am Coll Cardiol. 2000;36(4):1152–8.
19. Grunkemeier GL, Li HH, Naftel DC, Starr A, Rahimtoola SH. Long-term performance of heart valve prostheses. Curr Probl Cardiol. 2000;25(2):73–154.
20. Cannegieter SC, Rosendaal FR, Briet E. Thromboembolic and bleeding complications in patients with mechanical heart valve prostheses. Circulation. 1994;89(2):635–41.

21. Symersky P, Budde RP, Prokop M, de Mol BA. Multidetector-row computed tomography imaging characteristics of mechanical prosthetic valves. J Heart Valve Dis. 2011;20(2):216–22.
22. Konen E, Goitein O, Feinberg MS, Eshet Y, Raanani E, Rimon U, et al. The role of ECG-gated MDCT in the evaluation of aortic and mitral mechanical valves: initial experience. AJR Am J Roentgenol. 2008;191(1):26–31.
23. Habets J, Symersky P, van Herwerden LA, de Mol BA, Spijkerboer AM, Mali WP, et al. Prosthetic heart valve assessment with multidetector-row CT: imaging characteristics of 91 valves in 83 patients. Eur Radiol. 2011;21(7):1390–6.
24. Habets J, Mali WP, Budde RP. Multidetector CT angiography in evaluation of prosthetic heart valve dysfunction. Radiographics Rev Publ Radiological Soc North Am Inc. 2012;32(7):1893–905.
25. Litmanovich DE, Ghersin E, Burke DA, Popma J, Shahrzad M, Bankier AA. Imaging in Transcatheter Aortic Valve Replacement (TAVR): role of the radiologist. Insights Imaging. 2014;5(1):123–45.
26. Blanke P, Schoepf UJ, Leipsic JA. CT in transcatheter aortic valve replacement. Radiology. 2013;269(3):650–69.