

Model Local Coverage Determination

SCCT Model Local Coverage Determination Policy for Cardiac Computed Tomography and Coronary Computed Tomographic Angiography

Model Local Coverage Determination Contractor Information

Contractor Name

(Insert your Contractor Name here)

Contractor Number

(Insert your Contractor Number here)

Contractor Type

(Insert your Contractor Type here)

LCD Information

LCD Database ID Number

(Insert your LCD Database ID Number here)

LCD Title

(Insert your LCD Title here)

CMS National Coverage Policy

- Title XVIII of the Social Security Act, Section 1862 (a) (7) This section excludes routine physical examinations.
- Title XVIII of the Social Security Act, Section 1862 (a) (1) (A) This section allows coverage and payment for only those services considered medically reasonable and necessary.
- Title XVIII of the Social Security Act, Section 1833 (e) This section prohibits Medicare payment for any claim which lacks the necessary information to process the claim.

- CMS Manual System, Pub 100-3, National Coverage Determination Manual, #9; Section 220.1. This section deals with diagnostic examination by CT scan.
- CMS Manual System, Pub 100-4, Medicare Claims Processing Manual, Chapter 13, Section 20. This section addresses payment conditions for radiology services.
- CMS Manual System, Pub 100-9, Contractor Beneficiary and Provider #9; Communication Manual, Chapter 5, Section 20). This section addresses standards of medical/surgical practice and the correct coding initiative (CCI).

Primary Geographic Jurisdiction

(Insert your Primary Geographic Jurisdiction here)

Oversight Region

(Insert your Oversight Region here)

Original Determination Effective Date

For service performed on or after 01/01/2010
(Insert your Original Determination Effective Date here)

Original Determination Ending Date

(Insert your Original Determination Ending Date here)

Revision Effective Date

For service performed on or after 01/01/2012
(Insert your Revision Effective Date here)

Revision Ending Date

(Insert your Revision Ending Date here)

Indications of Coverage and/or Medical Necessity

Multidetector row Computed Tomography (MDCT) with its advanced spatial and temporal resolution has opened up new possibilities in the imaging of the heart and major vessels of the chest, including the coronary arteries.

Cardiac Computed Tomography and Coronary Computed Tomographic Angiography AMA CPT / ADA CDT Copyright Statement
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Coronary Computed Tomographic Angiography (Coronary CTA) using MDCT requires thin detector collimation (detector width of 0.5 to 0.75 mm), thin slice reconstruction (image thickness \leq 1.0 mm), multiple simultaneous images (e.g., 64 or more slices) and cardiac gating (often requiring beta blockers for ideal heart rate). There is significant post processing. For coronary artery imaging, the resulting images show a high correlation with stenotic lesions noted on diagnostic cardiac catheterization, but more importantly, with atheromas on intracoronary ultrasound and the prognosis of patients as demonstrated in large retrospectively conducted trials.

The Centers for Medicare and Medicaid Services (CMS) encourages the use of high level evidence-based indications which is emerging for Coronary CTA. However, new technology often lacks the highest level of supporting evidence, randomized prospective trials, requiring the use of expert consensus in affording patient access to promising new technologies. As such, a chain of indirect evidence, using diagnostic performance data, decision models and a consensus base approach have been used to validate the current indications. It is anticipated that future additions and revisions to these indications will occur as higher level evidence-based studies become available.

The currently available body of evidence demonstrates that Coronary CTA can reliably rule out the presence of significant coronary artery disease (CAD) in patients with a low to intermediate probability of having CAD with high negative predictability and can reliably achieve a high degree of diagnostic accuracy necessary to replace conventional angiography in select circumstances. In low risk patients presenting to the emergency room with chest pain, Coronary CTA in comparison to stress myocardial perfusion imaging results in a more rapid diagnosis and lower cost of care with no compromise to the patient. Coronary CTA can also be used selectively in patients with known coronary disease as an alternative to invasive angiography, such as to evaluate the patency of coronary bypass grafts or some intracoronary stents.

In other circumstances, Coronary CTA may be proposed instead of or in addition to other noninvasive cardiac tests. This is particularly useful in the commonly encountered clinical scenario of patients having an equivocal stress test (such as an equivocal nuclear stress test), or a stress test where the results are substantially discordant from the clinical impression.

The information from Coronary CTA may be used to guide further diagnostic evaluation and/or appropriate therapy (e.g., revascularization versus medical management) and this may over the long term influence morbidity of CAD (e.g., angina or subsequent myocardial infarction (MI) rate), functional status, or mortality. In addition Coronary CTA has been used along with other imaging modalities in assessment of suitability of the patient prior to planning for transcatheter aortic valve replacement (TAVR) or mitral valve procedures.

The use of Coronary CTA might have both short- and long-term effects on health outcomes depending on the clinical context. In the short term, Coronary CTA may avoid the morbidity and mortality of invasive coronary angiography when Coronary CTA provides reliable information that obviates the need for invasive coronary angiography. In addition, Coronary CTA may be proposed in circumstances where invasive coronary angiography may not

be clinically indicated. When Coronary CTA is used instead of an alternative noninvasive test then the effect on health outcomes would be influenced by the relative morbidity of the tests, the relative diagnostic performance characteristics, relative radiation exposure and the ability of the test to guide subsequent diagnostic and therapeutic decisions.

Indications

1. Coronary CTA used to assess the cause of chest pain or other symptoms thought possibly due to coronary ischemia in patients without known obstructive coronary artery disease.

The rationale for using this test to assess chest pain is to see if a coronary artery blockage might be the source of chest pain. The high negative predictive value of Coronary CTA (99%) allows for effective triage to a strategy of no-further cardiac testing, with higher accuracy than nuclear, stress echocardiography or treadmill testing. Further, the need for other testing might be obviated.

2. Coronary CTA following a stress test that is equivocal or suspected to be inaccurate.

Coronary CTA might be chosen in select patients who have an equivocal or suspected inaccurate stress (or stress imaging) test. The rationale is that a noninvasive coronary anatomic test (Coronary CTA) might permit a separate method of assessing the coronary arteries which is different from a stress test and limit the number of normal invasive coronary angiograms performed. It could also help avoid missing serious coronary disease in those suspected of having an inaccurate stress test result.

3. Coronary CTA for evaluation of acute chest pain in the emergency room with initial normal or equivocal cardiac markers and negative or equivocal electrocardiogram with respect to ischemic changes.

The rationale for the application of Coronary CTA in this setting is to quickly triage patients in order to rule out coronary artery disease as a possible cause of acute symptoms. It is hoped that the application of Coronary CTA in the emergency room would limit resource use in chest pain patients who do not have significant coronary artery disease. In two randomized trials, Coronary CTA led to significant cost reductions, radiation exposure reductions, and time to diagnosis improvement over standard of care imaging (nuclear medicine testing) in low-intermediate chest pain populations.

4. Coronary CTA for suspected congenital anomalies of the coronary circulation and/or known complex overlapping coronary anatomy.

Coronary CTA is used to assess patients suspected of having a congenital coronary anomaly. The cross-sectional and 3-dimensional nature of this imaging technique allows one to definitively determine the presence and the exact anatomy as well as possible future harm that could result from the anomaly. It may be used as the first test or following unsuccessful invasive coronary angiogram. A Coronary CTA may be used to decide if surgery is



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indicated and for surgical planning and may supplement information obtained from invasive coronary angiography.

5. Coronary CTA for left bundle branch block, congestive heart failure or myocardial systolic or diastolic dysfunction to exclude significant coronary artery disease as a cause of these presentations.

The rationale for the application of Coronary CTA in these settings is to rule out significant coronary artery disease as a cause of these common clinical presentations and would limit resource use to assess a stable patient with either or both clinical presentations who do not have significant coronary artery disease.

6. Use of Coronary CTA prior to non-coronary cardiovascular surgery.

Certain patients have non-coronary cardiovascular surgery (e.g. valve or ascending aortic surgery) and routinely have a pre-operative noninvasive stress ECG or imaging test or invasive coronary angiogram. The surgical planning may also depend upon the exact location of the coronary arteries. The rationale for the use of Coronary CTA in low to intermediate risk patient subsets is to avoid potentially unnecessary invasive testing and still provide appropriate pre-surgical information.

7. Coronary CTA for the assessment of congenital heart disease including anomalies of great vessels, and cardiac chambers and valves.

Coronary CTA offers very high spatial resolution and contrast to noise ratio as well as unlimited viewing angles that are often needed for the evaluation of congenital heart diseases.

8. Cardiac CT for evaluation of cardiac anatomy in preparation for electrophysiological procedures including electrophysiological testing, ablation and intervention.

This application of Cardiac CT for the coronary and pulmonary veins is primarily for pre-procedural planning. Pulmonary vein anatomy can vary from patient to patient. Pulmonary vein catheter radiofrequency isolation can isolate electrical activity from the pulmonary veins and allow for the elimination of recurrent atrial fibrillation. The presence of a pulmonary venous anatomic map may help eliminate procedural complications and allow for more accurate and successful completion of the procedure.

The use of Cardiac CT allows defining anatomic variants, previous injury from intervention, thrombus in particular in the left atrial appendage and associated other non-cardiac anatomic findings such as the location of the esophagus or other thoracic anatomy which may affect the conduct of the electrophysiology procedure.

Coronary CTA can define cardiac venous anatomy that can assist in placement of a pacemaker lead in the lateral or appropriate cardiac vein in order to resynchronize cardiac contraction in patients with heart failure. Coronary CTA for both applications is documented to reduce procedural time in the electrophysiology laboratory, reduce

contrast and radiation requirements and lead to lower utilization of catheters.

9. Coronary CTA to evaluate the cause of chest pain or other symptoms concerning for an angina equivalent (such as dyspnea) in patients with prior bypass surgery or intracoronary artery stent placement.

Coronary bypass grafts are well delineated with Coronary CTA, with documented diagnostic accuracy near 100% for stenosis and occlusion compared to invasive angiography. The rationale for Coronary CTA would be to determine the patency and severity of possible graft stenoses that may be the source of chest pain. Occasionally, a Coronary CTA would follow invasive angiography to help determine if a graft had been missed during the prior procedure.

Patients with prior intracoronary stents often present with recurrent chest pain. The rationale for a Coronary CTA as an alternative to invasive angiography is to rule out stent restenosis as the cause of symptoms. (Accurate assessment of stent restenosis is somewhat limited by the stent size and the artifact caused by the stent material itself and the quality of the scan and scanner).

10. Coronary CTA to evaluate the cause of chest pain or other possibly ischemic symptoms in patients with known coronary artery disease.

The use of Coronary CTA in this setting would be to evaluate the extent of coronary artery disease which led to a prior cardiac event or symptoms. Patients with known disease may have been evaluated with prior invasive angiography and/or stress testing. New or recurrent symptoms may or may not relate to a change in the coronary anatomy and could potentially be assessed with Coronary CTA. Coronary CTA in patients with known coronary disease should be done when it is planned as an alternative to possibly avoid other testing such as stress testing or invasive cardiac catheterization.

11. Cardiac CT for evaluation of anatomy and assessment of suitability of the patient in preparation for percutaneous or surgical structural heart intervention including aortic, mitral, or other valve repair, or placement of specific devices such as left atrial appendage occluder, etc.

The use of Cardiac CT in this setting is pre-surgical to determine the anatomy and presence of calcification in the aorta and aortic valve in anticipation of percutaneous intervention, and/or to define the anatomy of the left atrial appendage to size an occluder. It is used in conjunction with other imaging modalities to define the anatomy, motion and prolapse of the mitral valve in anticipation of determining the suitability for either surgical or percutaneous repair procedure. It has been demonstrated to be more reproducible than trans-esophageal echocardiography in the assessment of aortic diameter sizing for Transcatheter Aortic Valve Implantation.

12. Assessment of right ventricular function and morphology in patients of suspected Arrhythmogenic Right Ventricular Dysplasia (ARVD).



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Coronary CTA in this setting can be used for this diagnosis in the absence of availability of Cardiac Magnetic Resonance Imaging (MRI) or in conjunction with it in patients with suspected ARVD.

13. Evaluation of native or prosthetic cardiac valvular mass and pericardial anatomy in patients suspected clinically of significant valvular dysfunction and inadequate visualization with other non invasive methods.

The use of Cardiac CT in patients for this indication is either in conjunction with other imaging modalities or in isolation where visualization by other imaging modalities is suboptimal.

14. Quantitative evaluation of coronary calcium volume as a tool in patients with chest pain and unknown Agatston score to determine appropriateness of further Coronary CTA, stress test or invasive coronary angiography.
15. Quantitative evaluation of coronary calcium (Agatston) score for risk stratification in asymptomatic patients with intermediate risk for coronary artery disease.

The rationale of coronary artery calcium (CAC) scoring in these settings is the added benefits of calcium score as a tool for risk assessment, which has been demonstrated to add incremental and independent prognostic information to Framingham Risk Models, and in a large prospective randomized trial, resulted in lower downstream health care costs to those with scores of zero compared to those who did not receive a CAC scan.

In General

Medicare covers cardiac CT and coronary CTA for indications deemed "appropriate," as defined in the document referenced below. *

Medicare covers cardiac CT and coronary CTA for those indications deemed "uncertain" with an appropriateness rating of 6 or higher.

Medicare covers only upon medical review, cardiac CT and coronary CTA for those indications deemed "uncertain" with an appropriateness rating less than 6.

Medicare does not cover cardiac CT and coronary CTA for indications deemed "inappropriate."

Limitations

1. The test is never covered for routine screening, i.e., in the absence of signs, symptoms or disease.
2. The selection of the test should be made within the context of other

cardiac testing, such as stress testing (including nuclear and echo) and clinical information; so that the resulting information facilitates the management decision, and does not merely add a new layer of testing.

3. The test may be denied, on post-pay review, as not medically necessary when used for cardiac evaluation of a patient where there is a pre-test knowledge of sufficiently extensive calcification of the coronary segment in question that would diminish the interpretive value.
4. Coverage of this modality for coronary artery assessment is limited to scanners that process thin, high resolution slices (1 mm or less). The multidetector row scanner must have at least 64 slices per rotation capability (collimations of at least 32x2 or 64x1) and with gantry rotation times of 420 milliseconds or less should be utilized.
5. The administration of beta-blockers or calcium channel blockers and the monitoring of the patient during Cardiac CT by a physician or a qualified non-physician practitioner experienced in the use of cardiovascular drugs and contrast reaction are included here in and are not separately payable services. Supervision of beta-blocker or calcium channel blockers and nitroglycerin must be done by nurses under the general supervision of a physician.
6. All studies must be ordered by a physician or a qualified non-physician practitioner similar to any other cardiac testing such as the stress myocardial perfusion imaging or ultrasound evaluation.
7. For contrast enhanced examinations a physician or a qualified non-physician practitioner must be present for direct supervision during testing, as is the case for all contrasted exams.
8. The electron beam computed tomography (EBCT) technology, or MDCT with less than 64-slice detector technology is not covered by this LCD for coronary artery examination except for calcium scoring.
9. The study must be performed under the principles of As Low As Reasonable Achievable (**ALARA**) and centers must be accredited.

It is important to note that the fact that a new service or procedure has been issued a CPT code or is FDA approved does not, in itself, make the procedure medically reasonable and necessary. (Carrier Name) evaluates new services, procedures, drugs or technology and considers national and local policies before these new services may be considered Medicare covered services.

10. Technical limitations are guided by guidelines for scanning from the Society of Cardiovascular Computed Tomography. Any substantial changes in published guidelines for scanning by this organization are to be considered as incorporated into this LCD by two years from the date of such publication.

**Appropriate Use Criteria for Cardiac Computed Tomography" published by The American College of Cardiology Foundation Appropriate Use Criteria Task Force, The Society of Cardiovascular Computed Tomography, the American College of Radiology, the American Heart Association, the American Society of Echocardiography, the American Society of Nuclear Cardiology, the North American Society for Cardiovascular Imaging, the Society for Cardiovascular Angiography and Interventions, and the Society for Cardiovascular Magnetic Resonance.*



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Acceptable Levels of Competence for Performance and Interpretation

While it is not the Carrier's intention or jurisdiction to credential providers, Medicare does expect a satisfactory level of competence from providers who submit claims for services rendered. It is well known that substandard studies often lead to preventable repetition of studies and overutilization of services.

The acceptable levels of competence, as defined by the American College of Cardiology (ACC)/American Heart Association (AHA) Clinical Competence Statement on Cardiac Imaging with Computed Tomography and Magnetic Resonance (2007) and the American College of Radiology (ACR) Clinical Statement on Noninvasive Cardiac Imaging (2005), are outlined as follows:

For the technical portion, a recommended level of competence is fulfilled when the image acquisition is obtained under all of the following conditions:

- a. The service is performed by a technologist who is credentialed by a nationally recognized credentialing body (American Registry of Radiologic Technologists or equivalent) and meets state licensure requirements where applicable. Technologists performing coronary CT should have received specialized training regarding coronary CT and the particular scanner.
- b. If intravenous beta blockers, calcium channel blockers or nitrates are to be given prior to a Coronary CT angiogram or Agatston score, the test must be under the direct supervision of a certified registered nurse and the general supervision of a physician (familiar with the administration of cardiac medications) who are available to respond to medical emergencies. It is strongly recommended that the certified registered nurse and physician be ACLS certified.
- c. When contrast studies are performed, the physician must provide direct supervision and the radiologic technologist or registered nurse administering the contrast must have appropriate training on the use and administration of contrast media.
- d. The study must be performed under the principles of **ALARA**.

For the professional portion, a recommended level of competence is fulfilled when the interpretation is performed by a physician meeting the following requirements:

- a. The physician has appropriate additional training in Coronary CT Angiography and cardiac CT imaging equivalent to the guidelines set forth by the ACC or ACR (for example: the ACCF/AHA Clinical Competence Statement on Cardiac Imaging with Computed Tomography and Magnetic Resonance [2007] and the ACR Clinical Statement on Noninvasive Cardiac Imaging [2005]), or
- b. The physician has appropriate medical staff privileges to interpret Coronary CT Angiograms at a hospital that participates in the Medicare program, and is actively training in cardiac CT (as in paragraph a). A grace period of 24 months should be allowed to acquire the necessary training.

Documentation Requirements

1. Each claim must be submitted with ICD-10-CM codes that reflect the condition of the patient, and indicate the reason(s) for which the service was performed. Claims submitted without ICD-9-CM codes will be returned.
2. The documentation of the study requires a formal written report, with clear identifying demographics, the name of the interpreting provider, the reason for the tests, an interpretive report and copies of images. The computerized data with image reconstruction should also be maintained.
3. Documentation must be available to Medicare upon request.

Compliance with the provisions in this policy is subject to monitoring by post payment data analysis and subsequent medical review.

Coding Information

Bill Type Codes

Contractors may specify Bill Types to help providers identify those Bill Types typically used to report this service. Absence of a Bill Type does not guarantee that the policy does not apply to that Bill Type. Complete absence of all Bill Types indicates that coverage is not influenced by Bill Type and the policy should be assumed to apply equally to all claims.

999x

Not Applicable

Revenue Codes

Contractors may specify Revenue Codes to help providers identify those Revenue Codes typically used to report this service. In most instances Revenue Codes are purely advisory; unless specified in the policy services reported under other Revenue Codes are equally subject to this coverage determination. Complete absence of all Revenue Codes indicates that coverage is not influenced by Revenue Code and the policy should be assumed to apply equally to all Revenue Codes.

99999

Not Applicable

CPT/HCPCS Codes

Category I CPT Codes for Cardiac CT and Coronary CTA took effect on January 01, 2010. Select the name of the procedure or service that accurately identifies the service performed. Do not select a CPT code that merely approximates the service provided.

These codes replace all CPT codes previously used for these procedures. The use of Category I CPT Codes is mandatory to report cardiac CT and coronary CTA.

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 (including 3D image postprocessing, assessment of cardiac function, and evaluation of venous structures, if performed)



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75573 Computed tomography, heart, with contrast material, for evaluation of cardiac structure and morphology in the setting of congenital heart disease (including 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)

Only one code should be used, the code that best describes the reason for the test. 75571 is the code for a calcium score. 75574 is the code for a contrasted coronary CTA done to evaluate for coronary disease. Sometimes a patient may have a calcium scan done at the time of a coronary CTA. In this circumstance, only one code — 75574 — would be utilized. If a scan is done primarily for the evaluation of cardiac venous anatomy prior to an electrophysiological procedure such as pacer placement or pulmonary venous ablation the code is 75572. If on the same scan the patient was evaluated also for congenital heart disease (75573) and coronary disease (75574), these codes would not be used, but only the primary code for evaluation of cardiac venous anatomy.

ICD-9 Codes that Support Medical Necessity (*Codes Chart on pg. 7*)

ICD-9-CM code listings may cover a range and include truncated codes. It is the provider's responsibility to avoid truncated codes by selecting a code(s) carried out to the highest level of specificity and selected from the ICD-9-CM book appropriate to the year in which the service was performed. It is not enough to link the procedure code to a correct, payable ICD-9-CM code. The diagnosis or clinical signs/symptoms must be present for the procedure to be paid.

Diagnoses that Support Medical Necessity

Cardiac massAll ICD-9-CM codes listed in this policy under ICD-9-CM Codes that Support Medical Necessity above.

ICD-9 Codes that DO NOT Support Medical Necessity

All ICD-9-CM codes not listed in this policy under ICD-9-CM Codes that Support Medical Necessity above.

ICD-9 Codes that DO NOT Support Medical Necessity

Asterisk Explanation

Diagnoses that DO NOT Support Medical Necessity

All ICD-9-CM codes not listed in this policy under ICD-9-CM Codes that Support Medical Necessity above.

General Information

Documentation Requirements

The medical record must be made available to Medicare upon request. It is not enough to link the procedure code to a correct, payable ICD-9-CM code. The diagnosis or clinical signs/symptoms must be present for the procedure to be paid.

The HCPCS/CPT code(s) may be subject to Correct Coding Initiative (CCI) edits. This policy does not take precedence over CCI edits. Please refer to the CCI for correct coding guidelines and specific applicable code combinations prior to billing Medicare.

The documentation of the study requires a formal written report, with clear identifying demographics, the name of the interpreting provider, the reason for the tests including specifically how the course of treatment will be altered based on the findings, an interpretive report and copies of images. The computerized data with image reconstruction should also be maintained sufficient to document the extent and necessity of the services.

When the documentation does not meet the criteria for the service rendered or the documentation does not establish the medical necessity for the services, such services will be denied as not reasonable and necessary under Section 1862(a)(1) of the Social Security Act.

When requesting a written redetermination (formerly appeal), providers must include all relevant documentation with the request.

Appendices

Not applicable

Utilization Guidelines

The frequency of the studies exam must be reasonable and justified by the course of the patient's illness.

Sources of Information and Basis for Decision

This document was prepared by the Society of Cardiovascular Computed Tomography.



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ICD-9 CM Code Listing

| | |
|------------------|---|
| 411.1 | Intermediate coronary syndrome |
| 412 | Old myocardial infarction |
| 413.0 | Angina pectoris |
| 413.1 | Angina decubitus |
| 413.9 | Other unspecified angina pectoris |
| 414 | Other forms of chronic ischemic heart disease |
| 414.0 | Coronary atherosclerosis |
| 414.00 | Coronary atherosclerosis, unspecified type of vessel, native or graft |
| 414.01 | Coronary atherosclerosis of native coronary artery |
| 414.02 | Coronary atherosclerosis of autologous vein bypass graft |
| 414.03 | Coronary atherosclerosis of nonautologous biological bypass graft |
| 414.04 | Coronary atherosclerosis of artery bypass graft |
| 414.05 | Coronary atherosclerosis of unspecified type of bypass graft |
| 414.06 | Coronary atherosclerosis of native coronary artery transplanted heart |
| 414.07 | Coronary atherosclerosis of bypass graft (artery) (vein) transplanted heart |
| 414.11 | Aneurysm of coronary vessels |
| 414.12 | Dissection of coronary artery |
| 414.8 | Other specified forms of chronic ischemic heart disease |
| 414.9 | Chronic ischemic heart disease, unspecified |
| 425 | Cardiomyopathy |
| 426.3 | Other left bundle branch block |
| 427.3– 427.42 | Atrial and Ventricular fibrillation |
| 428 | Heart Failure |

| | |
|-----------------|--|
| 428.0 | Congestive heart failure |
| 428.1 | Left heart failure |
| 428.2 | Systolic heart failure |
| 428.3 | Diastolic heart failure |
| 428.4 | Combined systolic and diastolic heart failure |
| 428.9 | Heart failure, unspecified |
| 429.1 | Myocardial degeneration |
| 429.3 | Cardiomegaly |
| 429.4 | Functional disturbance following cardiac surgery |
| 429.83 | Takotsubo syndrome |
| 745.1– 746.9 | Congenital anomalies of the heart |
| 747.0 | Other congenital anomalies of circulatory system, patent ductus arteriosus |
| 747.41 | Total anomalous pulmonary venous connection |
| 747.42 | Partial anomalous pulmonary venous connection |
| 747.49 | Other anomalies of great veins |
| 747.9 | Unspecified anomaly of circulatory system |
| 786.05 | Shortness of breath |
| 786.50 | Chest pain, unspecified |
| 786.51 | Chest pain, precordial pain |
| 786.59 | Other chest pain |
| 794.30 | Cardiovascular, abnormal function study, unspecified |
| 794.31 | Cardiovascular, abnormal electrocardiogram |
| 746.89 | Pericardial Disease |
| 429.89 | Cardiac Mass |



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Bibliography

Coronary Artery Calcium Scoring – 75571

1. Budoff MJ, Shaw LJ, Liu ST, et al. Long-term prognosis associated with coronary calcification. *J Am Coll Cardiol* 2007; 49: 1860-70.
2. Detrano R, Guerci AD, Carr JJ, et al. Coronary calcium as a predictor of coronary events in four racial or ethnic groups. *N Engl J Med* 2008; 358:1336-45.
3. Folsom AR, Kronmal RA, Detrano RC, et al. Coronary artery calcification compared with carotid intima-media thickness in the prediction of cardiovascular disease incidence. *Arch Intern Med* 2008; 168:1333-1339.
4. Erbel R, Möhlenkamp S, Moebus S, Schmermund A, Lehmann N, Stang A, Dragano N, Grönemeyer D, Seibel R, Kälsch H, Bröcker-Preuss M, Mann K, Siegrist J, Jöckel KH; Heinz Nixdorf Recall Study Investigative Group. Coronary risk stratification, discrimination, and reclassification improvement based on quantification of subclinical coronary atherosclerosis: the Heinz Nixdorf Recall study. *J Am Coll Cardiol* 2010; 56:1397-406.
5. Greenland P, Bonow RO, Brundage BH, Budoff MJ, Eisenberg MJ, Grundy SM, Lauer MS, Post WS, Raggi P, Redberg RF, Rodgers GP, Shaw LJ, Taylor AJ, Weintraub WS; American College of Cardiology Foundation Clinical Expert Consensus Task Force (ACCF/AHA Writing Committee to Update the 2000 Expert Consensus Document on Electron Beam Computed Tomography); Society of Atherosclerosis Imaging and Prevention; Society of Cardiovascular Computed Tomography. ACCF/AHA 2007 clinical expert consensus document on coronary artery calcium scoring by computed tomography in global cardiovascular risk assessment and in evaluation of patients with chest pain: a report of the American College of Cardiology Foundation Clinical Expert Consensus Task Force (ACCF/AHA Writing Committee to Update the 2000 Expert Consensus Document on Electron Beam Computed Tomography) developed in collaboration with the Society of Atherosclerosis Imaging and Prevention and the Society of Cardiovascular Computed Tomography. *J Am Coll Cardiol* 2007; 49:378-402.
6. Elias-Smale SE, Proença RV, Koller MT, Kavousi M, van Rooij FJ, Hunink MG, Steyerberg EW, Hofman A, Oudkerk M, Witteman JC. Coronary calcium score improves classification of coronary heart disease risk in the elderly: the Rotterdam study. *J Am Coll Cardiol* 2010; 56:1407-14.
7. Greenland P, Alpert JS, Beller GA, Benjamin EJ, Budoff MJ, Fayad ZA, Foster E, Hlatky MA, Hodgson JM, Kushner FG, Lauer MS, Shaw LJ, Smith SC Jr, Taylor AJ, Weintraub WS, Wenger NK, Jacobs AK, Smith SC Jr, Anderson JL, Albert N, Buller CE, Creager MA, Ettinger SM, Guyton RA, Halperin JL, Hochman JS, Kushner FG, Nishimura R, Ohman EM, Page RL, Stevenson WG, Tarkington LG, Yancy CW; American College of Cardiology Foundation; American Heart Association. 2010 ACCF/AHA guideline for assessment of cardiovascular risk in asymptomatic adults: a report of the American College of Cardiology Foundation/American Heart Association Task Force on Practice Guidelines. *J Am Coll Cardiol* 2010; 56:e50-103.

8. Rozanski A, Gransar H, Shaw LJ, Kim J, Miranda-Peats L, Wong ND, Rana JS, Orakzai R, Hayes SW, Friedman JD, Thomson LEJ, Polk D, Min J, Budoff MJ, Berman DS. Impact of Coronary Artery Calcium Scanning on Coronary Risk Factors and Downstream Testing: The EISNER (Early Identification of Subclinical Atherosclerosis by Noninvasive Imaging Research) Prospective Randomized Trial. *J Am Coll Cardiol* 2011; 57 1622-1632.

Cardiac Structure and Morphology – 75572

1. Kistler PM, Earley and Harris S et al., Validation of three-dimensional cardiac image integration: use of integrated CT image into electroanatomic mapping system to perform catheter ablation of atrial fibrillation, *J Cardiovasc Electrophysiol* 2006; 17: 341–348.
2. Lessick J, Dragu R, Mutlak D, Rispler S, Beyar R, Litmanovich D, Engel A, Agmon Y, Kapeliovich M, Hammerman H, Ghersin E. Is functional improvement after myocardial infarction predicted with myocardial enhancement patterns at multidetector CT Radiology. 2007 Sep; 244(3):736-44.
3. Martinek M, Nesser HJ, Aichinger J, Boehm G, Purefellner H. Accuracy of integration of multislice computed tomography imaging into three-dimensional electroanatomic mapping for real-time guided radiofrequency ablation of left atrial fibrillation—Influence of heart rhythm and radiofrequency lesions. *J Interv Card Electrophysiol* 2006; 17:85-92.
4. Tops LF, Bax JJ and Zeppenfeld K et al., Fusion of multislice computed tomography imaging with three-dimensional electroanatomic mapping to guide radiofrequency catheter ablation procedures, *Heart Rhythm* 2005; 2: 1076–1081.
5. Sra J, Krum D, Malloy A, Registration of three-dimensional left atrial computed tomographic images with projection images obtained using fluoroscopy, *Circulation* 2005; 112:3763–3768.
6. Dewey M, Muller M, Eddicks S, Schnapauff D, Teige F, Rutsch W, Borges AC, Hamm B. Evaluation of global and regional left ventricular function with 16-slice computed tomography, biplane cineventriculography, and two-dimensional transthoracic echocardiography: comparison with magnetic resonance imaging. *J Am Coll Cardiol*. 2006; 48:2034-44.
7. Dong J, Calkins H and Solomon SB et al., Integrated electroanatomic mapping with three-dimensional computed tomographic images for real-time guided ablations, *Circulation* 2006; 113: 186–194.
8. Lin FY, Devereux RB, Roman MJ et al., Cardiac chamber volumes, function and mass by 64-detector row computed tomography: age- and gender-specific values among healthy adults free of hypertension and obesity. *J Am Coll Cardiol: CV Imaging* (in press).
9. Malchano ZJ, Neuzil P and Cury R et al., Integration of cardiac CT/MR imaging with three-dimensional electroanatomical mapping to guide catheter manipulation in the left atrium: implications for catheter ablation of atrial fibrillation, *J Cardiovasc Electrophysiol* 2006; 17: 1221–1229.
10. Mahnken AH, Koos R, Katoh M, Wildberger JE, Spuentrup E, Buecker A,



SOCIETY OF
CARDIOVASCULAR
COMPUTED TOMOGRAPHY

Model Local Coverage Determination

Günther RW, Kühl HP. Assessment of myocardial viability in reperfused acute myocardial infarction using 16-slice computed tomography in comparison to magnetic resonance imaging. *J Am Coll Cardiol*. 2005 Jun 21; 45(12):2042-7.

11. Raman SV, Shah M, McCarthy B, Garcia A, Ferketich AK. Multi-detector row cardiac computed tomography accurately quantifies right and left ventricular size and function compared with cardiac magnetic resonance. *Am Heart J*. 2006; 151:736-44.
12. Girsky MJ, Shinbane JS, Ahmadi N, Mao S, Flores F, Budoff MJ. Prospective Randomized Trial of Venous Cardiac Computed Tomographic Angiography for Facilitation of Cardiac Resynchronization Therapy. *Pacing Clin Electrophysiol*. 2010; 33(10):1182-7.

Congenital Heart Disease – 75573

1. Chang DS, Barack BM, Lee MH, Lee HY. Congenitally corrected transposition of the great arteries: imaging with 16-MDCT. *AJR Am J Roentgenol*. 2007 May; 188(5):W428-30.
2. Siegel MJ, Bhalla S, Gutierrez FR, Billadello JB. MDCT of postoperative anatomy and complications in adults with cyanotic heart disease. *AJR Am J Roentgenol*. 2005 Jan; 184(1):241-7.
3. Goo HW, Park IS, Ko JK, Kim YH, Seo DM, Yun TJ, Park JJ, Yoon CH. CT of congenital heart disease: normal anatomy and typical pathologic conditions. *Radiographics*. 2003 Oct; 23 Spec No:S147-65.
4. Wang ZJ, Reddy GP, Gotway MB, Yeh BM, Hetts SW, Higgins CB. CT and MR imaging of pericardial disease. *Radiographics*. 2003 Oct; 23 Spec No:S167-80Cook SC, Raman SV. Unique application of multislice computed tomography in adults with congenital heart disease. *Int J Cardiol*. 2007 Jun 25; 119(1):101-6.
5. Ou P, Celermajer DS, Calcagni G, Brunelle F, Bonnet D, Sidi D. Three-dimensional CT scanning: a new diagnostic modality in congenital heart disease. *Heart*. 2007 Aug; 93(8):908-13.
6. Lee T, Tsai IC, Fu YC, Jan SL, Wang CC, Chang Y, Chen MC. Using multidetector-row CT in neonates with complex congenital heart disease to replace diagnostic cardiac catheterization for anatomical investigation: initial experiences in technical and clinical feasibility. *Pediatr Radiol*. 2006 Dec; 36(12):1273-82.
7. Manghat NE, Morgan-Hughes GJ, Marshall AJ, Roobottom CA. Multidetector row computed tomography: imaging congenital coronary artery anomalies in adults. *Heart*. 2005 Dec; 91(12):1515-22.
8. Montaudon M, Latrabe V, Iriart X, Caix P, Laurent F. Congenital coronary arteries anomalies: review of the literature and multidetector computed tomography (MDCT)-appearance. *Surg Radiol Anat*. 2007 Jul; 29(5):343-55.
9. Nicol ED, Gatzoulis M, Padley SP, Rubens M. Assessment of adult congenital heart disease with multi-detector computed tomography:

beyond coronary lumenography. *Clin Radiol*. 2007 Jun; 62(6):518-27. Epub 2007 Mar 26.

10. Samyn MM. A review of the complementary information available with cardiac magnetic resonance imaging and multi-slice computed tomography (CT) during the study of congenital heart disease. *Int J Cardiovasc Imaging*. 2004 Dec; 20(6):569-78.
11. Taylor AJ, Cerqueira M, Hodgson JM, Mark D, Min J, O'Gara P, Rubin GD; American College of Cardiology Foundation Appropriate Use Criteria Task Force; Society of Cardiovascular Computed Tomography; American College of Radiology; American Heart Association; American Society of Echocardiography; American Society of Nuclear Cardiology; North American Society for Cardiovascular Imaging; Society for Cardiovascular Angiography and Interventions; Society for Cardiovascular Magnetic Resonance. ACCF/SCCT/ACR/AHA/ASE/ASNC/NASCI/SCAI/SCMR 2010 Appropriate Use Criteria for Cardiac Computed Tomography. A Report of the American College of Cardiology Foundation Appropriate Use Criteria Task Force, the Society of Cardiovascular Computed Tomography, the American College of Radiology, the American Heart Association, the American Society of Echocardiography, the American Society of Nuclear Cardiology, the North American Society for Cardiovascular Imaging, the Society for Cardiovascular Angiography and Interventions, and the Society for Cardiovascular Magnetic Resonance. *J Cardiovasc Comput Tomogr*. 2010 Nov-Dec; 4(6):407.e1-33. Epub 2010 Nov 23. PubMed PMID: 21232696.

Coronary Computed Tomography Angiography – 75574

1. Gilard M, Le Gal G, Cornily JC, Vinsonneau U, Joret C, Pennec PY, Mansourati J, Bosch J. Midterm prognosis of patients with suspected coronary artery disease and normal multislice computed tomographic findings: a prospective management outcome study. *Arch Intern Med*. 2007; 167:1686-9.
2. Goldstein J, Gallagher M, O'Neill W, Ross M, O'Neil B, Raff G. A randomized controlled trial of multi-slice coronary computed tomography for evaluation of acute chest pain. *J Am Coll Cardiol* 2007; 49:863-71.
3. Hamon M, Biondi-Zoccai G, Malagutti P, et al. Diagnostic performance of multislice spiral computed tomography of coronary arteries as compared with conventional invasive coronary angiography. *J Am Coll Cardiol* 2006; 48:1896-1910.
4. Hamon M, Lepage O, Malagutti P, et al. Diagnostic performance of 16- and 64-section spiral CT for coronary artery bypass graft assessment: meta-analysis. *Radiology* 2008.
5. Hamon M, Morelle R, Riddell JW et al., Diagnostic performance of 16- versus 64-section spiral CT compared with invasive coronary angiography – meta-analysis. *Radiology* 2007.
6. Jones CM, Athanasiou T, Dunne N, et al. Multidetector computed



SOCIETY OF
CARDIOVASCULAR
COMPUTED TOMOGRAPHY

Model Local Coverage Determination

tomography in coronary artery bypass graft assessment: a meta-analysis. *Ann Thorac Surg* 2007; 83:341-8.

7. Min JK, Shaw LJ, Devereux RB, Okin PM, Weinsaft JW, Russo DJ, Lippolis NJ, Berman DS, Callister TQ. Prognostic value of multidetector coronary computed tomographic angiography for prediction of all-cause mortality. *J Am Coll Cardiol*. 2007; 50:1161-70.
8. Leschka S, Koepfli P, Husmann L, Plass A, Vachenaue R, Gaemperli O, Schepis T, Genoni M, Marincek B, Eberli FR, Kaufmann PA, Alkadhi H. Myocardial bridging: depiction rate and morphology at CT coronary angiography--comparison with conventional coronary angiography. *Radiology*. 2008 Mar; 246(3):754-62. Epub 2008 Jan 25.
9. Vanhoenacker PK, Heijenbrok-Kal MH, Van Heste R, et al. Diagnostic performance of multidetector CT angiography for assessment of coronary artery disease: meta-analysis. *Radiology* 2007.
10. Abdulla J, Abildstrom SZ, Gotzsche O, et al. 64-multislice detector computed tomography coronary angiography as potential alternative to conventional coronary angiography: a systematic review and meta-analysis. *Eur Heart J* 2007; 28:3042-3050.
11. Mollet NR, Hoye A, Lemos PA, Cademartiri F, Sianos G, McFadden EP, Krestin GP, Serruys PW, de Feyter PJ. Value of preprocedure multislice computed tomographic coronary angiography to predict the outcome of percutaneous recanalization of chronic total occlusions. *Am J Cardiol*. 2005 Jan 15; 95(2):240-3.
12. Pundziute G, Schuijf JD, Jukema JW, Boersma E, de Roos A, van der Wall EE, Bax JJ. Prognostic value of multislice computed tomography coronary angiography in patients with known or suspected coronary artery disease. *J Am Coll Cardiol*. 2007; 49:62-70.
13. Chow BJ, Ahmed O, Small G, Alghamdi AA, Yam Y, Chen L, Wells GA. Prognostic Value of CT Angiography in Coronary Bypass Patients. *JACC Cardiovasc Imaging*. 2011 May; 4(5):496-502.
14. Von Ballmoos MW, Haring B, Juillerat P, Alkadhi H. Meta-analysis: diagnostic performance of low-radiation-dose coronary computed tomography angiography. *Ann Intern Med*. 2011 Mar 15; 154(6):413-20.

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