

# Cigna Medical Coverage Policies – Radiology Cardiac Implantable Device (CRID) Guidelines

Effective February 1, 2021



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## Instructions for use

The following coverage policy applies to health benefit plans administered by Cigna. Coverage policies are intended to provide guidance in interpreting certain standard Cigna benefit plans and are used by medical directors and other health care professionals in making medical necessity and other coverage determinations. Please note the terms of a customer's particular benefit plan document may differ significantly from the standard benefit plans upon which these coverage policies are based. For example, a customer's benefit plan document may contain a specific exclusion related to a topic addressed in a coverage policy.

In the event of a conflict, a customer's benefit plan document always supersedes the information in the coverage policy. In the absence of federal or state coverage mandates, benefits are ultimately determined by the terms of the applicable benefit plan document. Coverage determinations in each specific instance require consideration of:

1. The terms of the applicable benefit plan document in effect on the date of service
2. Any applicable laws and regulations
3. Any relevant collateral source materials including coverage policies
4. The specific facts of the particular situation

Coverage policies relate exclusively to the administration of health benefit plans. Coverage policies are not recommendations for treatment and should never be used as treatment guidelines.

This evidence-based medical coverage policy has been developed by eviCore, Inc. Some information in this coverage policy may not apply to all benefit plans administered by Cigna.

These guidelines include procedures eviCore does not review for Cigna. Please refer to the [Cigna CPT code list](#) for the current list of high-tech imaging procedures that eviCore reviews for Cigna.

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## **Cardiac Implantable Device (CRID) Guidelines**

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## Abbreviations

<b>ACE inhibitor</b>	angiotensin-converting enzyme inhibitor
<b>AMI</b>	acute myocardial infarction
<b>ARVC</b>	arrhythmogenic right ventricular cardiomyopathy
<b>CC</b>	complications/comorbid conditions
<b>CHF</b>	congestive heart failure
<b>CM</b>	cardiomyopathy
<b>CRT</b>	cardiac resynchronization therapy
<b>EP</b>	electrophysiology
<b>ICD</b>	implantable cardioverter defibrillator
<b>LV</b>	left ventricular
<b>LVEF</b>	left ventricular ejection fraction
<b>MCC</b>	major complications/comorbid conditions
<b>MI</b>	myocardial infarction
<b>NCCM</b>	non-compaction cardiomyopathy
<b>NYHA</b>	New York Heart Association functional classification
<b>VF</b>	ventricular fibrillation
<b>VT</b>	ventricular tachycardia

## Glossary

Class	NYHA Heart Failure Definitions
I	No symptoms and no limitation in ordinary physical activity, e.g. shortness of breath when walking, climbing stairs etc.
II	Mild symptoms (mild shortness of breath and/or angina) and slight limitation during ordinary activity.
III	Marked limitation in activity due to symptoms, even during less-than-ordinary activity, e.g. walking short distances (20–100 m). Comfortable only at rest.
IV	Severe limitations. Experiences symptoms even while at rest. Mostly bedbound patients
<p><b>Abnormal blood pressure response to exercise:</b> Flat response/failure to augment; rise then fall during exercise; vasoactive cardiovascular drugs may result in an abnormal blood pressure response to exercise</p>	
<p><b>Non-Sustained Ventricular Tachycardia (NSVT):</b> Three or more consecutive ventricular beats at a rate of greater than 120 beats/min with a duration of less than 30 seconds</p>	
<p><b>Incessant VT:</b> Frequent recurrences of ongoing hemodynamically stable VT</p>	
<p><b>Long QT Syndrome (LQTS):</b> A congenital disorder characterized by a prolongation of the QT interval on ECG and a propensity to ventricular tachyarrhythmias, which may lead to syncope, cardiac arrest, or sudden death.</p> <p>The QT interval on the ECG, measured from the beginning of the QRS complex to the end of the T wave, represents the duration of activation and recovery of the ventricular myocardium. QT intervals corrected for heart rate (QTc) longer than 0.44 seconds are generally considered abnormal, though a normal QTc can be more prolonged in females (up to 0.46 sec). The Bazett formula is the formula most commonly used to calculate the QTc, as follows: <math>QTc = QT / \sqrt{RR}</math> (in seconds).</p>	
<p><b>Optimal Medical Therapy:</b> Three months of heart failure medications in maximally titrated doses as tolerated. These include beta blockers, ACE inhibitors or angiotensin II receptor blocker, and diuretics.</p>	
<p><b>Structural Heart Disease:</b> A structural or functional abnormality of the heart, or of the blood vessels supplying the heart, that impairs its normal functioning.</p>	
<p><b>Non-Compaction Cardiomyopathy:</b> A rare congenital cardiomyopathy that affects children and adults. It results from the failure of myocardial development during embryogenesis. It is also called spongiform cardiomyopathy. Symptoms are often a result of a poor pumping performance by the heart. The disease can be associated with other problems with the heart and the body.</p>	

## **Preface to the eviCore CRID Guidelines**

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## **CRID Preface-1: Guideline Development**

- The eviCore evidence-based, proprietary clinical guidelines evaluate a range of advanced imaging and procedures, including CT, MRI, PET, and Radiation Oncology, Sleep Studies, and Cardiac and Spine interventions.
- eviCore healthcare reserves the right to change and update the guidelines. The guidelines undergo a formal review annually. eviCore's guidelines are based upon major national and international association and society guidelines and criteria, peer-reviewed literature, major treatises, and input from health plans, practicing academic and community-based physicians
- These guidelines are not intended to supersede or replace sound medical judgment, but instead should facilitate the identification of the most appropriate imaging procedure, given the patient's clinical condition. These guidelines are written to cover medical conditions as experienced by the majority of patients. However, these guidelines may not be applicable in certain clinical circumstances, and physician judgment can override the guidelines
- Clinical decisions, including treatment decisions, are the responsibility of the patient and his/her provider. Clinicians are expected to use independent medical judgment which takes into account the clinical circumstances to determine patient management decisions
- eviCore supports the Choosing Wisely® initiative ([www.choosingwisely.org](http://www.choosingwisely.org)) by the American Board of Internal Medicine (ABIM) Foundation and many national physician organizations, to reduce the overuse of diagnostic tests that are low value, no value, or whose risks are greater than the benefits
- eviCore's guidelines are based upon expert consensus and analysis reported by the following specialty societies, publications, studies and trials:
  - ◆ The American College of Cardiology (ACC)
  - ◆ The American Heart Association (AHA)
  - ◆ The Heart Rhythm Society (HRS)
  - ◆ The Multicenter Automatic Defibrillator Implantation Trial (MADIT/MADIT-2)
  - ◆ The Multicenter Unsustained Tachycardia Trial (MUSTT)
  - ◆ The Defibrillator in Acute Myocardial Infarction Trial (DINAMIT)
  - ◆ The Resynchronization/defibrillation for Ambulatory Heart Failure Trial (RAFT)
  - ◆ The Sudden Cardiac Death in Heart Failure Trial (SCD-HeFT)
  - ◆ The Resynchronization Reverses Remodeling in Systolic Left Ventricular Dysfunction trial (REVERSE)
  - ◆ Immediate Risk Stratification Improves Survival trial (IRIS)
  - ◆ The Comparison of Medical Therapy, Pacing, and Defibrillation in Heart Failure trial (COMPANION)
  - ◆ The Antiarrhythmic Versus Implantable Defibrillators trial (AVID)
  - ◆ The Canadian Implantable Defibrillator Study (CIDS)
  - ◆ The Cardiac Arrest Study Hamburg (CASH)

## **CRID Preface-2: Benefits, Coverage Policies, and Eligibility Issues**

- Benefits, coverage policies, and eligibility issues pertaining to each Health Plan may take precedence over eviCore's guidelines. Providers are urged to obtain written instructions and requirements directly from each payer
- Medicare Coverage Policies
  - ◆ For Medicare and Medicare Advantage enrollees, the coverage policies of CMS (Centers for Medicare and Medicaid Services) take precedence over these Cigna-eviCore cobranded guidelines
  - ◆ CMS requires coverage for studies requested as part of a CMS approved clinical trial through the CMS CED program. A list of the currently approved studies is available at:
  - ◆ <http://www.cms.gov/Medicare/Coverage/Coverage-with-Evidence-Development/Index>
- Investigational and Experimental Studies
  - ◆ Certain advanced imaging studies, or other procedures, may be considered investigational, experimental, or unproven if there is a paucity of supporting evidence; if the evidence has not matured to exhibit improved health parameters or; the advanced imaging study/procedure lacks a collective opinion of support
- Clinical and Research Trials
  - ◆ Similar to investigational and experimental studies, clinical trial imaging requests will be considered to determine whether they meet health plan coverage and eviCore's evidence-based guidelines
- State and federal legislations may need to be considered in the review of advanced imaging requests

### ***Reference***

1. Prospective Payment Systems - General Information. CMS.  
<https://www.cms.gov/Medicare/Medicare-Fee-for-Service-Payment/ProspMedicareFeeSvcPmtGen>.
2. Medicare Coverage With Evidence Development: A Policy-Making Tool in Evolution. Journal of Oncology Practice. 2007;3(6):296-301. doi:10.1200/jop.0763501

### CRID Preface-3: Clinical Information

- The philosophy behind eviCore guidelines entails using an evidence-based approach to determine the most appropriate procedure for each individual, at the most appropriate time in the diagnostic and treatment cycle
- Procedures should be requested after initial consultation and physician treatment planning, and following full counseling of the individual
- Current clinical information, which may include history, physical examination, symptoms, laboratory results, and imaging reports, are necessary for determining the medical necessity of implantable cardioverter defibrillator (ICD) devices and cardiac resynchronization therapy (CRT-D)
- The information provided to eviCore should have clinical relevance to the request
- If the information provided makes no reference to the potential indication for the request, then the medical necessity for the procedure(s) cannot be supported

### CRID Preface-4: References

- References are available at the end of the guidelines

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## **CRID-1: General Information**

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## CRID-1.0: General Guidelines

- Current clinical information, which may include history, physical examination, symptoms, laboratory results, and imaging reports, are necessary for determining the medical necessity of implantable cardioverter defibrillator (ICD) devices and cardiac resynchronization therapy (CRT-D)
- The information provided to eviCore should have clinical relevance to the request
- If the information provided makes no reference to the potential indication for the request, then the medical necessity for the procedure(s) cannot be supported

## CRID-1.1: Procedure Codes

- The CPT® code set **33202-33249** includes the various Pacemaker and Defibrillator procedures including the insertion, replacement and removal of the leads. Some of the codes apply to both the pacemaker and the defibrillator. Codes are included for informational purposes only and any given code's inclusion on this list does not necessarily indicate prior authorization is required. Pre-authorization requirements vary by health plan.

CPT®	DESCRIPTION
33206	Insertion of new or replacement of permanent pacemaker with transvenous electrode(s); atrial
33207	Insertion of new or replacement of permanent pacemaker with transvenous electrode(s); ventricular
33208	Insertion of new or replacement of permanent pacemaker with transvenous electrode(s); atrial and ventricular
33212	Insertion of pacemaker pulse generator only; single existing single lead
33213	Insertion of pacemaker pulse generator only; with existing dual leads
33214	Upgrade of implanted pacemaker system, conversion of single chamber system to dual chamber system (includes removal of previously placed pulse generator, testing of existing lead, insertion of new lead, insertion of new pulse generator)
33227	Removal of permanent pacemaker pulse generator with replacement of pacemaker pulse generator; single lead system
33228	Removal of permanent pacemaker pulse generator with replacement of pacemaker pulse generator; dual lead system
33221	Insertion of pacemaker pulse generator only; with existing multiple leads
33224	Insertion of pacing electrode, cardiac venous system, for left ventricular pacing, with attachment to previously placed pacemaker or pacing cardioverter-defibrillator pulse generator
33225	Insertion of pacing electrode, cardiac venous system, for left ventricular pacing, at time of insertion of pacing cardioverter-defibrillator pulse generator (including upgrade to dual chamber system and pocket revision)
33229	Removal of permanent pacemaker pulse generator with replacement of pacemaker pulse generator; multiple lead system
33230	Insertion of pacing cardioverter-defibrillator pulse generator only; with existing dual leads
33231	Insertion of pacing cardioverter-defibrillator pulse generator only; with existing multiple leads

<b>33240</b>	Insertion of pacing cardioverter-defibrillator pulse generator only; with existing single leads
<b>33249</b>	Insertion or replacement of permanent pacing cardioverter-defibrillator system with transvenous lead(s), single or dual chamber
<b>33262</b>	Removal of pacing cardioverter-defibrillator pulse generator with replacement of pacing cardioverter-defibrillator pulse generator; single lead system
<b>33263</b>	Removal of pacing cardioverter-defibrillator pulse generator with replacement of pacing cardioverter-defibrillator pulse generator; dual lead system
<b>33264</b>	Removal of pacing cardioverter-defibrillator pulse generator with replacement of pacing cardioverter-defibrillator pulse generator; multiple lead system
<b>33270</b>	Insertion or replacement of permanent subcutaneous implantable defibrillator system, with subcutaneous electrode, including defibrillation threshold evaluation, induction of arrhythmia, evaluation of sensing for arrhythmia termination, and programming or reprogramming of sensing or therapeutic parameters when performed
<b>33271</b>	Insertion of subcutaneous implantable defibrillator electrode
<b>33274</b>	Transcatheter insertion or replacement of permanent leadless pacemaker, right ventricular, including imaging guidance (e.g., fluoroscopy, venous ultrasound, ventriculography, femoral venography) and device evaluation (e.g., interrogation or programming), when performed
<b>33275</b>	Transcatheter removal of permanent leadless pacemaker, right ventricular
<b>33289</b>	Transcatheter implantation of wireless pulmonary artery pressure sensor for long-term hemodynamic monitoring, including deployment and calibration of the sensor, right heart catheterization, selective pulmonary catheterization, radiological supervision and interpretation, and pulmonary artery angiography, when performed
<b>0515T</b>	Insertion of wireless cardiac stimulator for left ventricular pacing, including device interrogation and programming, and imaging supervision and interpretation, when performed; complete system (includes electrode and generator [transmitter and battery])
<b>0516T</b>	Insertion of wireless cardiac stimulator for left ventricular pacing, including device interrogation and programming, and imaging supervision and interpretation, when performed; electrode only
<b>0517T</b>	Insertion of wireless cardiac stimulator for left ventricular pacing, including device interrogation and programming, and imaging supervision and interpretation, when performed; pulse generator component(s) (battery and/or transmitter) only
<b>0519T</b>	Removal and replacement of wireless cardiac stimulator for left ventricular pacing; pulse generator component(s) (battery and/or transmitter)
<b>0520T</b>	Removal and replacement of wireless cardiac stimulator for left ventricular pacing; pulse generator component(s) (battery and/or transmitter), including placement of a new electrode
<b>0571T</b>	Insertion or replacement of implantable cardioverter-defibrillator system with substernal electrode(s), including all imaging guidance and electrophysiological evaluation (includes defibrillation threshold evaluation, induction of arrhythmia, evaluation of sensing for arrhythmia termination, and programming or reprogramming of sensing or therapeutic parameters), when performed
<b>0572T</b>	Insertion of substernal implantable defibrillator electrode
<b>0614T</b>	Removal and replacement of substernal implantable defibrillator pulse generator

## **CRID-1.2: Removal and replacement**

- Generator replacement (**CPT® 33227, 33228, 33229, 33262, 33263, 33264, 0614T**) with a same or similar device is indicated when:
  - ◆ Interrogation shows device is nearing Elective Replacement Indicator (ERI) or End of Life (EOL).
  - ◆ Interrogation report documents the device is not functioning correctly and requires replacement.

## **CRID-2: Definite Indications for ICD Implantation**

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### CRID-2.1: Survivors of Cardiac Arrest

- ICD implantation is indicated in individuals who are survivors of cardiac arrest due to ventricular tachycardia (VT) or ventricular fibrillation (VF) after evaluation has excluded any completely reversible causes

### CRID-2.2: Structural Heart Disease with Sustained VT

- ICD implantation is indicated in individuals with structural heart disease (such as prior myocardial infarction (MI), congenital heart disease, and/or ventricular dysfunction) and spontaneous, sustained VT (greater than 30 seconds), whether hemodynamically stable or unstable

### CRID-2.3: Syncope of Undetermined Origin and Positive EP Study

- ICD implantation is indicated in individuals with syncope of undetermined origin who have clinically relevant, hemodynamically significant sustained VT or VF induced at electrophysiology (EP) study

### CRID-2.4: Unexplained Syncope

- ICD implantation is indicated in individuals with unexplained syncope, significant left ventricular (LV) dysfunction (LV ejection fraction less than 50%), and structural heart disease such as prior myocardial infarction (MI), congenital heart disease, and/or ventricular dysfunction

### CRID-2.5: Ischemic Cardiomyopathy

- ICD implantation is indicated in individuals with **any** of the following:
  - ◆ LV dysfunction due to prior myocardial infarction (MI) and **all** of the following
    - LV ejection fraction less than or equal to 35%
    - At least 40 days post-MI
    - Are NYHA functional Class II or III
    - Are on optimal medical therapy, defined as 3 months of maximally titrated doses as tolerated of an ACE inhibitor/angiotensin II receptor blocker, beta-blocker, and diuretic
  - ◆ LV dysfunction due to prior MI and **all** of the following
    - LV ejection fraction less than or equal to 30%
    - At least 40 days post-MI
    - Are NYHA functional Class I
  - ◆ Have non-sustained VT due to prior MI and **all** of the following
    - LV ejection fraction less than or equal to 40%
    - Have inducible VF or sustained VT at EP study performed at least 96 hours after revascularization or MI
      - If the ejection fraction was less than 35% prior to the most recent MI then the 40 day waiting period can be waived

## **CRID-2.6: Nonischemic Dilated Cardiomyopathy (DCM)**

- ICD implantation is indicated in individuals with nonischemic dilated cardiomyopathy who have all of the following:
  - ◆ LV ejection fraction less than or equal to 35%
  - ◆ NYHA Class II or III CHF
  - ◆ Are on optimal medical therapy
    - Optimal medical therapy is defined as 3 months of maximally titrated doses as tolerated of an ACE inhibitor/angiotensin II receptor blocker, beta-blocker, and, if needed, a diuretic
- Trials assessing ICD therapy in primary prophylaxis in DCM have not generally included asymptomatic, NYHA functional Class I patients.

## **CRID-3: Reasonable Indications for ICD Implantation**

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### **CRID-3.1: General Considerations**

- For the “reasonable” or “considered” indications listed in this CRID-3 guideline, consensus opinion is less clear about the use of ICD implantation in these settings. Limited evidence suggests that ICD placement may be reasonable or may be considered; this category includes VF or hypotensive VT events where pharmaceutical or ablative techniques are indicated but the results of treatment are too unpredictable to withhold ICD implantation.

### **CRID-3.2: Sustained Ventricular Tachycardia with Normal LV Function**

- ICD implantation is reasonable for individuals with sustained VT and normal or near-normal ventricular function

### **CRID-3.3: Cardiomyopathy**

- Cardiomyopathy due to Hypertrophic Cardiomyopathy:
  - ◆ ICD implantation is reasonable for individuals with hypertrophic cardiomyopathy who have one or more risk factors for sudden cardiac death
    - Risk factors for sudden cardiac death include the following:
      - Unheralded syncope
      - Family history of sudden death
      - Septal wall thickness of greater than or equal to 30 mm
      - Abnormal blood pressure response to exercise
      - Nonsustained VT (< 30 seconds)
- Cardiomyopathy due to Arrhythmogenic Right Ventricular Cardiomyopathy (ARVC):
  - ◆ ICD implantation is reasonable for individuals with ARVC who have one or more risk factors for sudden cardiac death
    - Risk factors for sudden cardiac death include the following:
      - Unheralded syncope
      - Family history of sudden death
      - Nonsustained VT(< 30 seconds)
      - Clinical signs of RV failure

### **CRID-3.4: Long QT Syndrome**

- ICD implantation is reasonable in Long-QT Syndrome in the following settings:
  - ◆ Syncope and/or VT while receiving beta-blockers or if beta-blockers are contraindicated
  - ◆ Asymptomatic with other risk factors for sudden cardiac death
    - Risk factors for sudden cardiac death include the following:
      - QTc greater than 500 msec **or**
      - LQT 2 or 3
      - Family history of sudden death

### **CRID-3.5: Brugada Syndrome**

- ICD implantation is reasonable for individuals with Brugada Syndrome who have had the following:
  - ◆ Syncope **or**
  - ◆ Documented or inducible VT or VF

### **CRID-3.6: Catecholaminergic Polymorphic Ventricular Tachycardia**

- ICD implantation is reasonable for individuals with catecholaminergic polymorphic VT who have syncope and/or documented sustained VT while receiving beta-blockers

### **CRID-3.7: Other Indications**

- ICD implantation is reasonable, regardless of LV ejection fraction measurement, for individuals with:
  - ◆ Cardiac sarcoidosis
  - ◆ Giant cell myocarditis
  - ◆ Chagas disease
- LV non compaction
  - ◆ ICD implantation should be considered for the primary prevention of sudden cardiac death due to malignant ventricular arrhythmias in individuals with non-compaction cardiomyopathy and impaired LV function (LV ejection fraction less than 50%)
    - ICD implantation is also indicated for normal LV function (LVEF greater than 50%) primary prevention cases with positive family history of sudden cardiac death. This exception is due to the presence of sarcomeric gene mutations reported in non-compaction cardiomyopathy
- ICD implantation may be considered in affected individuals with a familial cardiomyopathy associated with sudden death

**CRID-4: ICD Implantation—Non-Indications**

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### **CRID-4.1: Ischemic Cardiomyopathy**

- ICD implantation is **not** indicated in individuals who have had a myocardial infarction within the past 40 days or who have had coronary revascularization within the past 90 days **unless** the following applies:
  - ◆ A separate indication for permanent pacemaker implantation exists (thus preventing a likely repeat procedure for an upgraded device in the near future)

### **CRID-4.2: NYHA Class IV CHF**

- ICD implantation is **not** indicated for individuals with NYHA functional class IV symptoms **unless** one of the following applies:
  - ◆ It is a CRT-D device meeting the indications for CRT-D implantation listed in **CRID-5.1: Sinus Rhythm, Dilated Cardiomyopathy with NYHA Class II, III, or IV Congestive Heart Failure (CHF)**
  - ◆ The individual is awaiting heart transplantation
  - ◆ Left ventricular assist device (LVAD) is being used as destination therapy

### **CRID-4.3: Limited Life Expectancy**

- ICD implantation is **not** indicated for individuals who do not have a reasonable expectation of survival with an acceptable functional status for at least one year, even if they meet ICD implantation criteria listed in:
  - ◆ **CRID-2: Definite Indications for ICD Implantation** or
  - ◆ **CRID-3: Reasonable Indications for ICD Implantation**

### **CRID-4.4: Incessant VT or VF**

- ICD implantation is **not** indicated for individuals with incessant VT or VF
  - ◆ Incessant VT or VF is defined as hemodynamically stable VT or VF continuing for hours

### **CRID-4.5: Psychiatric Conditions**

- ICD implantation is **not** indicated in individuals with significant psychiatric illnesses that may be aggravated by device implantation or that may preclude systematic follow-up

### **CRID-4.6: Reversible Cause of VT/VF**

- ICD implantation is **not** indicated when VF or VT is due to a reversible cause such as:
  - ◆ Severe electrolyte disturbance
  - ◆ Drug-induced torsades de pointes
  - ◆ Acute, reperfused myocardial infarction with preserved ejection fraction

### **CRID-4.7: Ablation Candidate, No Structural Heart Disease**

- ICD implantation is **not** indicated if the individual has no structural heart disease and is a candidate for ablation. Surgical or catheter ablation can be curative in this setting.

### **CRID-4.8: Substernal implantable cardioverter-defibrillator**

- Substernal implantable cardioverter-defibrillator systems involve inserting a defibrillator lead directly beneath the sternum anterior to the heart, and is intended to provide anti-tachycardia pacing as well as post-shock pacing without intravenous leads.
- At this time substernal implantable cardioverter-defibrillator systems are considered experimental and investigational.

## **CRID-5: Indications for Cardiac Resynchronization Therapy(CRT)-D Implantation**

<b>CRID-5.1: Sinus Rhythm, Dilated Cardiomyopathy with NYHA Class II, III, or IV Congestive Heart Failure (CHF)</b>	<b>23</b>
<b>CRID-5.2: Sinus Rhythm, Dilated Cardiomyopathy with NYHA Class II, III, or IV Congestive Heart Failure (CHF) and QRS duration 120-149 ms</b>	<b>23</b>
<b>CRID-5.3: Sinus Rhythm, Dilated Cardiomyopathy with non-LBBB and NYHA Class III or IV Congestive Heart Failure (CHF)</b>	<b>23</b>
<b>CRID-5.4: Atrial Fibrillation and NYHA Class I, II, or III Congestive Heart Failure</b>	<b>24</b>
<b>CRID-5.5: Cardiac Resynchronization Therapy (CRT)-P</b>	<b>24</b>

### **CRID-5.1: Sinus Rhythm, Dilated Cardiomyopathy with NYHA Class II, III, or IV Congestive Heart Failure (CHF)**

- CRT-D implantation is indicated in individuals with ischemic or nonischemic dilated cardiomyopathy who have **all** of the following:
  - ◆ Left bundle branch block with QRS greater than or equal to 150 msec
  - ◆ LV ejection fraction less than or equal to 35%
  - ◆ Are NYHA functional Class II, III, or ambulatory class IV on stable optimal medical therapy
    - Optimal medical therapy is defined as 3 months of maximally titrated doses as tolerated of an ACE inhibitor/angiotensin II receptor blocker, beta-blocker, and diuretic

### **CRID-5.2: Sinus Rhythm, Dilated Cardiomyopathy with NYHA Class II, III, or IV Congestive Heart Failure (CHF) and QRS duration 120-149 ms**

- CRT-D implantation is indicated in individuals with ischemic or nonischemic dilated cardiomyopathy who have **all** of the following:
  - ◆ Left bundle branch block with QRS duration 120 to 149 msec
  - ◆ LV ejection fraction less than or equal to 35%
  - ◆ NYHA functional Class II, III, or ambulatory class IV on stable optimal medical therapy
    - Optimal medical therapy is defined as 3 months of maximally titrated doses as tolerated of an ACE inhibitor/angiotensin II receptor blocker, beta-blocker, and diuretic

### **CRID-5.3: Sinus Rhythm, Dilated Cardiomyopathy with non-LBBB and NYHA Class III or IV Congestive Heart Failure (CHF)**

- CRT-D Implantation is indicated in individuals who have **all** of the following:
  - ◆ NYHA Class III, or IV Congestive Heart Failure
  - ◆ Non-LBBB with QRS duration greater or equal to 150 ms
  - ◆ LV ejection fraction less than or equal to 35%

### **CRID-5.4: Atrial Fibrillation and NYHA Class I, II, or III Congestive Heart Failure**

- CRT is indicated in patients with AF and the following:
  - ◆ A left ventricular ejection fraction (LVEF)  $\leq$ 35 percent on guideline-directed medical therapy and all of the following:
    - The patient requires ventricular pacing or otherwise meets CRT criteria  
“Meets CRT criteria” means either:
      - Has left bundle branch block (LBBB) and a QRS duration  $\geq$  120 ms and New York Heart Association (NYHA) functional class II, III, or ambulatory class IV HF symptoms on stable optimal medical therapy;  
or
      - Has a non-LBBB pattern with a QRS duration  $\geq$ 150 and NYHA class III or ambulatory class IV HF symptoms
    - Atrioventricular nodal ablation or pharmacologic rate control will allow near 100 percent ventricular pacing with CRT

### **CRID-5.5: Cardiac Resynchronization Therapy (CRT)-P**

- See: **CRID-10: Cardiac Resynchronization Therapy (CRT)-P**



## **CRID-6: Cardiac Resynchronization Therapy (CRT)-D Implantation—Non-Indications**

<b>CRID-6.1: Ischemic Cardiomyopathy</b>	<b>26</b>
<b>CRID-6.2: Reversible Causes of Cardiomyopathy</b>	<b>26</b>

### **CRID-6.1: Ischemic Cardiomyopathy**

- CRT-D or CRT-P implantation is **not** indicated in individuals who have had a myocardial infarction within the past 40 days or who have had coronary revascularization within the past 90 days **unless** the following applies:
  - ◆ A separate indication for permanent pacemaker implantation exists (thus preventing a likely repeat procedure for an upgraded device in the near future)

### **CRID-6.2: Reversible Causes of Cardiomyopathy**

- CRT-D implantation is not indicated in the setting of a reversible cardiomyopathy such as: toxic, metabolic, or tachycardia induced cardiomyopathy
  - ◆ Once the reversible aberration is corrected, clinical reassessment is indicated

## **CRID-7: Definite Indications for Permanent Pacemaker Implantation**

<b>CRID-7.1: Symptomatic Bradycardia</b>	<b>28</b>
<b>CRID-7.2: Symptomatic Chronotropic Incompetence</b>	<b>28</b>
<b>CRID-7.3: Indications for Asymptomatic Patients</b>	<b>28</b>
<b>CRID-7.4: Prior to Planned Catheter Ablation</b>	<b>28</b>
<b>CRID-7.5: Persistent Second Degree AV Block</b>	<b>29</b>
<b>CRID-7.6: Syncope</b>	<b>29</b>

### **CRID-7.1: Symptomatic Bradycardia**

- Permanent pacemaker implantation is indicated for symptomatic bradycardia, including frequent sinus pauses that produce symptoms and any degree of AV block producing symptoms
- Permanent pacemaker implantation is indicated for third-degree and advanced second-degree AV block at any anatomic level associated with ventricular arrhythmias presumed due to AV block, or any other medical conditions requiring drug therapy that results in symptomatic bradycardia (for example, beta blocker therapy in patients with prior myocardial infarction, or tachy-brady syndrome in atrial fibrillation).

### **CRID-7.2: Symptomatic Chronotropic Incompetence**

- Permanent pacemaker implantation is indicated for symptomatic chronotropic incompetence defined as limitations due to the inability to achieve 80% of maximum predicted heart rate (220-age)

### **CRID-7.3: Indications for Asymptomatic Patients**

- Permanent pacemaker implantation is indicated for asymptomatic patients with third degree AV block
- Permanent pacemaker implantation is indicated for asymptomatic patients with advanced second degree AV block (Mobitz type II) and intermittent third degree AV block
- Permanent pacemaker implantation is indicated for asymptomatic patients with second degree AV block and documented periods of asystole greater than or equal to 3.0 seconds
- Permanent pacemaker implantation is indicated for second degree AV block in awake, symptom-free patients with atrial fibrillation and a documented pause of 5 seconds or longer
- Permanent pacemaker implantation is indicated for alternating bundle branch block in asymptomatic patients.
- Permanent pacemaker implantation is indicated for asymptomatic patients with second degree AV block at any anatomic level associated with neuromuscular diseases known to involve the heart

### **CRID-7.4: Prior to Planned Catheter Ablation**

- Permanent pacemaker implantation is indicated prior to a planned catheter ablation of the AV junction intended for a rate control strategy for management of atrial fibrillation

### **CRID-7.5: Persistent Second Degree AV Block**

- Permanent pacemaker implantation is indicated for persistent second degree AV block in the His-Purkinje system with alternating bundle branch block or third degree AV block within or below the His-Purkinje system after myocardial infarction

### **CRID-7.6: Syncope**

- Permanent pacemaker implantation is indicated for syncope caused by spontaneously occurring carotid sinus stimulation and carotid sinus pressure that induces ventricular asystole of more than 3 seconds

## **CRID-8: Reasonable Indications for Permanent Pacemaker Implantation**

<b>CRID-8.1: General Considerations</b>	<b>31</b>
<b>CRID-8.2: Sinus Node Dysfunction</b>	<b>31</b>
<b>CRID-8.3: Syncope</b>	<b>31</b>
<b>CRID-8.4: Asymptomatic Second Degree AV Block</b>	<b>31</b>
<b>CRID-8.5: First or Second AV Block</b>	<b>31</b>
<b>CRID-8.6: Symptomatic Recurrent SVT</b>	<b>31</b>
<b>CRID-8.7: Relative Bradycardia – Postoperative Cardiac Transplant</b>	<b>32</b>
<b>CRID-8.8: Incidental Finding at Electrophysiology (EP) Study</b>	<b>32</b>
<b>CRID-8.9: Neuromuscular Diseases Known to Involve the Heart</b>	<b>32</b>
<b>CRID-8.10: Cardiomyopathy with a history of heart failure and an LV Ejection Fraction less than 50% on optimal medical therapy</b>	<b>32</b>

### **CRID-8.1: General Considerations**

- For the “reasonable” or “considered” indications listed in this CRID-8 guideline, consensus opinion is less clear about permanent pacing in these settings, with evidence suggesting that device placement may be reasonable or may be considered

### **CRID-8.2: Sinus Node Dysfunction**

- Permanent pacemaker implantation is reasonable for individuals with sinus node dysfunction with a resting heart rate of less than 40 bpm when periodic symptomatic bradycardia is suspected

### **CRID-8.3: Syncope**

- Permanent pacemaker implantation may be reasonable or may be considered for individuals with syncope in the following settings:
  - ◆ Syncope of unexplained origin when clinically significant abnormalities of sinus node function are discovered or provoked in electrophysiological studies
  - ◆ Syncope without clear, provocative events and with a hypersensitive cardioinhibitory response of 3 seconds or longer
  - ◆ Significantly symptomatic neurocardiogenic syncope associated with bradycardia documented spontaneously or at the time of tilt table testing
  - ◆ Syncope after cardiac transplantation even when bradyarrhythmia has not been documented

### **CRID-8.4: Asymptomatic Second Degree AV Block**

- Permanent pacemaker implantation is reasonable for individuals with asymptomatic second degree AV block at intra- or infra- His levels found at electrophysiological study

### **CRID-8.5: First or Second AV Block**

- Permanent pacemaker implantation is reasonable for individuals with first or second degree AV block with symptoms similar to those of pacemaker syndrome

### **CRID-8.6: Symptomatic Recurrent SVT**

- Permanent pacemaker implantation is reasonable for individuals with symptomatic, recurrent SVT that is reproducibly terminated by pacing when catheter ablation and/or drugs fail to control the arrhythmia or produce intolerable side effects

### **CRID-8.7: Relative Bradycardia – Postoperative Cardiac Transplant**

- Permanent pacemaker implantation may be considered for individuals when relative bradycardia is prolonged or recurrent, which limits rehabilitation or discharge after postoperative recovery from cardiac transplantation or in post-transplant syncope even if bradyarrhythmia has not been documented

### **CRID-8.8: Incidental Finding at Electrophysiology (EP) Study**

- Permanent pacemaker implantation may be reasonable for an incidental finding at electrophysiology study of a markedly prolonged HV interval (greater than or equal to 100 milliseconds) or non-physiological intra- or infra- Hisian block in asymptomatic patients

### **CRID-8.9: Neuromuscular Diseases Known to Involve the Heart**

- Permanent pacemaker implantation may be considered for progressive neuromuscular diseases known to involve the heart with any degree of AV block (including first degree AV block) or any fascicular block, with or without symptoms, because there may be unpredictable progression of AV conduction disease. Progressive neuromuscular diseases known to involve the heart include:
  - ◆ Myotonic muscular dystrophy
  - ◆ Kearns-Sayre syndrome
  - ◆ Erb dystrophy (limb-girdle muscular dystrophy)
  - ◆ Peroneal muscular atrophy

### **CRID-8.10: Cardiomyopathy with a history of heart failure and an LV Ejection Fraction less than 50% on optimal medical therapy**

See: **CRID-10: Cardiac Resynchronization Therapy (CRT)-P**



## **CRID-9: Permanent Pacemaker Implantation**

### **CRID-9.1: Non-Indications**

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## **CRID-9.1: Non-Indications**

- Permanent pacemaker implantation is **not** indicated in any of the following settings:
  - ◆ Sinus node dysfunction in asymptomatic patients
  - ◆ Sinus node dysfunction in patients for whom the symptoms, suggestive of bradycardia, have been clearly documented to occur in the absence of bradycardia
  - ◆ Sinus node dysfunction in symptomatic patients due to nonessential drug therapy
  - ◆ Fascicular block without AV block or symptoms concerning for AV block
  - ◆ Incidentally noted hypersensitive cardioinhibitory response to carotid sinus stimulation without symptoms or with vague symptoms
  - ◆ Asymptomatic first degree AV block
  - ◆ Asymptomatic type I second degree AV block at the supra-His (AV node) level or that which is not known to be intra- or infra-Hisian
  - ◆ Permanent ventricular pacing not indicated for asymptomatic transient AV block in the absence of intraventricular conduction defects or in isolated single fascicular block
  - ◆ Permanent pacing not indicated for situational vasovagal syncope in which avoidance behavior is effective

## **CRID-10: Cardiac Resynchronization Therapy (CRT)-P**

### **CRID-10.1: Indications for CRT-P**

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### **CRID-10.1: Indications for CRT-P**

- High grade AV block and NYHA Class I, II or III Congestive Heart Failure:
  - ◆ CRT-P implantation is indicated in individuals who have **all** of the following:
    - LV ejection fraction less than 50%
    - NYHA Class I, II, or III heart failure
    - High grade AV block, including AV nodal ablation, requiring more than 40% pacing (CRT)-P

**CRID-11: Leadless Implantable Devices**

<b>CRID-11.1: Leadless Pacemaker</b>	<b>38</b>
<b>CRID-11.2: Wireless Cardiac Resynchronization</b>	<b>38</b>
<b>CRID-11.3: Wireless Pulmonary Artery Pressure Sensor</b>	<b>38</b>

## **CRID-11.1: Leadless Pacemaker**

### **CRID-11.1.1: Leadless Pacemaker-general information**

- Permanent RV leadless pacemakers (CPT® 33274) are implanted directly into the right ventricle and are capable only of VVI and VVIR pacing. They cannot be used for dual-chamber pacing, and the estimated battery life is about 10 years.

### **CRID-11.1.2: Leadless Pacemaker-Indications**

- Indications for leadless pacer implant (BOTH):
  - ◆ Meets pacing indications per **CRID-7: Definite Indications for Permanent Pacemaker Implantation** or **CRID-8: Reasonable Indications for Permanent Pacemaker Implantation**
  - ◆ **None** of the following apply:
    - Patients with pacemaker syndrome or need for dual chamber pacing
    - Current implantation of neurostimulator or any other chronically implanted device which uses electrical current (includes ICDs)
    - Mechanical tricuspid valve, implanted vena cava filter, or left ventricular assist device
    - Elevated pulmonary pressures due to theoretical risk of embolization

## **CRID-11.2: Wireless Cardiac Resynchronization**

- Permanent LV leadless pacemakers (CPT® 0515T) are implanted directly in the left ventricle for synchronization with RV leads in the setting of cardiac resynchronization therapy. At this time they are considered experimental and investigational.

## **CRID-11.3: Wireless Pulmonary Artery Pressure Sensor**

- (CPT® 33289) Wireless Pulmonary Artery Pressure Sensor devices (CardioMEMS™ HF System) are implanted into a branch of the pulmonary artery during right heart catheterization and require a specialized delivery system. These devices monitor constant pulmonary artery pressures over time, utilizing the concept that as pulmonary artery pressures increase, outpatient medical therapy can be adjusted. This can potentially reduce inpatient admissions and treatment. Although FDA approved, these devices have yet to be incorporated into the standard of care and remain investigational and experimental at this time.

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