HEALTHHELP®

A WNS COMPANY

2026 Pacemaker Publication

Cardiology

CARD-CPAC-HH

Last Review Date: 10/06/2025
Previous Review Date: 01/13/2025
Guideline Initiated: 06/30/2019

HEALTHHELP®

A WNS COMPANY

Table of Contents

Cardiac Resynchronization Therapy-Pacemaker (CRT-P)

Cardiac Resynchronization Therapy-Pacemaker (CRT-P) Related National Coverage Determination (NCD)/Local Coverage Determination (LCD)

Please refer to https://www.cms.gov/medicare-coverage-database/search.aspx if applicable to the individual's health plan membership.

Type/ID Number	Title
NCD 20.8.3	Cardiac Pacemakers: Single Chamber and Dual Chamber Permanent Cardiac Pacemakers
NCD 20.4	Implantable Automatic Defibrillators
LCD 39080	Cardiac Resynchronization Therapy

Clinical Judgment

These medical policies are designed to provide clinical guidance and do not supplant a provider's independent professional judgment. Physicians retain full and independent authority to determine appropriate care based on each patient's individual clinical circumstances. Although services may be subject to documentation requirements, medical necessity review, or coverage limitations, nothing in this policy is intended to restrict or interfere with a physician's independent medical judgment.

Cardiac Resynchronization Therapy-Pacemaker (CRT-P) Contraindications

Cardiac Resynchronization Therapy-Pacemaker (CRT-P) may have the following contraindications:

1. Atrioventricular block is known and will require significant right ventricular pacing.
   Reference: [13]
2. Myocardial scarring or fibrosis preventing appropriate lead placement.
   Reference: [9]

Preamble: Pediatric Cardiology Preamble

HealthHelp's clinical guidelines for the Cardiology program, are intended to apply to both adults and pediatrics (21 years of age or younger), unless otherwise specified within the criteria.

CRT-P Guideline

Cardiac resynchronization therapy-pacemaker (CRT-P) is considered medically appropriate when heart failure is symptomatic (eg, dyspnea, fatigue, orthopnea), despite optimal medical therapy (OMT) and the documentation demonstrates **ALL** of the following:

1. **EITHER** of the following:
    a. Left bundle branch block (LBBB)
    b. QRS interval is **EITHER** of the following:
        i. 150 msec or more, in an adult individual
        ii. More than upper limit of normal for age range, in a pediatric individual (*See Pediatric Heart Rate in the **Definition** section*)

    References: [8] [6] [11]
2. Electrocardiogram (ECG) demonstrates atrial fibrillation or normal sinus rhythm.
    References: [8] [6]
3. Left ventricular ejection fraction (LVEF) is 35% or less.
    References: [8] [6]
4. New York Heart Association Functional Classification for Heart failure, classes II, III or ambulatory class IV **AND** is symptomatic (eg, dyspnea, fatigue, orthopnea), despite optimal medical therapy (OMT)
    References: [8] [6]
5. Ventricular pacing is required (current or anticipated).
    References: [8] [6]

CRT-P Removal or Replacement Guideline

CRT-P removal or replacement is considered medically appropriate when the documentation demonstrates **ANY** of the following:

1. Battery is at the end-of-life span per device manufacturer **OR** a battery error message occurred, with a request for a replacement of the current battery.
    References: [19] [21]
2. Complication related to the device occurred including **ANY** of the following:
    a. Erosion of device through the skin
    b. Infection is chronic and related to the implant.
    c. Lead fracture

d. Migration of device

e. Pain is associated with the device.

References: [19] [21]

3. Device is at the end-of-life span (per device manufacturer) and implantation was more than 5 years ago.
   Reference: [19]
4. National recall of device
   References: [19]

CRT-P Lead Removal or Replacement Guideline

Lead removal or replacement is considered medically appropriate when the documentation demonstrates **ANY** of the following:

1. Abandoned lead
   References: [21] [19]
2. Infection is known and related to implant or lead.
   Reference: [21]
3. Lead entrapment is a concern due to stenosis, venous occlusion or planned stent deployment.
   References: [21] [19]
4. Lead fracture, migration or malfunction
   Reference: [21]
5. Pain is associated with lead.
   References: [21] [19]
6. Thrombus on a lead is known, significant thromboembolic event (stroke, transient ischemic attack [TIA]) occurred and **CANNOT** be treated by other means.
   References: [21] [19]
7. Venous occlusion affects the same side of the body as the lead.
   References: [21] [19]

HEALTHHELP®
A WNS COMPANY

Procedure Codes

Table 1. Cardiac Resynchronization Therapy-Pacemaker (CRT-P) Associated Procedure Codes

CODE	DESCRIPTION
0695T	Body surface-activation mapping of pacemaker or pacing cardioverter-defibrillator lead(s) to optimize electrical synchrony, cardiac resynchronization therapy device, including connection, recording, disconnection, review, and report; at time of implant or replacement
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
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)
33215	Repositioning of previously implanted transvenous pacemaker or implantable defibrillator (right atrial or right ventricular) electrode
33216	Insertion of a single transvenous electrode, permanent pacemaker or implantable defibrillator
33217	Insertion of 2 transvenous electrodes, permanent pacemaker or implantable defibrillator
33218	Repair of single transvenous electrode, permanent pacemaker or implantable defibrillator
33220	Repair of 2 transvenous electrodes for permanent pacemaker or implantable defibrillator
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 implantable defibrillator pulse generator (including revision of pocket, removal, insertion, and/or replacement of existing generator)
33226	Repositioning of previously implanted cardiac venous system (left ventricular) electrode (including removal, insertion and/or replacement of existing generator)
33229	Removal of permanent pacemaker pulse generator with replacement of pacemaker pulse generator; multiple lead system
33233	Removal of permanent pacemaker pulse generator only
33234	Removal of transvenous pacemaker electrode(s); single lead system, atrial or ventricular
33236	Removal of permanent epicardial pacemaker and electrodes by thoracotomy; single lead system, atrial or ventricular
33237	Removal of permanent epicardial pacemaker and electrodes by thoracotomy; dual lead system
33238	Removal of permanent transvenous electrode(s) by thoracotomy
C1900	Lead, left ventricular coronary venous system

Table 2. Cardiac Defibrillator or Pacemaker Device Associated Secondary Codes (Authorization Requirements Depend on Primary Procedure)

Code	Description
33202	Insertion of epicardial electrode(s); open incision (eg, thoracotomy, median sternotomy, subxiphoid approach)

Code	Description
33203	Insertion of epicardial electrode(s); endoscopic approach (eg, thoracoscopy, pericardioscopy)

Leadless Intracardiac Pacemaker

Leadless Intracardiac Pacemaker Related National Coverage Determination (NCD)/Local Coverage Determination (LCD)

Please refer to https://www.cms.gov/medicare-coverage-database/search.aspx if applicable to the individual's health plan membership.

Type/ID Number	Title
NCD 20.8.4	Leadless Pacemakers

Clinical Judgment

These medical policies are designed to provide clinical guidance and do not supplant a provider's independent professional judgment. Physicians retain full and independent authority to determine appropriate care based on each patient's individual clinical circumstances. Although services may be subject to documentation requirements, medical necessity review, or coverage limitations, nothing in this policy is intended to restrict or interfere with a physician's independent medical judgment.

Preamble: Pediatric Cardiology Preamble

HealthHelp's clinical guidelines for the Cardiology program, are intended to apply to both adults and pediatrics (21 years of age or younger), unless otherwise specified within the criteria.

Leadless Intracardiac Pacemaker Contraindications

Leadless Intracardiac Pacemaker Contraindications

Contraindications to the placement of a leadless intracardiac pacemaker include **ANY** of the following:

1. Femoral venous anatomy is unfavorable.
   References: [4] [5]
2. Implanted cardiac device (eg, defibrillator, left ventricular assist device [LVAD], pacemaker) is already present and functioning.
   References: [4] [5]

3. Inferior vena cava filter is present.
   References: [4] [5]
4. Mechanical tricuspid valve is present.
   References: [4] [5]
5. Morbid obesity that prevents adequate device function
   References: [4] [5]
6. Procedure-related drug allergy or intolerance (eg, contrast-media, dexamethasone acetate, heparin)
   References: [4] [5]

Leadless Intracardiac Pacemaker Insertion or Replacement Guideline

A leadless pacemaker is considered medically appropriate when the documentation demonstrates **ALL** of the following:

1. Atrial lead placement (single lead) is high risk or **NOT** deemed necessary for effective therapy due to **ANY** of the following:
   a. Anatomical access is limited for transvenous pacing due to venous occlusion or venous anomaly.
   b. Arteriovenous (AV) fistula for hemodialysis is planned or is currently in use.
   c. Implantable electronic device (cardiovascular or endovascular) infection is present or there is a high-risk for infection.

   References: [3] [6] [17]
2. Pacemaker (insertion or replacement) guideline criteria are met (see "Pacemaker Insertion or Replacement Guideline").
   References: [3] [7] [17]

Leadless Intracardiac Pacemaker Removal Guideline

Removal of an intracardiac leadless pacemaker is considered medically appropriate when the documentation demonstrates **ANY** of the following[1]

1. Battery at end-of-life span (per device manufacturer) or a battery error message occurred, with request for a replacement of the current battery.
   References: [7] [16]

[1]A National recall on the device situations will be reviewed on a case-by-case basis.

2. Complication related to the device occurred, including **ANY** of the following:
    a. Dislodgement
    b. Infection is chronic or related to implant.
    c. Migration of device

    References: [3] [2]

3. End-of-life span (per device manufacturer) and the device was implanted more than 5 years ago.
    Reference: [7]

Leadless Intracardiac Pacemaker Procedure Codes

Table 1. Leadless Intracardiac Pacemaker Associated Procedure Codes

Code	Description
33274	Transcatheter insertion or replacement of permanent leadless pacemaker, right ventricular, including imaging guidance (eg, fluoroscopy, venous ultrasound, ventriculography, femoral venography) and device evaluation (eg, interrogation or programming), when performed
33275	Transcatheter removal of permanent leadless pacemaker, right ventricular, including imaging guidance (eg, fluoroscopy, venous ultrasound, ventriculography, femoral venography), when performed
E0610	Pacemaker monitor, self-contained, (checks battery depletion, includes audible and visible check systems)
E0615	Pacemaker monitor, self-contained, checks battery depletion and other pacemaker components, includes digital/visible check systems

Pacemaker

Pacemaker Related National Coverage Determination (NCD)/ Local Coverage Determination (LCD)

Please refer to https://www.cms.gov/medicare-coverage-database/search.aspx if applicable to the individual's health plan membership.

Type/ID Number	Title
NCD 20.8.3	Cardiac Pacemakers: Single Chamber and Dual Chamber Permanent Cardiac Pacemakers
NCD 20.4	Implantable Automatic Defibrillators

Clinical Judgment

These medical policies are designed to provide clinical guidance and do not supplant a provider's independent professional judgment. Physicians retain full and independent authority to determine appropriate care based on each patient's individual clinical circumstances. Although services may

be subject to documentation requirements, medical necessity review, or coverage limitations, nothing in this policy is intended to restrict or interfere with a physician's independent medical judgment.

Pacemaker Contraindications

Pacemaker may have the following contraindications:

- Tricuspid valve is prosthetic.
  Reference: [22]

Preamble: Pediatric Cardiology Preamble

HealthHelp's clinical guidelines for the Cardiology program, are intended to apply to both adults and pediatrics (21 years of age or younger), unless otherwise specified within the criteria.

Pacemaker Guideline

Pacemaker insertion is considered medically appropriate when the documentation demonstrates **ANY** of the following: (***NOTE**: *Heart rates are determined by age*. *[See Pediatric Heart Rate in the **Definitions** section]*)

1. Atrial fibrillation is permanent, bradycardia is symptomatic (eg, confusion, dizziness/light-headedness, fatigue, heart failure [HF], presyncope/syncope) and medications that affect atrioventricular nodal conduction are **NOT** taken.
   Reference: [12]
2. Atrio-ventricular (AV) block and **ANY** of the following:
   a. Atrial arrhythmia is known (AF or atrial flutter) and AV block is paroxysmal or permanent.
   b. Neuromuscular disease associated with conduction disorders (eg, amyloidosis, Kearns-Sayre syndrome, muscular dystrophy) and **ANY** of the following:
      i. 2nd degree AV block
      ii. 3rd degree AV block
      iii. His-ventricular (HV) interval is 70 ms or more.
   c. Post-procedural (alcohol ablation or surgical myectomy) is complete and **ANY** of the following:
      i. 3rd degree AV block
      ii. High-grade AV block

iii. Mobitz Type II, 2nd degree AV block, is acquired.

d. Progression to advanced 2nd or 3rd degree AV block, in a pediatric individual, **AND NO** reversible causes.

e. Symptomatic (eg, exercise intolerance, palpitations, angina, pre-syncope, syncope) and **ANY** of the following:

i. 2nd or 3rd degree AV block and **ANY** of the following:

A. Antiarrhythmic or beta blocker use is chronic and stable

B. Cardiac sarcoidosis associated

ii. Guideline directed medical therapy (GDMT) associated, when alternative treatment is **NOT** tolerated, effective or available, and treatment needs to continue.

iii. Mobitz type I (Wenckebach) 1st or 2nd degree

iv. New, after coronary artery bypass graft surgery or valve replacement

v. Treatment resistant

f. AV block is **NOT** associated with a physiologic or reversible etiology and **ANY** of the following:

i. 3rd degree AV block

ii. High-grade AV block

iii. Mobitz Type II, 2nd degree AV block, is acquired.

References: [12] [19]

3. Cardiomyopathy, infiltrative (eg, cardiac sarcoidosis or amyloidosis) is known and **ANY** of the following:

a. 3rd degree AV block

b. High-grade AV block

c. Mobitz Type II, 2nd degree AV block

Reference: [12]

4. Carotid sinus syndrome is cardioinhibitory or mixed and syncope is reproducible (massage, severe, recurrent breath holding or spontaneously).
References: [20] [19]

5. Chagas disease is known in a pediatric individual, with advanced 2nd or 3rd degree AV block **AND** spontaneous resolution is **NOT** likely.
Reference: [19]

6. Channelopathy (Brugada syndrome, catecholaminergic polymorphic ventricular tachycardia [CPVT], long or short QT syndrome), in a pediatric individual and significant, pause dependent ventricular tachycardia (VT) is known.
   Reference: [19]
7. Conduction disorder is known (eg, AV block, bundle branch blocks, fascicular block) and **ANY** of the following: [12]
   a. Bundle branch block is alternating.
   b. Kearns-Sayre syndrome is known.
   c. Syncope, with left bundle branch block (LBBB) and EPS demonstrates HV interval 70 ms or more or infranodal block.
8. Congenital heart disease and **ANY** of the following:
   a. AV block is congenital and complete and **ANY** of the following:
      i. Asymptomatic and **EITHER** of the following:
         A. Adult individual
         B. Infant **AND** mean ventricular rate is 50 bpm or less.
      ii. Symptomatic and **ANY** of the following:
         A. Mean daytime heart rate (HR) is **EITHER** of the following:
            I. Below 40 bpm in a pediatric individual
            II. Below 50 bpm in an adult individual
         B. Wide QRS escape rhythm
         C. Ventricular dysfunction
         D. Ventricular ectopy is complex.
   b. AV block is known and bradycardia is symptomatic (eg, dizziness, presyncope, syncope)
   c. Intra-atrial re-entrant tachycardia episodes are recurrent, in a pediatric individual **AND** there is **INADEQUATE** response to catheter ablation or medication therapy
   d. Post-operative development of AV block is **NOT** expected to resolve and **ANY** of the following:
      i. 3rd degree
      ii. High-grade AV block
      iii. Mobitz type II, 2nd degree

References: [12] [19]

9. Epilepsy is known, ictal bradycardia is symptomatic **AND** anti-epileptic medications are **NOT** effective.
   Reference: [12]

10. Lamin A/C gene mutation is known (eg, Emery-Dreifuss and limb girdle muscular dystrophy), PR interval is more than 240 ms **AND** LBBB is known.
    Reference: [12]

11. Myocardial infarction (MI), acute, and conduction disorder is persistent, for at least 5 days post-MI and **ANY** of the following:
    a. 3rd degree
    b. Alternating bundle branch block
    c. High-grade AV block
    d. Mobitz type II, 2nd degree

    References: [12] [6]

12. Post-cardiac transplant, in a pediatric individual, and **EITHER** of the following:
    a. Bradycardia is persistent, symptomatic and **NOT** expected to resolve.
    b. Chronotropic incompetence is impairing quality of life (QOL).

    Reference: [19]

13. Sinus node dysfunction is symptomatic (eg, confusion, dizziness/light-headedness, exercise intolerance, fatigue, presyncope/syncope) and **ANY** of the following:
    a. Bradycardia
    b. Chronotropic incompetence
    c. Electrophysiology study (EPS) demonstrates sinus node dysfunction
    d. Medication-induced bradycardia, medication is necessary for treatment (eg, congenital long QT syndrome requiring beta blockers) and there is **NO** alternative treatment available.
    e. New, after isolated coronary artery bypass surgery or valve replacement
    f. Tachy-brady syndrome is known.

    References: [12] [19]

14. Syncope is unexplained, bifascicular block is known and **ANY** of the following:
    a. **ANY** of the following:
       i. Elderly (age is over 65 years old.)

ii. Frail (poor functional capacity, failure to thrive, comorbidities)

iii. High-risk (low ejection fraction [EF])

iv. Syncope is recurrent.

b. HV interval is 70 ms or more.

c. Incremental pacing and EPS demonstrates **ANY** of the following:

i. 2nd degree AV block

ii. 3rd degree AV block

iii. Infra-Hisian block

d. Pharmacologic challenge (ajmaline, flecainide, procainamide) results are abnormal.

References: [20] [6]

Pacemaker, Dual Chamber Device Upgrade Guideline

A dual chamber device upgrade is considered medically appropriate when the documentation demonstrates **ANY** of the following:

1. AV block, 2nd or 3rd degree, is symptomatic (eg, chest pain, dizziness, heart palpitations, shortness of breath).
   Reference: [6]
2. Pacemaker syndrome is present.
   Reference: [6]
3. Syncope and **ANY** of the following:
   a. **ALL** of the following:
      i. Age is over 40 years old.
      ii. **ANY** of the following:
         A. Asystolic pause is documented, spontaneous and **ANY** of the following:
            I. Asymptomatic and pause is more than 6 seconds
            II. Symptomatic and pause is more than 3 seconds.
         B. Asystolic syncope is demonstrated on tilt table test.
         C. Cardioinhibitory carotid sinus syndrome
      iii. Syncope is recurrent, severe and unpredictable
   b. Carotid sinus syndrome is known.

References: [6] [20]

Pacemaker Removal or Replacement Guideline

Pacemaker removal (eg, for replacement) is considered medically appropriate when the documentation demonstrates **ANY** of the following:

1. Battery is at the end-of-life span (per device manufacturer) or a battery error message occurred, with request for a replacement of the current battery.
   References: [3] [19] [21]
2. Complication related to the device occurred, including **ANY** of the following:
   a. Erosion of device through the skin
   b. Infection is chronic or related to implant.
   c. Lead fracture
   d. Migration of device
   e. Pain is associated with device.

   References: [3] [19] [21]
3. Device is at the end-of-life span (per device manufacturer) and implantation of device was more than 5 years ago.
   Reference: [3] [19]
4. National recall of device
   References: [3] [19] [14]

Pacemaker Lead Removal or Replacement Guideline

Lead removal or replacement is considered medically appropriate when the documentation demonstrates **ANY** of the following:

1. Abandoned lead
   References: [21] [19]
2. Infection is known and related to implant or lead.
   Reference: [21]
3. Lead entrapment is a concern due to stenosis, venous occlusion or planned stent deployment.
   References: [21] [19]
4. Lead fracture, migration or malfunction
   Reference: [21]

5. Pain is associated with lead.
   References: [21] [19]
6. Thrombus on a lead is known, significant thromboembolic event (stroke, transient ischemic attack [TIA]) occurred and **CANNOT** be treated by other means.
   References: [21] [19]
7. Venous occlusion affects the same side of the body as the lead.
   References: [21] [19]

Pacemaker Procedure Codes

Table 1. Cardiac Pacemaker Device Associated Procedure Codes

CODE	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
33210	Insertion or replacement of temporary transvenous single chamber cardiac electrode or pacemaker catheter (separate procedure)
33211	Insertion or replacement of temporary transvenous dual chamber pacing electrodes (separate procedure)
33212	Insertion of pacemaker pulse generator only; with 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)
33215	Repositioning of previously implanted transvenous pacemaker or implantable defibrillator (right atrial or right ventricular) electrode
33216	Insertion of a single transvenous electrode, permanent pacemaker or implantable defibrillator
33217	Insertion of 2 transvenous electrodes, permanent pacemaker or implantable defibrillator
33218	Repair of single transvenous electrode, permanent pacemaker or implantable defibrillator
33220	Repair of 2 transvenous electrodes for permanent pacemaker or implantable defibrillator
33221	Insertion of pacemaker pulse generator only; with existing multiple leads
33222	Surgery to relocate pocket of skin that holds heart-assist device. The device emits electrical pulses to train the heart, improving its function.
33224	Insertion of pacing electrode, cardiac venous system, for left ventricular pacing, with attachment to previously placed pacemaker or implantable defibrillator pulse generator (including revision of pocket, removal, insertion, and/or replacement of existing generator)
33226	Repositioning of previously implanted cardiac venous system (left ventricular) electrode (including removal, insertion and/or replacement of existing generator)
33227	Removal of permanent pacemaker pulse generator with replacement of pacemaker pulse generator; single lead system

CODE	DESCRIPTION
33228	Removal of permanent pacemaker pulse generator with replacement of pacemaker pulse generator; dual lead system
33229	Removal of permanent pacemaker pulse generator with replacement of pacemaker pulse generator; multiple lead system
33233	Removal of permanent pacemaker pulse generator only
33234	Removal of transvenous pacemaker electrode(s); single lead system, atrial or ventricular
33235	Removal of transvenous pacemaker electrode(s); dual lead system
33236	Removal of permanent epicardial pacemaker and electrodes by thoracotomy; single lead system, atrial or ventricular
33237	Removal of permanent epicardial pacemaker and electrodes by thoracotomy; dual lead system
33238	Removal of permanent transvenous electrode(s) by thoracotomy
C1779	Lead, pacemaker, transvenous VDD single pass
C1785	Pacemaker, dual chamber, rate-responsive (implantable)
C1786	Pacemaker, single chamber, rate-responsive (implantable)
C1898	Lead, pacemaker, other than transvenous VDD single pass
C1899	Lead, pacemaker/cardioverter-defibrillator combination (implantable)
C1900	Lead, left ventricular coronary venous system
C2619	Pacemaker, dual chamber, nonrate-responsive (implantable)
C2620	Pacemaker, single chamber, nonrate-responsive (implantable)
C2621	Pacemaker, other than single or dual chamber (implantable)
E0610	Pacemaker monitor, self-contained, (checks battery depletion, includes audible and visible check systems)
E0615	Pacemaker monitor, self-contained, checks battery depletion and other pacemaker components, includes digital/visible check systems
G0448	Insertion or replacement of a permanent pacing cardioverter-defibrillator system with transvenous lead(s), single or dual chamber with insertion of pacing electrode, cardiac venous system, for left ventricular pacing

Table 2. Cardiac Defibrillator or Pacemaker Device Associated Secondary Codes (Authorization Requirements Depend on Primary Procedure)

Code	Description
33202	Insertion of epicardial electrode(s); open incision (eg, thoracotomy, median sternotomy, subxiphoid approach)
33203	Insertion of epicardial electrode(s); endoscopic approach (eg, thoracoscopy, pericardioscopy)

Pacemaker Summary of Changes

Pacemaker guidelines had the following version changes from 2025 to 2026:

Table 1. 2025-2026 Pacemaker Summary of Changes

Date	Type of Change	Summary
10/06/2025	Annual	• CRT-P annual update ▪ Added definitions for embolism, stroke, transient ischemic attack ▪ Changed "120 msec or more, in an adult individual" to "150 msec or more, in an adult individual" • Pacemaker annual update ▪ Added the following to keep in line with current evidence: ◦ Definitions for atrial flutter, cardiac sarcoidosis, coronary artery bypass graft, functional capacity, sarcoidosis, ventricular tachycardia ◦ "New, after coronary artery bypass surgery" under "Sinus node dysfunction" ◦ "New, after coronary artery bypass surgery" under "Symptomatic" under "Atrio-ventricular (AV) block" ◦ "Post-procedural (alcohol ablation or surgical myectomy)" under "Atrio-ventricular (AV) block" ▪ Removed the following as current evidence no longer supports the indication: ◦ "life expectancy is more than 1 year" throughout as it is implied if test is ordered. ◦ "Sinus node dysfunction" under "Congenital heart disease" as it is redundant ◦ "Tachycardia-bradycardia (tachy-brady) syndrome is present" under "Atrial fibrillation" ◦ "Tachycardia is symptomatic" under "Atrial fibrillation"

Pacemaker Definitions

Ablation is a procedure performed in a cardiac catheterization laboratory during an electrophysiology study (EPS) for the purpose of destroying myocardial tissue by delivery of radio-frequency energy, electrical or cryo-energy. The procedure is used to correct heart arrhythmias.
Alcohol septal ablation is a catheter-based intervention that uses an injection of absolute alcohol into the septal perforator to induce a controlled infarction of the hypertrophied septum and consequently abolish the dynamic outflow obstruction.
Alternating bundle branch block (BBB) is an unusual conduction disturbance consisting of right bundle branch block (RBBB) and left bundle branch block (LBBB) on successive electrocardiograms (ECGs).
Amyloidosis is a disorder characterized by the deposition of a waxy translucent substance consisting primarily of protein in bodily organs and tissues.

Angina is a type of chest pain caused by reduced blood flow to the heart.
Anomaly is something different, abnormal, peculiar or not easily classified.
Antiarrhythmic Medications are a class of medications used to treat abnormal cardiac rates or rhythms. There are five groups of antiarrythmics: Group I sodium channel blockers, group II beta-blockers, group III potassium channel blockers, group IV calcium channel blockers and group V other mode of action medications.
Arteriovenous fistula (AVF) is an abnormal connection between an artery and a vein. It happens when one or more arteries are directly connected to one or more veins or venous spaces called sinuses.
Asystole is the absence of electrical activity of the heart, no contractions of the heart muscle (absence of heartbeat).
Atrial fibrillation (AF) is a cardiac rhythm disorder characterized by uncontrolled atrial activation without effective atrial contraction. On the electrocardiogram (ECG), P waves are absent. AF is characterized by rapid oscillations or fibrillatory waves that vary in amplitude, shape and timing associated with an irregular ventricular response.

- **Paroxysmal AF** terminates spontaneously or with intervention within 7 days of onset. Episodes typically convert back to sinus rhythm within 48 hours.
- **Persistent AF** is continuous AF sustained beyond 7 days.

Atrial flutter is a rhythm disorder characterized by coordinated electrical activity in the atria, and the electrocardiogram (ECG) shows a saw tooth pattern of the flutter waves.

- Typical atrial flutter is localized to the right atrium.
- Atypical atrial flutter refers to atrial flutter arising in the left atrium.

Atrial lead placement is the process of inserting a flexible, insulated wire into the atrium, or upper chamber, of the heart to treat an irregular heartbeat. The wire, or lead, sends electrical signals to the heart to correct its rhythm.
Atrioventricular (AV) nodal ablation is a treatment for an irregularly fast and disorganized heartbeat called atrial fibrillation. It uses heat (radiofrequency) energy to destroy a small amount of tissue between the upper and lower chambers of the heart (AV node).
Atrioventricular synchrony is the heart activation sequence in which first the atria then (after an appropriate delay) the ventricles contract.
Beta blocker is a type of drug that blocks the action of substances, such as adrenaline, on nerve cells and causes blood vessels to relax and dilate (widen). This allows blood to flow more easily and lowers blood pressure and the heart rate.
Bifascicular block is a conduction disturbance below the atrioventricular (AV) node in which the right bundle branch and one of the two fascicles (anterior or posterior) of the left bundle branch are involved.

Bradycardia is a heart rate that is too slow. What is considered too slow can depends on age and physical condition. In general, for adults, a resting heart rate of fewer than 60 beats per minute (BPM) qualifies as bradycardia. Causes for bradycardia may include: problems with the sinoatrial (SA) node, sometimes called the heart's natural pacemaker, problems in the conduction pathways of the heart that do not allow electrical impulses to pass properly from the atria to the ventricles, metabolic problems (eg, hypothyroidism), damage to the heart from heart disease or heart attack, and certain heart medications that can cause the side effect of bradycardia.

Brugada syndrome is a rare inherited cardiovascular disorder characterized by disturbances affecting the electrical system of the heart. The main symptom is irregular heartbeat and, without treatment, may result in sudden death.

Bundle branch block is a type of conduction disorder involving partial or complete interruption of the flow of electrical impulses through the right or left bundle branches. Normally, electrical impulses travel down the right and left branches of the ventricles at the same speed, allowing both ventricles to contract simultaneously. When there is a "block " in one of the branches, electrical signals have to take a different path through the ventricle and one ventricle contracts a fraction of a second slower than the other, causing an arrhythmia.

Cardiac cycle length is the sequence of electrical and mechanical events that occurs with every heartbeat. The normal duration of a cardiac cycle for a heart rate of 75 beats/minutes is 0.8 seconds.

Cardiac resynchronization therapy is a procedure to implant a device in the chest to make the heart's chambers contract in a more organized and efficient way. Cardiac resynchronization therapy (CRT) uses a device called a biventricular pacemaker (also called a cardiac resynchronization device) that sends electrical signals to both ventricles. The signals trigger the ventricles to contract in a more coordinated way, which improves the pumping of blood out of the heart. Sometimes the device also contains an implantable cardioverter-defibrillator (ICD), which can deliver an electrical shock to reset the heart if the heart rhythm becomes dangerously erratic.

Cardiac rhythm is an electrical impulse generated by highly specialized fibers capable of spontaneously producing and propagating electrical impulse in the myocardium.

Cardiac sarcoidosis is an inflammatory granulomatous disease that can affect the heart. Up to one-quarter of the population with systemic sarcoidosis may have evidence of cardiac involvement. The clinical manifestations of cardiac sarcoidosis (CS) include heart block, atrial arrhythmias, ventricular arrhythmias and heart failure.

Cardioinhibitory response is generally defined as ventricular asystole exceeding 3 seconds. Ventricular asystole refers to a complete cessation of ventricular cardiac activity.

Cardiomyopathy is a disease of the heart muscle that makes it harder for the heart to pump blood to the rest of the body. Cardiomyopathy can lead to heart failure. The main types of cardiomyopathy include dilated, hypertrophic and restrictive cardiomyopathy.

Cardiovascular refers to the body system which includes the heart and the blood vessels.

Carotid sinus stimulation is a noninvasive diagnostic test used to detect carotid sinus hypersensitivity and, in emergencies, to diagnose or treat paroxysmal supraventricular tachycardia.

Carotid Sinus Hypersensitivity and Carotid Sinus Syndrome is the exaggerated response to carotid stimulation or pressure resulting in bradycardia, vasodilatation and/or hypotension. Carotid sinus hypersensitivity with associated symptoms of dizziness, syncope and/or unexplained falls is termed as carotid sinus syndrome (CSS).

Catecholamenergic polymorphic ventricular tachycardia (CPVT) is a rare, inherited arrhythmia syndrome characterized by exercise or emotion-induced ventricular arrhythmias in individuals with structurally normal hearts and a normal resting electrocardiogram (ECG).

Chagas disease is caused by the tropical parasite Trypanosoma cruzi, which is transmitted to animals and people by insect vector and is also referred to as American trypanosomiasis. There is an acute and, if untreated, chronic phase. Complications of chronic Chagas may include arrhythmia, congestive heart failure and/or a dilated esophagus or colon.

Channelopathies are genetically determined disorders characterized by abnormal function of ion channels, leading to various clinical manifestations including muscle, cardiac, and neurological disorders.

Chronotropic incompetence is the inability to increase and maintain heart rate appropriately in the setting of increased physiologic demand.

Conduction disorder is a disturbance in the electrical impulses that control the heart rhythm, affecting the normal sequence of electrical conduction through the heart's conduction system. Conduction disorders can involve delays or blocks in the conduction pathways, including the sinus node, atrioventricular node, His bundle, bundle branches, and Purkinje fibers.

Congenital heart disease (CHD) is a term for a variety of birth defects that affect heart anatomy and function. Congenital is defined as present since birth. CHD occurs when the heart, or blood vessels near the heart, do not develop normally. Common heart defects include: atrial septal defect, coarctation of the aorta, d-transposition of the great arteries, Ebstein's anomaly, patent ductus arteriosus, tetralogy of fallot, total anomalous pulmonary venous connection and ventricular septal defect.

Table 1. Adult Congenital Heart Disease Classifications

Classifi-cation	CHD Anatomy
Simple	• Native Anatomy ▪ Isolated, small ASD ▪ Isolated, small VSD ▪ Mild, isolated pulmonic stenosis • Repaired Conditions ▪ Previously ligated or occluded ductus arteriosus ▪ Repaired secundum ASD or sinus venosus defect without significantresidual shunt or chamber enlargement ▪ Repaired VSD without significant residual shunt or chamberenlargement

Classification	CHD Anatomy
Moderate Complexity	• Repaired or unrepaired conditions ▪ Aorto-left ventricular fistula ▪ Anomalous pulmonary venous connection, partial or total ▪ Anomalous coronary artery arising from the pulmonary artery ▪ Anomalous aortic origin of a coronary artery from the opposite sinus ▪ AVSD (partial or complete, including primum ASD) ▪ Congenital aortic valve disease ▪ Congenital mitral valve disease ▪ Coarctation of the aortan Ebstein anomaly (disease spectrum includes mild, moderate, and severevariations) ▪ Infundibular right ventricular outflow obstruction ▪ Ostium primum ASD ▪ Moderate and large unrepaired secundum ASD ▪ Moderate and large persistently patent ductus arteriosus ▪ Pulmonary valve regurgitation (moderate or greater) ▪ Pulmonary valve stenosis (moderate or greater) ▪ Peripheral pulmonary stenosis ▪ Sinus of Valsalva fistula/aneurysm ▪ Sinus venosus defect ▪ Subvalvar aortic stenosis (excluding HCM ▪ Supravalvar aortic stenosis ▪ Straddling atrioventricular valve ▪ Repaired tetralogy of Fallot ▪ VSD with associated abnormality and/or moderate or greater shunt

Classification	CHD Anatomy
Great Complexity (or complex)	• Cyanotic congenital heart defect (unrepaired or palliated, all forms) • Double-outlet ventricle • Fontan procedure • Interrupted aortic arch • Mitral atresia • Single ventricle (including double inlet left ventricle, tricuspid atresia,hypoplastic left heart, any other anatomic abnormality with a functionally single ventricle) • Pulmonary atresia (all forms) • TGA (classic or d-TGA; CCTGA or l-TGA) • Truncus arteriosus • Other abnormalities of atrioventricular and ventriculoarterial connection (i.e.,crisscross heart, isomerism, heterotaxy syndromes, ventricular inversion)

Coronary artery bypass graft (CABG) is a surgical procedure performed to shunt blood around a narrowing or blockage in the coronary artery of the heart. This procedure involves attaching one end of a segment of blood vessel (eg, a vein of the leg) that was removed from another part of the body into the aorta, and the other end of the segment into the coronary artery beyond the obstructed area, to increase blood flow.

Defibrillator is a device that provides an electric shock to the heart to allow it to get out of a potentially fatal abnormal heart rhythm, or arrhythmia.

Dislodgement is the displacement of a device (such as a catheter or tracheal tube) thought to be securely in position.

Dual chamber pacing is the stimulation of both the right atrium and right ventricle of the heart by an electronic device implanted in the body to help control the heartbeat (pacemaker).

Dyspnea is difficult, painful breathing or shortness of breath.

Echocardiogram (ECHO) is a test that uses high frequency sound waves (ultrasound) to make pictures of the heart. The test is also called echocardiography or diagnostic cardiac ultrasound. An echo uses sound waves to create pictures of the heart's chambers, valves, walls and the blood vessels (aorta, arteries, veins). A probe called a transducer is passed over the chest. The probe produces sound waves that bounce off the heart and "echo" back to the probe. These waves are changed into pictures viewed on a video monitor.

Ejection fraction (EF) is a measurement of how much blood the left ventricle pumps out with each contraction. It is measured in percentages with a normal measurement usually between 50 and 70%.

Electrocardiogram (ECG or EKG) is a test that measures and records the electrical activity of the heart. The ECG electrical activity is divided into the P wave, PR interval, QRS complex,

QT interval, ST segment, T wave and U wave. An ECG is useful in establishing many cardiac diagnoses.

Electrophysiology study (EPS) is a minimally invasive procedure that evaluates the electrical conduction system of the heart to assess the electrical activity, conduction pathways and abnormal heart beats. During an EPS, the sinus rhythm, and supraventricular and ventricular arrhythmias of baseline cardiac intervals, are recorded. The study is indicated to investigate the cause, location of origin and best treatment (drug therapy, catheter ablation or implantable cardioverter-defibrillator), for various abnormal heart rhythms.

Embolism is an obstruction of an artery, typically by a clot of blood or an air bubble, that has traveled from another part of the body.

Emery-Dreifuss muscular dystrophy is a condition that primarily affects muscles used for movement (skeletal muscles) and the heart (cardiac muscle). Among the earliest features of this disorder are joint deformities called contractures.

Endovascular procedure is a less invasive procedure using a catheter containing medications or miniature instruments inserted through the skin into a blood vessel for the diagnosis and treatment of vascular disease.

Epilepsy is a chronic neurological disorder characterized by recurrent unprovoked seizures due to abnormal excessive or synchronous neuronal activity in the brain.

Erosion is something that eats away at the layers of tissue or skin.

Escape rhythm is a slower heart rhythm that emerges when the normal pacemaker of the heart fails or is overridden, typically originating from the atrium, AV node, His-Purkinje system, or ventricular myocardium.

Fascicular is a group of muscle or nerve fibers.

Fascicular block is a condition that occurs when the transmission of electrical signals in the heart's fascicles is slowed or stopped. Fascicles are bundles of specialized heart muscle cells, also known as bundle branches, located in the heart's lower chambers.

Fistula is an abnormal connection between two epithelialized surfaces, often involving organs such as the gut, bladder, vagina, or skin, and can result from various causes including surgery, trauma, Crohn's disease, diverticular disease, or malignancy.

Functional Capacity is a measure of exercise tolerance (MET) that can be impacted by uncontrolled variables (familiarity with the exercise equipment, level of training and environmental conditions in the exercise laboratory). MET is a common unit in capacity calculations. Capacity is a strong predictor of mortality and cardiovascular complications across the adult population.

Functional restriction is the lack of physical, cognitive or psychological ability to independently perform the routine activities of daily living due to a disability.

Guideline-directed medical therapy (GDMT) refers to the optimal course of treatment for each stage of a chronic cardiac condition (eg, angina, heart failure), including those at high risk of disease progression but without structural heart disease or symptoms. The goal is titration of medications to maximum tolerated doses.

Heart block also called atrioventricular (AV) block, is partial or complete interruption of impulse transmission from the atria to the ventricles. [2]

Normally, electrical signals travel from the upper chambers of the heart (atria) to the lower chambers (ventricles). The AV node is a cluster of cells that connect the electrical activity from the top chambers of your heart (atria) to the bottom chambers (ventricles). A heart block occurs when the electrical signal does not travel through the AV node to the ventricles. The result is a heart that does not function effectively, and it cannot pump blood through its chambers and out to the body as a normal heart would. Heart block can be first, second or third degree, depending on the extent of electrical signal impairment.

First-degree heart block: The electrical impulse still reaches the ventricles, but moves more slowly than normal through the AV node. The impulses are delayed. This is the mildest type of heart block.

Second-degree heart block is classified into two categories: Type I and Type II. In second-degree heart block, the impulses are intermittently blocked. Type I, also called Mobitz Type I or Wenckebach's AV block: This is a less serious form of second-degree heart block. The electrical signal gets slower and slower until the heart actually skips a beat. Type II, also called Mobitz Type II: While most of the electrical signals reach the ventricles every so often, some do not and the heartbeat becomes irregular and slower than normal.

Third-degree heart block: The electrical signal from the atria to the ventricles is completely blocked. To make up for this, the ventricle usually starts to beat on its own acting as a substitute pacemaker but the heartbeat is slower and often irregular and not reliable. Third-degree block seriously affects the heart's ability to pump blood out to the body.

Heart failure (HF) (also known as **congestive heart failure [CHF]**) is a condition that develops when the heart is unable to pump enough blood for the body's needs. HF occurs when the heart cannot fill with enough blood or is too weak to pump properly. Decompensated heart failure is sudden worsening (exacerbation) of heart failure symptoms (eg, difficulty breathing, lower extremity edema, fatigue) to where the heart can no longer continue to compensate for its full function.

Hemodialysis is a medical procedure that removes waste products and fluid from the blood. It also corrects electrolyte imbalances. Hemodialysis is used to treat both acute and chronic kidney failure.

High-grade atrioventricular (AV) block is intermittent atrial conduction to the ventricle with two or more consecutive blocked P waves but without complete AV block.

His-ventricular (HV) interval is the conduction time from the proximal His bundle to the ventricular myocardium. It is measured from the earliest rapid deflection of the His bundle depolarization to the earliest onset of ventricular activation recorded from multiple surface electrocardiography (ECG) leads.

---

[2]Merck & Co., Inc., "Atrioventricular Block." [Online]. Available: www.merckmanuals.com

Hypersensitivity is an exaggerated response by the immune system to a drug or other substance.

Hypertrophic cardiomyopathy (HCM) is a congenital or acquired disorder, characterized by marked ventricular hypertrophy with diastolic dysfunction but without increased afterload (eg, due to valvular aortic stenosis, coarctation of the aorta, systemic hypertension). In obstructive HCM, the wall (septum) between the two bottom chambers of the heart thickens. The walls of the pumping chamber can also become stiff. It may block or reduce the blood flow from the left ventricle to the aorta. **Left ventricular outflow tract (LVOT)** obstruction is a common feature of HCM and a cause of symptoms and exercise limitation. LVOT obstruction is defined as a peak LVOT gradient of more than 30 mmHg at rest or more than 50 mmHg with provocation. Most people with HCM have LVOT. In non-obstructive HCM, the heart's main pumping chamber still becomes stiff. This limits how much blood the ventricle can take in and pump out, but blood flow is not blocked. [3,4]

Ictal bradycardia is a medical condition where a person's heart rate drops below 60 beats per minute (bpm) during a seizure. It's a cardiac manifestation of epilepsy that occurs when epileptic discharges disrupt the normal cardiac rhythm.

Implantable cardiac defibrillator (ICD) is a battery-powered device placed under the skin that keeps track of the heart rate. Thin wires connect the ICD to the heart. If an abnormal heart rhythm (heart beating chaotically or much to fast) is detected, the device will deliver a shock to restore a normal heartbeat.

Incremental pacing is a medical technique that involves delivering a series of pacing stimuli at progressively shorter cycle lengths. It's also known as burst pacing.

Inferior vena cava filter is a small device that can stop blood clots from going up into the lungs. The inferior vena cava is a large vein in the middle of the body.

Infra His Block is an impaired conduction in the electrical system of the heart that occurs below the atrioventricular node.

Intra-atrial re-entrant tachycardia (IART) is a type of atrial tachycardia characterized by a re-entry circuit within the atria, commonly associated with structural heart abnormalities due to congenital heart disease (CHD) or surgical interventions.

Intracardiac refers to the area within the heart (eg, muscles, ventricles).

Ipsilateral is something situated or appearing on or affecting the same side of the body.

Kearns-Sayre syndrome is a rare neuromuscular disorder with onset usually before the age of 20 years. It is the result of abnormalities in the DNA of mitochondria (small rod-like structures found in every cell of the body that produce the energy that drives cellular functions).

Lamin A/C mutation refers to genetic alterations in the LMNA gene, which encodes the nuclear envelope proteins lamin A and C. These mutations can lead to a variety of diseases known

[3]Merck & Co., Inc., "Hypertrophic Cardiomyopathy." [Online]. Available:www.merckmanuals.com

[4]American Heart Association (AHA). "Health Topics." [Online]. Available: www.heart.org

as laminopathies, affecting multiple systems including skeletal muscle, cardiac muscle, adipose tissue, and others.

Lead fracture is a break in the conductor coil within the lead of a pacemaker, and can lead to pacemaker failure. Symptoms can include dizziness, syncope, chest discomfort, palpitations or less commonly with extracardiac symptoms.

Leadless Pacemaker is a self-contained generator and electrode system implanted directly into the right ventricle. Leadless pacemakers provide single chamber ventricular pacing.

Left bundle branch block (LBBB) is a delay or obstruction along the electrical pathway to the heart's left ventricle, which can be caused by underlying heart problems. There are often no symptoms involved, however, symptomatic persons can experience syncope or pre-syncope, fatigue and shortness of breath.

Left ventricular assist device (LVAD) is a device that helps pump blood from the lower chambers of the heart (ventricles) to the rest of the body.

Left ventricular ejection fraction (LVEF), also known as ejection fraction (EF), is defined as the percentage of blood ejected from the left ventricle during each contraction.

Left ventricular outflow tract gradient is a measure that predicts the likelihood of heart failure and cardiovascular death in those with hypertrophic cardiomyopathy, and determines the need for myectomy and alcohol septal ablation.

Left ventricular outflow tract obstruction (LVOTO) is the limitation of blood flow out of the left ventricle.

Limb-girdle muscular dystrophy (LGMD) is a group of genetic diseases that cause muscle weakness and wasting in the arms and legs. The muscles closest to the body, like the shoulders, upper arms, pelvic area, and thighs, are usually the first to be affected.

Long QT syndrome (LQTS) is an abnormal feature of the heart's electrical system that can lead to a potentially life-threatening arrhythmia called torsades de pointes. Torsades de pointes may result in syncope or sudden cardiac death.

Migration is the unwanted movement of an implanted device from its original therapeutic location to another part of the body, where it may cause injury.

Mobitz I block, also called Wenckebach phenomenon, is a progressive prolongation of the PR interval culminating in a non-conducted P wave: • PR interval is longest immediately before dropped beat • PR interval is shortest immediately after dropped beat.

Mobitz II block, also called Hay Block, is a form of 2nd degree AV block in which there is intermittent non-conducted P waves without progressive prolongation of the PR interval.

Morbid obesity is a complex chronic disease in which a person has a body mass index (BMI) of 40 or higher; or a BMI of 35 or higher and is experiencing obesity-related health conditions (eg, coronary heart disease, diabetes, high cholesterol, hypertension, obstructive sleep apnea).

Muscular dystrophy is any of a group of hereditary diseases characterized by progressive wasting of muscles.

Myectomy is an operation where the thickened heart wall is surgically removed, and used when medications are no longer able to control symptoms of hypertrophic cardiomyopathy.

Myocardial infarction (MI), also called a heart attack, occurs when the blood flow that brings oxygen to the heart muscle is severely reduced or cut off completely. The coronary arteries that supply the heart muscle with blood flow can become narrowed from a buildup of fat, cholesterol and other substances that together are called plaque. This process is known as atherosclerosis. When plaque within a coronary artery breaks, a blood clot forms around the plaque and can block the flow of blood through the artery to the heart muscle. Ischemia results when there is an inadequate blood supply to the heart muscle causing damage or death of part of the heart muscle, resulting in an MI.

National recall occurs when a manufacturer takes action to fix a device that violates Food and Drug Administration (FDA) safety laws by being defective, a risk to health or both. The manufacturer may take corrective action or removal action, depending on the circumstances.

Neuromuscular disease is a disease that affects the function of muscles due to problems with the nerves and muscles in the body. The most common sign of these diseases is muscle weakness.

New York Heart Association (NYHA) Functional Classification for Heart Failure

CLASS	SYMPTOMS EXPERIENCED
Class I (Mild)	Cardiac disease, but no symptoms and no limitation in ordinary physical activity (eg, shortness of breath when walking, climbing stairs).
Class II (Mild)	Mild symptoms (eg, mild shortness of breath and/or angina) and slight limitation during ordinary activity.
Class III (Moder-ate)	Marked limitation in activity due to symptoms, even during less-than-ordinary activity, (eg, walking short distances [20–100 m]). Comfortable only at rest. Class IIIa: no dyspnea at rest. Class IIIb: recent dyspnea at rest.
Class IV (Severe)	Severe limitations. Experience symptoms while at rest. Unable to carry on any physical activity with-out discomfort.

Normal sinus rhythm (NSR) is the rhythm that originates from the sinus node (the heart's natural pacemaker, which is located in the superior right atrium) and describes the characteristic rhythm of the healthy human heart.

Occlusion is an obstruction or blockage of an anatomical passage.

Optimal medical therapy (OMT) refers to the comprehensive use of medications and lifestyle modifications to manage a disease effectively, aiming to reduce symptoms, prevent complications, and improve quality of life.

Orthopnea is shortness of air or difficulty breathing that occurs when lying down. It is typically relieved by sitting or standing upright. Orthopnea is often a symptom of underlying medical conditions, most commonly heart failure, but can also be caused by respiratory issues.

Pacemaker is a small, battery-powered device that's surgically implanted in the chest or abdomen to monitor and regulate the heart's rhythm and rate. A pacemaker sends electrical

impulses to the heart to help it beat at a normal rhythm and rate. The device has long, thin wires that connect it to the heart through a large vein.

Pacemaker syndrome is an array of cardiovascular and neurologic signs and symptoms resulting from disruption of appropriate AV synchrony (AV dyssynchrony) caused by suboptimal pacing, inappropriate programming of pacing parameters or upper-limit behavior of AV synchronous pacing systems.

Paroxysmal is a sudden attack or increase of symptoms of a disease (such as pain, coughing, shaking, etc.) that often occurs again and again.

Pediatric approximate ages are defined by the US Department of Health (USDH), the Food and Drug Administration (FDA), and the American Academy of Pediatrics (AAP) as the following:

1. Infancy, between birth and 2 years of age
2. Childhood, from 2 to 12 years of age
3. Adolescence, from 12 to 21 years of age, further defined by the AAP into:
    a. Early (ages 11–14 years)
    b. Middle (ages 15–17 years),
    c. Late (ages 18–21 years)
    d. Older ages may be appropriate for children with special healthcare needs.

Pediatric Heart Rates by Age

Table 2. Pediatric Heart Rates by Age

Age	Heart Rate Range
Newborn (0 months up to 1 month old)	120 to 160 bpm (may drop to 85 bpm during sleep)
Infants (1 month up to 12 months old)	90 to 160 bpm (may drop to 70 bpm during sleep)
Toddlers (1 year up to 3 years old)	95 to 110 bpm
Preschool (3 years up to 5 years old)	75 to 100 bpm
School Age (5 years up to 12 years old)	70 to 100 bpm
Adolescents (12 years up to 18 years old	60 to 100 bpm (may be as low as 40 bpm in athletic individuals

Physiological etiology is the function(s) of the body that is the cause or origin of disease.

Presyncope is the feeling that one is about to faint. Someone with pre-syncope may be lightheaded (dizzy) or nauseated, have a visual "gray out" or trouble hearing, have palpitations, or feel weak or suddenly sweaty.

Pulmonary hypertension is a chronic, progressive condition characterized by elevated pressure in the pulmonary arteries, defined as a mean pulmonary arterial pressure greater than 20 mm Hg at rest.

QRS interval is the time required for a stimulus to spread through the ventricles (ventricular depolarization), and is normally 0.11 sec or less when measured by a computer (eg, electrocardiogram).

QT interval is the section on the electrocardiogram (ECG) that represents the time it takes for the electrical system to fire an impulse through the ventricles and then recharge. It is translated to the time it takes for the heart muscle to contract and then recover.
Reversible etiology is a condition caused by something that is able to be cured or changed.
Sarcoidosis is a chronic disease of unknown cause, that is characterized by the formation of nodules, especially in the lymph nodes, lungs, bones and skin.
Short QT syndrome (SQTS) is a genetically inherited disorder characterized by a shortened QT interval on the ECG, leading to an increased risk of atrial and ventricular arrhythmias and sudden cardiac death.
Sick sinus syndrome, also known as sinus node dysfunction, is an abnormal function in the sinoatrial (SA) node (also called sinus node). The sinus node is the natural pacemaker of the heart and is responsible for the regular, rhythmic heartbeat. When the sinus node malfunctions, abnormalities may result (eg, bradycardia, tachycardia, tachycardia-bradycardia syndrome, sinus pauses or arrest). Clinical symptoms result from hypoperfusion of end organs. Symptoms of sinus node dysfunction can include palpitations, syncope, pre-syncope, chest pain, weakness or decreased physical activity tolerance.
Sinus node dysfunction, previously known as sick sinus syndrome, is an abnormal function in the sinoatrial (SA) node (also called sinus node). The sinus node is the natural pacemaker of the heart and is responsible for the regular, rhythmic heartbeat. When the sinus node malfunctions, abnormalities may result (eg, bradycardia, tachycardia, tachycardia-bradycardia syndrome, sinus pauses or arrest). Clinical symptoms result from hypoperfusion of end organs. Symptoms of sinus node dysfunction can include palpitations, syncope, pre-syncope, chest pain, weakness or decreased physical activity tolerance.
Sinus pause occurs when the heartbeat pauses or stops.
Stenosis is a narrowing of the spinal cord or the nerves that go from the spinal cord to the muscles
Stroke, sometimes called a brain attack, occurs when something blocks blood supply to part of the brain or when a blood vessel in the brain bursts. In either case, parts of the brain become damaged or die. A stroke can cause lasting brain damage, long-term disability or even death
Supraventricular tachycardia (SVT) is a rapid rhythm with atrial and/or ventricular rates of more than 100 beat per minute (bpm) at rest, which originate and are sustained in atrial or atrioventricular node tissue above the bundle of His. The condition is caused by reentry phenomena or automaticity at or above the atrioventricular node and includes atrioventricular (AV) nodal reentrant tachycardia, atrioventricular reciprocating and atrial tachycardia.
Syncope is a transient loss of consciousness and postural tone (ability to maintain or change position intentionally) due to insufficient cerebral perfusion. The loss of consciousness is associated with prompt recovery, not needing resuscitation.
Tachycardia is an accelerated heart rate of more than 100 beats per minute in adults.

Tachycardia-bradycardia syndrome occurs when the heart fluctuates between beating too quickly (tachycardia) and too slowly (bradycardia).

Thrombus is a blood clot that forms on the wall of a blood vessel or in the heart when blood platelets, proteins and cells stick together. A thrombus may block the flow of blood.

Tilt-table test is a non-invasive diagnostic test that attempts to determine the cause of syncope by creating changes in posture from lying to standing.

Transient ischemic attack (TIA)is a brief interruption of the blood supply to the brain that causes a temporary impairment of vision, speech or movement. The episode usually lasts for just a few moments but may be a warning sign of a full scale stroke.

Transvenous pacing is a procedure involving the use of an intravenous catheter containing an electrode carrying electrical impulses from an extracorporeal (outside of the body) source to the heart.

Treatment resistant refers to a disease or disorder that fails to respond positively or significantly to adequate intervention(s).

Tricuspid valve is a valve of three flaps that prevents reflux of blood from the right ventricle to the right atrium.

Trifascicular block is a pre-conduction delay in the three fascicles (nerve fiber bundles) below the atrioventricular (AV) node that include the right bundle branch, left anterior fascicular (LAF) and left posterior fascicular (LPF). The LAF and LFP are referred to as the left bundle branch. A trifascicular block can include one to all three of the nerve fiber bundles. When all three are involved it is considered a complete heart block. Treatment is dependent upon which bundle of nerve fibers are involved.

Vasodepressor response is a reflex that causes a sudden drop in blood pressure, which can lead to fainting, or syncope. A vasodepressor response occurs when the heart slows down and blood vessels widen, which reduces blood flow to the brain. This can happen when the body's involuntary nervous system, also known as the vasovagal system, is triggered.

Vasovagal syncope is a fainting spell due to the body's overreaction to certain triggers, such as the sight of blood or extreme emotional distress.

Venous anomaly is a vascular malformation that occurs when small veins are arranged in an abnormal pattern. The most common type of venous anomaly is a developmental venous anomaly (DVA), which is characterized by a group of small veins that resemble the spokes of a wheel and drain into a larger central vein.

Venous occlusion is a medical condition that occurs when a vein is blocked, compressed, or narrowed by nearby structures like muscles, arteries, clots, or other veins. This can lead to blood pooling and flowing backward, which can cause pain and swelling in the area.

Ventricular dysfunction is the condition characterized by dilation of the left ventricle of the heart.

Ventricular ectopy complex is an ectopic (abnormal) impulse originating from an area distal to the His Purkinje system (the part of the heart's conduction system that is responsible for the rapid electric conduction in the ventricles).
Ventricular escape rhythm occurs whenever higher-lever pacemakers in AV junction or sinus node fail to control ventricular activation. The escape rate is usually 20 to 40 bpm and is often associated with broad QRS complexes.
Ventricular pacing refers to the electrical stimulation provided to the ventricles of the heart by a pacemaker. It's intended to regulate the heart rate in individuals with abnormally slow heart rhythm.
Ventricular pause occurs when there is a conduction block causing in the sinus node and/or the atrium causing a delay or 'pause' in the ventricular contraction.
Ventricular tachycardia (VT) is a rhythm disorder caused by abnormal electrical signals in the ventricles of the heart.

- **Monomorphic ventricular tachycardia** is ventricular tachycardia with stable QRS morphology.
- **Non-sustained ventricular tachycardia (NSVT)** is defined as 3 or more consecutive beats originating from the ventricle, lasting less than 30 seconds, at a rate more than 100 beats per minute (bpm).
- **Polymorphic ventricular tachycardia** is a ventricular rhythm, with a rate greater than 100 bpm with a varying QRS pattern that terminates spontaneously (causing syncope if lasting more than a few seconds) or will deteriorate into ventricular fibrillation, causing cardiac arrest.
- **Sustained ventricular tachycardia (SVT)** is defined as a ventricular rhythm more than 100 bpm (widened QRS complex with duration greater than 120 ms) lasting more than 30 seconds or requiring termination due to hemodynamic instability.

Wide QRS (ventricular) escape rhythm occurs whenever higher-lever pacemakers in AV junction or sinus node fail to control ventricular activation. Escape rate is usually 20-40 bpm, often associated with broad QRS complexes (at least 120 ms).

Pacemaker References

[1] (2026). Aveir Leadless Pacemaker. *Abbott*. Retrieved: April 2026. https://manuals.eifu.abbott/en/detail-screen.html
[2] Bhatia, N. & El-Chami, M. (2021). Leadless pacemakers: a contemporary review. *Journal of Geriatric Cardiology, 15*(4), 249–253.

[3] Chung, M.K. & Daubert, J.P. (2022). Pacemakers and Implantable Cardioverter-Defibrillators. P. Libby & R.O. Bonow (Eds.). *Braunwald's Heart Disease: A Textbook of Cardiovascular Medicine* (12), (pp. 1321-1348). Philadelphia, PA: Elsevier.

[4] (2022). Aveir Leadless Pacing System – Aveir Leadless Pacemaker, Model LSP112V (Right Ventricular); Aveir Delivery Catheter, Model LSCD111; and Aveir Link Module, Module LSL02 – P150035. *US Food & Drug Administration*. Retrieved: February 2024. https://www.fda.gov/medical-devices/recently-approved-devices/aveir-leadless-pacing-system-aveir-leadless-pacemaker-model-lsp112v-right-ventricular-aveir-delivery

[5] (2022). SUMMARY OF SAFETY AND EFFECTIVENESS DATA (SSED). *US Food & Drug Administration*. Retrieved: February 2024. file:///P:/Clinical%20Guidelines%20Research%20and%20Development/2024%20Content%20Production/2024%20Cardiology/0%20Research/pacemaker/Leadless/2022%20US%20Food%20and%20Drug%20Administration.%20Summary%20of%20Effectiveness%20Data....pdf

[6] Glickson, M., Nielson, J.C., . . . Tolosana, J.M. (2021). 2021 ESC Guidelines on cardiac pacing and cardiac resynchronization therapy: Developed by the Task Force on cardiac pacing and cardiac resynchronization therapy of the European Society of Cardiology (ESC) With the special contribution of the European Heart Rhythm Association (EHRA). *European Heart Journal, 42*(35), 3427-3520.

[7] Groner, A. & Grippe, K. (2019). The Leadless Pacemaker. *Journal of the American Academy of Physician Assistants, 32*(6), 48-50.

[8] Heidenreich, P.A., Bozkurt, B., . . . Yancy, C.W. (2022). AHA/ACC/HFSA Guideline for the Management of Heart Failure. *JACC (Journal of the American College of Cardiology), 79*(17), e263–e421.

[9] Herweg, B,., Welter-Frost, A., . . . Vjayaraman, P. (2022). Conduction System Pacing for Cardiac Resynchronization Therapy. *Cardiac Electrophysiology Clinics, 14*(2), 297-310.

[10] Karpawich, P.P. & Chubb, H. (2023). Indications for Cardiac Resynchronization Therapy in Patients with Congenital Heart Disease. *Cardiac Electrophysiology Clinics, 15*(4), 433-445.

[11] Kirk, R., Dipchand, A.I., . . . Weintraub, R. (2014). The International Society for Heart and Lung Transplantation Guidelines for the management of pediatric heart failure: Executive summary. *Journal of Heart and Lung Transplantation, 33*(9), 888-909.

[12] Kusumoto, F.M., Schoenfeld, M.H., . . . Varosy, P.D. (2019). 2018 ACC/AHA/HRS Guideline on the Evaluation and Management of Patients With Bradycardia and Cardiac Conduction Delay. *Journal of the American College of Cardiology, 74*(7), e51-e156.

[13] Lindenfeld, J. & Zile, M.R. (2022). Devices for Monitoring and Managing Heart Failure. P. Libby & R.O. Bonow (Eds.). *Braunwald's Heart Disease: A Textbook of Cardiovascular Medicine* (12), (pp. 1107-1118). Philadelphia, PA: Elsevier Inc.

[14] Melman, Y.F., Steinberg, B.A., . . . Cutler, M.J. (2021). Limitations of manufacturer-recommended remote monitoring in the St. Jude Assurity/Endurity battery recall. *HeartRhythm Case Reports, 7*(12), 791-794.

[15] Ommen, S.R., Mital, S., . . . Sorajja, P. (2020). 2020 AHA/ACC Guideline for the Diagnosis and Treatment of Patients With Hypertrophic Cardiomyopathy. *Circulation, 142*(25), e558-e631.

[16] Oosterwerff, E.F.J., Salavati, A., . . . Elvan, A. (2022). Experience with malfunctioning leadless pacemakers: Troubleshooting and management during medium-term follow-up. *Heart Rhythm, 19*(6), 894-900.

[17] Palmisano, P., Iacopino, S., . . . Zucchelli, G. (2022). Leadless transcatheter pacemaker: Indications, implantation technique and peri-procedural patient management in the Italian clinical practice. *International Journal of Cardiology, 365*, 49-56.

[18] Russo, A., Desai, M., . . . Do, M. (2025). 2025 ACC/AHA/ASE/HFSA/HRS/SCAI/SCCT/SCMR 2025 Appropriate Use Criteria for Implantable Cardioverter-Defibrillators, Cardiac Resynchronization Therapy, and Pacing. *Journal of the America College of Cardiology, 85*(11), 1213-1285.

[19] Shah, M.J., Silka, M.J., . . . Wockel, P.L. (2021). 2021 PACES Expert Consensus Statement on the Indications and Management of Cardiovascular Implantable Electronic Devices in Pediatric Patients. *Heart Rhythm, 18*(11), 1888-1924.

[20] Shen, W., Sheldon, R.S., . . . Yancy, C.W. (2017). 2017 ACC/AHA/HRS guideline for the evaluation and management of patients with syncope. *Journal of the America College of Cardiology, 70*(5), e40-e110.

[21] Tainter, C.R. & Wardi, G. (2023). Implantable Cardiac Devices. R.M. Walls (Ed.). *Rosen's Emergency Medicine: Concepts and Clinical Practice* (10), (pp. 921-933.e3). Philadelphia: Elsevier.

[22] Tracy, C.M, Epstein, A.E., . . . Varosy, P.D. (2012). ACCF/AHA/HRS Focused Update of the 2008 Guidelines for Device-Based Therapy of Cardiac Rhythm Abnormalities. *Heart Rhythm, 9*(10), 1737-1753.

Disclaimer section

Purpose

The purpose of the HealthHelp's clinical guidelines is to assist healthcare professionals in selecting the medical service that may be appropriate and supported by evidence to safely improve outcomes. Medical information is constantly evolving, and HealthHelp reserves the right to review and update these clinical guidelines periodically. HealthHelp reserves the right to include in these guidelines the clinical indications as appropriate for the organization's program objectives. Therefore the guidelines are not a list of all the clinical indications for a stated procedure, and

associated Procedure Code Tables may not represent all codes available for that state procedure or that are managed by a specific client-organization.

Clinician Review

These clinical guidelines neither preempt clinical judgment of trained professionals nor advise anyone on how to practice medicine. Healthcare professionals using these clinical guidelines are responsible for all clinical decisions based on their assessment. All Clinical Reviewers are instructed to apply clinical indications based on individual patient assessment and documentation, within the scope of their clinical license.

Payment

The use of these clinical guidelines does not provide authorization, certification, explanation of benefits, or guarantee of payment; nor do the guidelines substitute for, or constitute, medical advice. Federal and State law, as well as member benefit contract language (including definitions and specific contract provisions/exclusions) take precedence over clinical guidelines and must be considered first when determining eligibility for coverage. All final determinations on coverage and payment are the responsibility of the health plan. Nothing contained within this document can be interpreted to mean otherwise.

Registered Trademarks (®/™) and Copyright (©)

National and Local Coverage Determination (NCD and LCD)

NOTICE
To ensure appropriate review occurs to the most current NCD and/or LCD, always defer to https://www.cms.gov/medicare-coverage-database/search.aspx.

Background

National Coverage Determinations (NCD) and Local Coverage Determinations (LCD) are payment policy documents outlined by the Centers for Medicare and Medicaid Services (CMS) and

the government's delegated Medicare Audit Contractors (MACs) that operate regionally in jurisdictions.

CMS introduced variation between different jurisdictions/Medicare Audit Contractors (MACs) and their associated covered code lists with the transition to ICD 10. The variation resulted in jurisdictions independently defining how codes are applied for exclusions, limitations, groupings, ranges, etc. for the medical necessity indications outlined in the NCD and LCD. Due to this variation, there is an inconsistent use/application of codes and coverage determinations across the United States between the different MACs.

In addition, **WITHOUT** notice, CMS can change the codes that indicate medical necessity and the format of the coverage determinations/associated documents (eg, Articles). This is an additional challenge for organizations to keep up with ongoing, unplanned changes in covered codes and medical necessity indications.

Medical Necessity Codes

Due to the variation in code application between jurisdictions/MACs and that updates can happen without notification, HealthHelp is not able to guarantee full accuracy of the codes listed for any Coverage Determination, and advises that prior to use, the associated Coverage Determination Articles are reviewed to ensure applicability to HealthHelp's programs and any associated NCDs and LCDs.

For Internal Use Only:

11248 11249 11253 11282 11325 11328 11333 11349 11350 11351 11352 11354 11355 11356 11358 11359 11360 11361 11362 11365 11366 11367 11368 11369 11370 11374 11375 11394 11395 11396 11565