Heart Block

Clinical Guidelines for Medical Necessity Review

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Important Notices

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Other Notices:

Guideline Information:

Disease Area: Cardiology
Care Path Group: Arrhythmias
Care Path Name: Heart Block
Type: [**X**] Adult (18+ yo) | [_] Pediatric (0-17yo)

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Table of Contents

Care Path Overview

Care Path Clinical Discussion

Key Information

1st degree AV block

1st-degree Atrioventricular Block (AV block) is 1:1 atrioventricular conduction with a PR interval greater than 200 ms. 1st-degree AV block may or may not be associated with a slow heart rate. It is usually due to primary AV node disease but sometimes can involve conduction delay through atrial tissue and rarely in the HIS-Purkinje system. First-degree AV block can appear due to coronary artery disease (CAD) affecting AV nodal function. In these cases, the delay in AV nodal conduction can be fixed or progressive. However, physicians commonly find 1st degree AV block in younger people, but the PR prolongation is often variable with the degree of vagal tone.[1,2]

Other causes of a prolonged PR interval can be medication-related, specifically those that delay AV nodal conduction. These include:

- Calcium channel blockers
- Beta-adrenergic receptor blockers
- Digoxin
- Class III antiarrhythmics such as Amiodarone.

The finding of significant PR prolongation using medications requires careful monitoring and often dose adjustment or discontinuation. Specific infectious processes can cause a prolonged PR interval, particularly rheumatic heart disease; Lyme disease can also cause varying degrees of AV block, all of which indicate the presence of carditis. Endocarditis, with or without an abscess, can also cause first-degree AV block.

1st-degree AV block is usually asymptomatic in most patients. However, in cases where the PR interval is markedly prolonged (greater than 300 msec), the synchrony between the atria and ventricles can be disrupted. This can cause symptoms of:

- Chest discomfort
- Fatigue
- Shortness of breath
- Worsening heart failure
- Near syncope[2]

2nd degree AV block (Mobitz I and II)
2nd-degree AV block is a rhythm where P waves have a normal rate (less than 100 bpm) and atrioventricular conduction occurs, but not in a consistent fashion. 2nd-degree AV block has two categories: 1) Mobitz I and 2) Mobitz II. These two categories highlight AV block's different ECG monitoring presentations and help define the block's anatomic area.

2nd degree, Mobitz I AV block (a.k.a. “Wenckebach” rhythm) is an AV block that usually originates within the AV node. However, rarely can this pattern involve the infra-Hisian region. This type of rhythm has a conduction pattern where the PR interval progressively prolongs with AV conduction loss on the cycle's final beat. This pattern often recurs sequentially. This type of AV block is often a product of increased vagal tone. At rest or during sleep, this is extremely common to observe with ECG monitoring, with a resolution of the arrhythmia with increased activity/exercise. The use of certain antiarrhythmics or electrolyte disturbances can also create a delay in AV nodal conduction. Mobitz I and Mobitz II 2nd-degree AV block can cause these symptoms associated with bradycardia:

- ➢ Fatigue
- ➢ Shortness of breath
- ➢ Chest discomfort
- ➢ Worsening heart failure
- ➢ Dizziness, especially in patients with underlying cardiac disease
- ➢ Syncope (in Mobitz II)

In these cases, further observation, in an outpatient or inpatient setting as appropriate, ensures that reversible causes are treated and that other, more severe forms of AV block are not present.

2nd-degree Mobitz II AV block indicates disease below the AV node level with or without AV node involvement. This type of rhythm has a pattern where the PR interval is consistent (and can be normal) with intermittently blocked AV conduction. Sometimes a 2:1 AV conduction ratio is observed. This pattern suggests infranodal block until proven otherwise. 2nd-degree Mobitz II can be associated with intermittent 3rd-degree AV block and can cause syncopal events. This rhythm is a reasonable indication for pacemaker implantation.

3rd degree AV block
3rd-degree AV block (or complete heart block) is a total electrical disconnection between the atria and the ventricles. With this disconnection, the atria and ventricles will beat at different rates with an atrial rate greater than or equal to the ventricular rate.

The causes of 3rd-degree AV block are varied. Most etiologies are acquired and can either be due to an acute event or develop gradually over time. There are congenital causes of AV block, including patients receiving pacing since birth for exposure to maternal isoimmune antibodies and progressive AV block related to L-TGA (congenital ventricular inversion).

Acquired complete AV block can be a product of reversible or nonreversible pathophysiology. This can include:

- Chronic tissue fibrosis
- Anterior wall ischemic event, myocarditis
- Infiltrative diseases
- Electrolyte abnormalities
- Medication side effects

A common cause of 3rd degree AV block is direct damage from cardiac surgery or transcatheter procedures; this includes traumatic complications from transcatheter aortic valve replacement (TAVR) procedures as well as septal alcohol injections for hypertrophic cardiomyopathy. Electrophysiologic ablation procedures of certain arrhythmias have about a 1% incidence of inadvertent injury to the AV node, creating an AV block severe enough that indicates pacing. AV block, when paired with permanent pacing can control the rate of atrial fibrillation. Most patients with 3rd-degree AV block have an insufficient escape rhythm, which is a significant mortality risk. A wide complex escape rhythm is a high risk feature - associated with VT and cardiogenic shock, PEA, and death.. Pacemaker implantation is the definitive treatment for AV block, which is not due to reversible causes.

Bifascicular Block

Bifascicular block is a disease of the conduction system usually within the ventricles, in the right or left bundle branches. This condition has similar causes to other forms of heart block. ECG evidence of bifascicular block within the ventricles is demonstrable with any of the following patterns:

- Alternating right bundle branch block and left bundle branch block (LBBB)
- Right bundle branch block with left anterior fascicular block
- Right bundle branch block with a left posterior fascicular block[2]

Bifascicular block is known to progress to 3rd degree AV block. It is also common to see ventricular arrhythmias in patients with bifascicular block. Syncope may occur, and the cause may be due to emerging high-grade 2nd-degree, 3rd-degree AV block, or runs of ventricular tachycardia. For patients with higher degrees of AV block and bifascicular block, pacing is indicated.[1,2]

The information contained herein gives a general overview of the pathway of this specific diagnosis, beginning with the initial presentation, recommended assessments, and treatment options as supported by the medical literature and existing guidelines. It should be noted that the care of patients can be complex. The information below is meant to support clinical decision-making in adult patients. It is not necessarily applicable to every case, as the entire clinical picture (including comorbidities, history, etc.) should be considered.

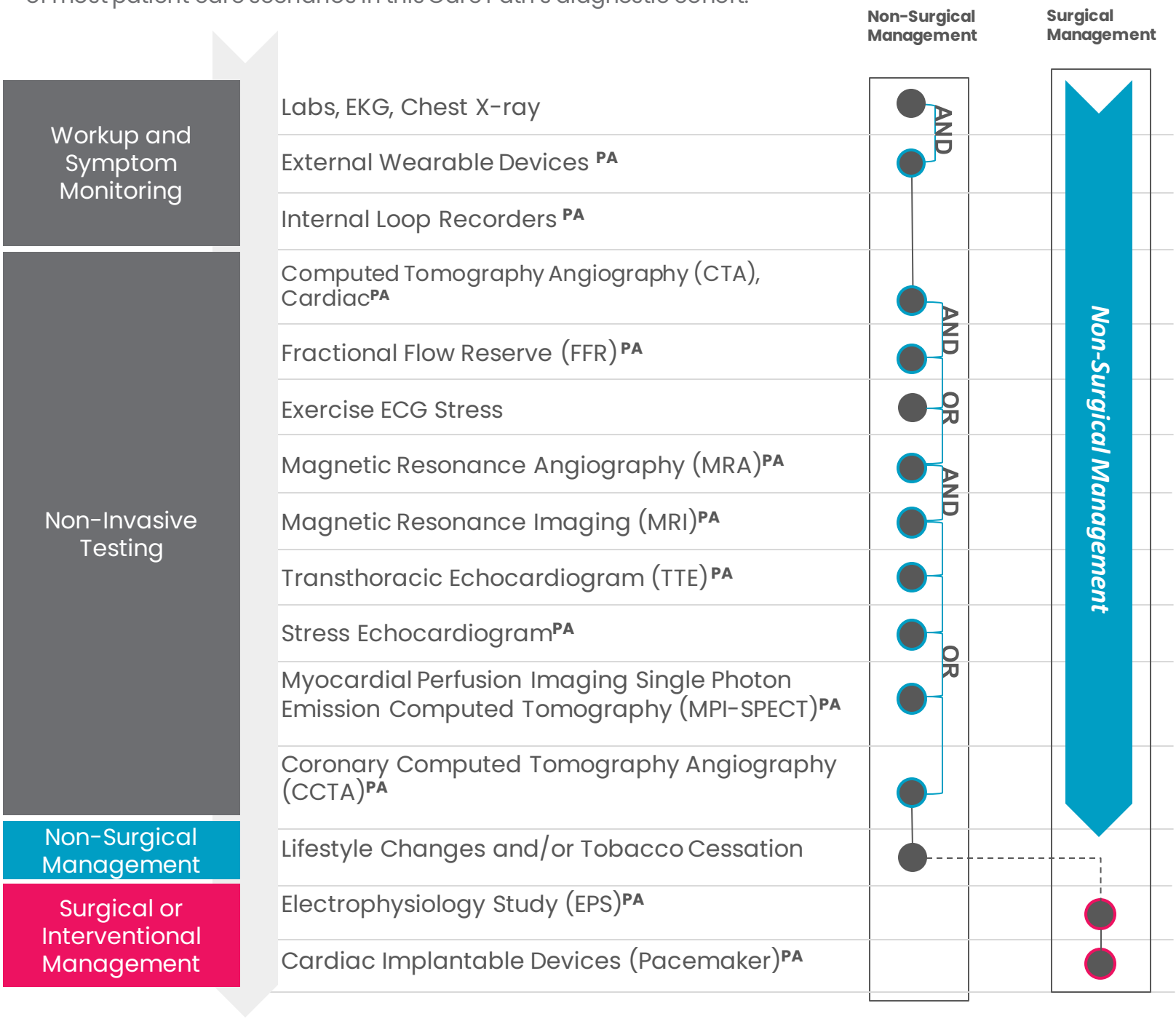
Definitions

- **1st-degree Atrioventricular Block (AV block):** 1:1 atrioventricular conduction with a PR interval greater than 200 ms. 1st-degree AV block may or may not be associated with a slow heart rate. It is usually due to primary AV node disease but sometimes can involve conduction delay through atrial tissue and rarely in the HIS-Purkinje system.[1,2]
- **2nd degree AV block (Mobitz I and II)**: a rhythm where P waves have a normal rate (less than 100 bpm) where atrioventricular conduction occurs, but not in a consistent fashion. 2nd-degree AV block has two categories: 1) Mobitz I and 2) Mobitz II. These two categories highlight the AV block's different presentations on ECG monitoring and help define the block's anatomic area.
- **3rd-degree AV block (or complete heart block)**: 3rd-degree AV block (or complete heart block) is a total electrical disconnection between the atria and the ventricles. With this disconnection, the atria and ventricles will beat automatically at different rates and are easily seen on an ECG.
- **Bifascicular block**: Bifascicular block is a disease of the conduction system within the ventricles, in the right or left bundle branches. This condition has similar causes to other forms of heart block.
- **Pre-Test Probability:** The pretest probability of CAD is the likelihood that the patient has CAD, calculated before the test result is known. These guidelines reference the 2019 European Society of Cardiology (ESC) Guidelines for the diagnosis and management of chronic coronary syndromes model to calculate the pretest probability based on age, sex, and type of chest pain.[3,4]

Heart Block

What is a "Cohere Care Path"?

These Care Paths organize the services typically considered most clinically optimal and likely to be automatically approved. These service recommendations also include the suggested sequencing and quantity or frequency determined clinically appropriate and medically necessary for the management of most patient care scenarios in this Care Path's diagnostic cohort.



Key

PA = Service may require prior authorization
★ = Denotes preferred service
AND = Services completed concurrently
OR = Services generally mutually exclusive

= Rate Control management prior authorization group of services
= Rhythm Control management prior authorization group of services
= Subsequent service
= Management path moves to a different management path

Care Path Diagnostic Criteria

Disease Classification

Arrhythmias, Heart Block

ICD-10 Codes Associated with Classification

ICD-10 Code	Code Description/Definition
G90.01	Carotid sinus syncope
I44	Atrioventricular and left bundle-branch block
I44.0	Atrioventricular block, first degree
I44.1	Atrioventricular block, second degree
I44.2	Atrioventricular block, complete
I44.3	Other and unspecified atrioventricular block
I44.30	Unspecified atrioventricular block
I44.39	Other atrioventricular block
I44.4	Left anterior fascicular block
I44.5	Left posterior fascicular block
I44.6	Other and unspecified fascicular block
I44.60	Unspecified fascicular block
I44.69	Other fascicular block
I44.7	Left bundle-branch block, unspecified
I45	Other conduction disorders
I45.0	Right fascicular block
I45.1	Other and unspecified right bundle-branch block
I45.10	Unspecified right bundle-branch block
I45.19	Other right bundle-branch block
I45.2	Bifascicular block
I45.3	Trifascicular block
I45.4	Nonspecific intraventricular block

I45.5	Other specified heart block
I45.8	Other specified conduction disorders
I45.89	Other specified conduction disorders
I45.9	Conduction disorder, unspecified
I49	Other cardiac arrhythmias
I49.5	Sick sinus syndrome
I49.8	Other specified cardiac arrhythmias
R00.1	Bradycardia, unspecified
T82.110A	Breakdown (mechanical) of cardiac electrode, initial encounter
T82.110D	Breakdown (mechanical) of cardiac electrode, subsequent encounter
T82.111A	Breakdown (mechanical) of cardiac pulse generator (battery), initial encounter
T82.118D	Breakdown (mechanical) of other cardiac electronic device, subsequent encounter
T82.119A	Breakdown (mechanical) of unspecified cardiac electronic device, initial encounter
T82.120A	Displacement of cardiac electrode, initial encounter
T82.121A	Displacement of cardiac pulse generator (battery), initial encounter
T82.128A	Displacement of other cardiac electronic device, initial encounter
T82.190A	Other mechanical complication of cardiac electrode, initial encounter
T82.191A	Other mechanical complication of cardiac pulse generator (battery), initial encounter
T82.198A	Other mechanical complication of other cardiac electronic device, initial encounter
T82.198S	Other mechanical complication of other cardiac electronic device, sequela
T82.199A	Other mechanical complication of unspecified cardiac

	device, initial encounter
T82.518A	Breakdown (mechanical) of other cardiac and vascular devices and implants, initial encounter
T82.598A	Other mechanical complication of other cardiac and vascular devices and implants, initial encounter
T82.598D	Other mechanical complication of other cardiac and vascular devices and implants, subsequent encounter
T82.7XXA	Infection and inflammatory reaction due to other cardiac and vascular devices, implants and grafts, initial encounter
T82.7XXD	Infection and inflammatory reaction due to other cardiac and vascular devices, implants and grafts, subsequent encounter
T82.837A	Hemorrhage due to cardiac prosthetic devices, implants and grafts, initial encounter
T82.867D	Thrombosis due to cardiac prosthetic devices, implants and grafts, subsequent encounter
T82.897A	Other specified complication of cardiac prosthetic devices, implants and grafts, initial encounter
T82.897S	Other specified complication of cardiac prosthetic devices, implants and grafts, sequela
T85.698A	Other mechanical complication of other specified internal prosthetic devices, implants and grafts, initial encounter
Z45.010	Encounter for checking and testing of cardiac pacemaker pulse generator [battery]
Z45.018	Encounter for adjustment and management of other part of cardiac pacemaker
Z45.02	Encounter for adjustment and management of automatic implantable cardiac defibrillator

Presentation and Etiology

Causes and Risk Factors

Chronic, progressive fibrosis within the cardiac conduction system is one of the common etiologies of all forms and severities of AV block in elderly patients. Additional causes and risk factors are:

- Coronary heart disease.
- Myocardial infarction.
- Electrolyte abnormalities (particularly hypokalemia and hypomagnesemia).
- Inflammation.
- Infections (endocarditis, myocarditis, rheumatic fever, Chagas disease, Lyme disease, diphtheria).
- Drugs (antiarrhythmics IA, IC, II, III, IV, and digoxin).
- Infiltrative diseases (e.g., sarcoidosis).
- Collagen vascular diseases (SLE, rheumatoid arthritis, and scleroderma).
- Idiopathic degenerative diseases (Lenegre and Lev diseases).
- Neuromuscular disorders.

AV block is often the consequence of manipulation of the ventricular septum in cardiac surgery or transcatheter procedures. In particular, transcatheter aortic valve replacements (TAVR), alcohol septal ablation, large ventricular septal defect repair, or subaortic stenosis myectomy.

Clinical Presentation

1st-degree AV block is usually asymptomatic and incidentally found on a 12 lead ECG in most patients. These ECG findings can be due to high vagal tone, and the PR interval can vary with the patient's heart rate. In patients with marked or extreme 1st degree AV block, defined as a PR interval as >300 msec, patients can develop a form of "pacemaker syndrome." Pacemaker syndrome presents as chest discomfort or a sense of fullness in the neck or chest due to atrial contraction against a closed AV valve. 1st degree AV block can also be the initial presentation of certain conditions such as rheumatic fever. It can also herald progression to more advanced AV block degrees in cases of cardiac infiltrative diseases, Lyme carditis, or congenital cardiac conditions.

2nd degree AV block Mobitz I can be asymptomatic on presentation. Asymptomatic presentation is often a function of high vagal tone. Higher sympathetic or excitatory input can restore the function of 1:1 AV nodal conduction. However, there are patients with extreme prolongation of the PR

interval before dropped ventricular conduction; these patients can have a feeling of neck or chest fullness, exercise intolerance, or worsening of preexisting heart failure.

Mobitz II 2nd-degree AV block can present with any symptom associated with significant bradycardia. However, progression to 3rd degree AV block is common and can be sudden. Syncope is often the presenting symptom in this circumstance.

3rd degree AV block usually results in profound bradycardia or even asystolic pauses. This can cause significant symptoms, the most common being syncopal events. Other signs or symptoms can include:

- Dizziness,
- Worsening heart failure,
- Fatigue and exercise intolerance,
- Cognitive changes/confusion,
- Cardiovascular collapse/shock,
- Death.

Typical Physical Exam Findings

The focus of the physical examination should evaluate for hemodynamic consequences of bradycardia due to advanced AV block, including:

- Weak pulses,
- Sluggish capillary refill,
- Cognitive changes/confusion.

The cardiac exam should focus on evidence of:

- Other rhythm disturbances on auscultation,
- Murmurs suggesting structural heart disease,
- Exaggerated or irregular jugular venous pulsation (escape rhythms originating at or below the AV node),
- Pulmonary crackles/decreased breath sounds,
- Liver enlargement/congestion,
- Peripheral edema.

Examining the skin for rashes and joints for tenderness can reveal systemic inflammatory processes such as Lyme disease, an important reversible cause of heart block.

Typical Diagnostic Findings

1st degree AV block
2nd degree AV block (Mobitz I and II)
3rd degree AV block

Initial diagnostic workup should begin with a 12 lead ECG. Note the degree of baseline AV block and whether the QRS complexes show a narrow or wide morphology. Examine the 12 lead ECG for signs of other cardiac pathology, including ischemic changes.

With suspicion of advanced degrees of AV block or unexplained syncope, extended ambulatory electrocardiographic monitoring is recommended. Implantable loop recorders can help symptoms that infrequently occur, especially when external monitoring does not yield a definitive diagnosis.

With a history of prior cardiac disease or cardiac surgery/intervention, cardiac imaging evaluation is appropriate.

- Transthoracic echocardiography can better assess cardiac function and define anatomic abnormalities which could impact rhythm stability.
- Cardiac MRI can define structural heart disease and myocardial fibrosis/infiltrative disease, which may be contributing to the progression of AV block.
- Cardiac CT imaging can also be useful for cardiac anatomy definition after cardiac surgery, and coronary CTA can add value with an assessment of coronary patency; however, it is less sensitive for evaluating myocardial diseases.

Stress testing can be useful when exertion causes conduction disease symptoms. When risk factors for coronary artery disease (CAD) are present, additional imaging with echocardiography or radionuclide scanning is appropriate. If reversible ischemia is the likely cause of exercise-related AV block, then cardiac catheterization may be indicated.

Electrophysiology studies can evaluate AV block level, especially for certain variations of 2nd degree AV block. In the case of a Mobitz I or a 2:1 AV block with narrow complex QRS, sometimes infrahisian disease is found; this would make pacing a reasonable recommendation.[2]

Treatment of AV block is focused on:

- Managing reversible causes of conduction disease, and
- Providing an adequate physiologic heart rate response and restoring AV synchrony.

Initial interventions may include:

- Removing any medications which would have direct effects on slowing cardiac conduction.
- Treatment of underlying systemic conditions.
- Supporting heart rate in patients who are at risk of becoming unstable.

- Performing laboratory studies evaluating electrolytes, drug levels, blood gases, pH, or Lyme titers (as appropriate for clinical suspicion) to detect conditions that can acutely be corrected.

For patients who have evidence of symptomatic AV block or multifocal conduction disease, evaluate for reversible causes. Once ruled out, refer the patient for permanent pacing. Many AV block causes are irreversible and/or progressive, and pacemaker implantation is necessary to prevent symptoms and prevent associated ventricular arrhythmias and increased mortality.[1,2]

Care Path Services & Medical Necessity Criteria

Workup and Symptom Monitoring

Service: Internal Loop Recorders

General Guidelines

- **Units, Frequency, & Duration:** When medical necessity criteria are met in the absence of exclusionary criteria, referral to a cardiac electrophysiologist (a specialized cardiologist) or trained cardiologist for an implant of an internal loop recorder (ILR) can be indicated. A single outpatient procedure is anticipated. The duration of an implant can be up to 4 years, depending on the device's battery life. Periodic recordings are actively or passively transmitted for interpretation by a physician.
- **Criteria for Subsequent Requests:** Subsequent requests are only accepted with documentation of device malfunction, an infection that requires removal of the initial device, or incorrect placement resulting in poor R-wave sensing.
- **Recommended Clinical Approach:** Non-invasive ambulatory ECG monitoring is first recommended in patients with suspicion for conduction system disease. Poor diagnostic yield of non-invasive monitoring in the setting of continued but infrequent symptoms may lead a physician to recommend an ILR for their patient. This procedure is performed by a trained cardiologist or cardiac electrophysiologist, and referral to a center that supports this service is required.[1]
- **Exclusions:** None.

Medical Necessity Criteria

Indications

➔ **ILR** is considered appropriate if **ALL** of the following are **TRUE**[1]:

- ◆ No diagnostic conclusions were achieved with non-invasive monitoring methods, such as an external loop recorder or mobile cardiac telemetry.
- ◆ The patient has no other implantable cardiac devices which can detect, record, and transmit data to a physician/cardiologist.

- The patient has no active systemic infection or nonreversible bleeding disorder, which would create a safety contraindication.

Non-Indications

➔ **ILR** is not considered appropriate if **ANY** of the following is **TRUE**[1]:

- The patient does NOT have any positive clinical risk factors, presentation or history findings, or physical exam findings pertinent to remote ECG monitoring.
- The patient has a culprit arrhythmic diagnosis identified on non-invasive monitoring.
- The patient has an active infection or an irreversible bleeding disorder.

Site of Service Criteria

Outpatient status.

Procedure Codes (HCPCS/CPT)

HCPCS Code	Code Description/Definition
33285	Insertion and programming of subcutaneous cardiac rhythm monitor
33286	Removal of subcutaneous cardiac rhythm monitor

Service: External Wearable Devices

General Guidelines

- **Units, Frequency, & Duration:** When medical necessity is met based on described clinical criteria, and there is an absence of exclusionary criteria, non-invasive external cardiac monitoring may be conducted using external wearable devices for a duration of 24 hours to 30 days, depending on symptom frequency.
- **Criteria for Subsequent Requests:** Subsequent requests are appropriate for follow-up monitoring of a chronic or progressive cardiac rhythm abnormality. It may also be considered for device malfunction, high burden of poor quality data/artifact, or inability to record patient symptoms.
- **Recommended Clinical Approach:** In a patient with clinical evidence of symptomatic or progressive conduction disease, the most appropriate external wearable monitor should be selected based on patient symptom frequency and suspected duration of the episodes. Daily symptoms and/or ongoing brief episodes of AV block may be addressable with a 24-48 hour Holter monitor. Less frequent symptomatic events are more likely to be captured with longer monitoring, either a 30-day loop recorder, cardiac mobile telemetry, or an extended-wear patch device. Consideration of a patient's ability to trigger a device effectively may also guide device selection in favor of those with more passive event recording capability.[5-6]
- **Exclusions:** 2 types of monitors cannot be ordered simultaneously.

Medical Necessity Criteria

Indications

➔ **External Wearable Device** is considered appropriate if **ANY** of the following is **TRUE**[5-6]:

- ◆ The patient experiences high-grade AV block symptoms once every 21 days.
- ◆ For diagnostic surveillance of AV block, which has a high-risk of progression.

*If the patient has had 3 or more external wearable devices in the last six months, consider an internal loop recorder.

Non-Indications

➔ **External Wearable Device** is not considered appropriate if **ANY** of the following is **TRUE**[5-6]:

- Palpitations are associated with symptoms suggestive of angina or clinically significant coronary artery obstruction, and monitoring would delay other needed testing and/or intervention.
- The patient has an implantable cardiac device capable of acquiring clinical data of a similar or equivalent quality to an external cardiac monitor.
- Symptoms occur very infrequently.

Site of Service Criteria

Outpatient.

Procedure Codes (HCPCS/CPT)

HCPCS Code	Code Description/Definition
93228	Other qualified health care professional review and interpretation with report of external mobile cardiovascular telemetry with electrocardiographic recording, concurrent computerized real time data analysis, and greater than 24 hours of accessible electrocardiogram (ECG) data storage (retrievable with query) with ECG triggered and patient selected events transmitted to a remote attended surveillance center for up to 30 days
93229	Technical support for connection and patient instructions for use, attended surveillance for up to 30 days, analysis and other qualified health care professional prescribed transmission of daily and emergent data reports of external mobile cardiovascular telemetry with electrocardiographic recording, concurrent computerized real time data analysis, and greater than 24 hours of accessible electrocardiogram (ECG) data storage (retrievable with query) with ECG triggered and patient selected events transmitted to a remote attended surveillance center

Non-Invasive Testing

Service: Computed Tomography Angiography (CTA)/Computed Tomography with Contrast, Cardiac

General Guidelines

- **Units, Frequency, & Duration:** Single request based on medical necessity criteria.
- **Criteria for Subsequent Requests:** New indication or follow-up after an intervention.
- **Recommended Clinical Approach:** Cardiac CTA is useful in the setting of structural abnormalities and the assessment of acquired or congenital anatomic factors, which may impact the strategy for implantation of a pacemaker device with one or more leads. Angiography as an adjunct imaging protocol is also helpful in understanding anatomic features, which may impact the success of accessing various cardiac structures.[7]
- **Exclusions:** Cardiac CTA for evaluation for cardiac anatomic evaluations may not include other study protocols, e.g., calcium scoring, which may require a different diagnostic indication.

Medical Necessity Criteria

Indications

➔ **Cardiac CTA** is considered appropriate if **ANY** of the following is **TRUE**[7]:
- ◆ For pre-procedural evaluation of cardiac anatomy when structural heart factors may impact insertion of a pacemaker (or defibrillator).

Non-Indications

➔ **Cardiac CTA** may not be considered appropriate if **ANY** of the following is **TRUE**[8]:
- ◆ The patient has non-rate controlled atrial fibrillation or uncontrolled rate in any rhythm.
- ◆ In a patient with renal failure if angiographic contrast is needed.
- ◆ In a patient with contrast dye allergy.
- ◆ In pregnant patients.
- ◆ The patient uses metformin.

Site of Service Criteria

Outpatient.

Procedure Codes (HCPCS/CPT)

HCPCS Code	Code Description/Definition
75572	Computed tomography (CT) of heart with contrast material for evaluation of cardiac structure and morphology, including 3-dimensional (3D) image postprocessing, assessment of cardiac function, and evaluation of venous structures
75573	Computed tomography (CT) of heart with contrast material for evaluation of cardiac structure and morphology in congenital heart disease
76380	Limited follow-up computed tomography (CT)

Service: Coronary Computed Tomography Angiography (CCTA)

General Guidelines

- **Units, Frequency, & Duration:** Single instance as guided by medical necessity criteria.
- **Criteria for Subsequent Requests:** For periodic surveillance of coronary artery lesions or new clinical indications.
- **Recommended Clinical Approach:** Coronary computed tomography angiography (CCTA) is a specific anatomic evaluation for coronary artery anatomy and quantifies obstructive coronary lesions. Patients with AV block due to coronary artery disease (CAD) usually have this during an acute coronary event involving the right coronary artery or with exertional ischemia. Therefore, CCTA is rarely used in these circumstances. Otherwise, CCTA is a test that has high sensitivity in the identification of plaques. It also has a high negative predictive value for screening patients at lower to moderate risk of CAD. CCTA is a test that is increasingly performed for screening patients in the outpatient setting for CAD. It can be a complimentary evaluation with stress testing and can serve as an alternative diagnostic tool in equivocal or uninterpretable stress testing results.[1]
- **Exclusions:** Coronary CTA is a distinct procedure from a cardiac CT with or without angiography for global anatomical survey.

Medical Necessity Criteria

Indications

➔ **CCTA** is considered appropriate if **ANY** of the following is **TRUE**:

- The patient has CAD symptoms (chest pain or ischemic equivalent) with an intermediate-high pre-test probability.[3,9]
- The patient is undergoing an intermediate or high-risk surgery **OR** has an intermediate or high clinical risk for surgery, **AND** has ANY of the following[10-11]:
  - Poor (less than 4 METS) or unknown functional capacity
  - Is unable to have either exercise or pharmacologic stress testing
- The patient is undergoing an intermediate or high-risk surgery **OR** has an intermediate or high clinical risk for surgery, **AND** has previous functional or structural CAD testing (e.g., stress test) with abnormal or inconclusive results.

- In a patient with bradycardia or bundle branch block if structural heart disease is suspected yet not confirmed by other diagnostic modalities.[1]
- For evaluation of coronary anatomy in suspected coronary anomalies in young persons

Non-Indications

➔ **CCTA** may not be considered appropriate if **ANY** of the following is **TRUE**:

- The patient has non-rate controlled atrial fibrillation or uncontrolled rate in any rhythm.
- The patient has impaired renal function because angiographic contrast is utilized for the study
- The patient has contrast dye hypersensitivity
- The patient uses metformin.
- In pregnant patients[8]
- Normal coronary angiogram or CCTA with no stenosis or plaque within the last two years.
- Normal stress test (given adequate stress) within the last year.

Site of Service Criteria

Outpatient.

Procedure Codes (HCPCS/CPT)

HCPCS Code	Code Description/Definition
75574	Computed tomographic angiography, heart, coronary arteries and bypass grafts (when present), with contrast material, including 3D image postprocessing (including evaluation of cardiac structure and morphology, assessment of cardiac function, and evaluation of venous structures, if performed.

Service: Fractional Flow Reserve (CT-FFR)

General Guidelines

- **Units, Frequency, & Duration:** Single instance must be ordered in conjunction with coronary computed tomography angiography (CCTA) imaging.
- **Criteria for Subsequent Requests:** For periodic surveillance of coronary artery lesions or new clinical indications.
- **Recommended Clinical Approach:** The use of non-invasive fractional flow reserve (FFR) following a positive CCTA may be considered medically necessary to guide decisions about the use of invasive coronary angiography in patients with intermediate to high risk coronary lesions on imaging.[12-13]
- **Exclusions:** None.

Medical Necessity Criteria

Indications

➔ **FFR***** is considered appropriate if **ANY** of the following is **TRUE**[14]:
- ◆ For functional evaluation of coronary CTA lesions which are 40-90% stenosed in a proximal to a mid coronary segment on CCTA.[9,13]
- ◆ For evaluation of multivessel disease to identify potential culprit lesions causing symptoms.
- ◆ For evaluation of multiple lesions in a single vessel to evaluate physiologic severity.

***FFR can only be requested with a Coronary CTA, or after a recently performed Coronary CTA

Non-Indications

➔ **FFR** is not appropriate if **ANY** of the following is **TRUE**[15]:
- ◆ The patient is not a candidate for revascularization.
- ◆ The patient is post coronary artery bypass surgery.
- ◆ The patient has a metal intracoronary stent in the vessel to be studied.[13]
- ◆ Coronary anatomy that is low risk (less than 40% stenosis).

Site of Service Criteria

Outpatient.

Procedure Codes (HCPCS/CPT)

HCPCS Code	Code Description/Definition
0501T	Non-invasive estimated coronary fractional flow reserve (FFR) derived from coronary computed tomography angiography data using computation fluid dynamics physiologic simulation software analysis of functional data to assess the severity of coronary artery disease.
0502T	Non-invasive estimated coronary fractional flow reserve (FFR) derived from coronary computed tomography angiography data using computation fluid dynamics physiologic simulation software analysis of functional data to assess the severity of coronary artery disease; data preparation and transmission
0503T	Non-invasive estimated coronary fractional flow reserve (FFR) derived from coronary computed tomography angiography data using computation fluid dynamics physiologic simulation software analysis of functional data to assess the severity of coronary artery disease; analysis of fluid dynamics and simulated maximal coronary hyperemia, and generation of estimated FFR model
0504T	Non-invasive estimated coronary fractional flow reserve (FFR) derived from coronary computed tomography angiography data using computation fluid dynamics physiologic simulation software analysis of functional data to assess the severity of coronary artery disease; anatomical data review in comparison with estimated FFR model to reconcile discordant data, interpretation and report
0523T	Intraprocedural coronary fractional flow reserve (FFR) with 3D functional mapping of color-coded FFR values for the coronary tree, derived from coronary angiogram data, for real-time review and interpretation of possible atherosclerotic stenosis(es) intervention (List separately in addition to code for primary procedure)

Service: Magnetic resonance imaging (MRI), Cardiac

General Guidelines

- **Units, Frequency, & Duration:** None.
- **Criteria for Subsequent Requests:** Considerations of additional phase, dynamic sequences, positioning of the patient, and use of markers at the discretion of the protocoling radiologist.
- **Recommended Clinical Approach:** Cardiac MRI is useful in the setting of acquired or congenital structural abnormalities and assessment of anatomic factors which may impact the clinical course and prognosis of AV block. As an adjunct imaging protocol, angiography is also useful in understanding anatomic features, which may impact the strategy for implanting a pacemaker or defibrillator.[1,2] Cardiac MRI with late gadolinium enhancement is beneficial for studying fibrosis within the myocardium, the extent of which can impact the cardiac conduction system. This is useful in patients with a history of cardiac surgery, infiltrative diseases like sarcoidosis or hemochromatosis, lymphoma, or past myocardial infarction.[16]
- **Exclusions:** Exclusions include contraindications of MRI (e.g., retained metal, incompatible width to bore size, claustrophobia), incompatibility with following directions (i.e., breath-hold), and renal insufficiency (eGFR less than 30 mL/min per 1.73 m^2) if gadolinium is requested.

Medical Necessity Criteria

Indications

➔ **MRI** is considered appropriate if **ANY** of the following is **TRUE**[16]:
- ◆ For evaluation of cardiac anatomy in preparation for implantation of a cardiac device.
- ◆ For assessment of structural heart disease (cardiomyopathies, infiltrative disease, ischemic scar, etc.), which may be associated with conduction disease.

Non-Indications

➔ **MRI** is not considered appropriate if **ANY** of the following is **TRUE**[16]:
- ◆ Simultaneous or recent cardiac CT scan for the same indication.
- ◆ Non-compatible implanted devices.
- ◆ Metallic foreign bodies.
- ◆ Possibly claustrophobia.
- ◆ There is a potential for adverse reactions to contrast media.

- If the patient has renal insufficiency (eGFR less than 30 mL/min per 1.73 m^2) and if gadolinium contrast is requested, an MRI/MRA may not be considered appropriate.[8]

Site of Service Criteria

Outpatient.

Procedure Codes (HCPCS/CPT)

HCPCS Code	Code Description/Definition
71550	Magnetic resonance imaging (MRI) of chest without contrast material
71551	Magnetic resonance imaging (MRI) of chest with contrast material
71552	Magnetic resonance imaging (MRI) of chest with contrast material, including noncontrast images and image postprocessing, for evaluation of hilar and mediastinal lymphadenopathy
75557	Cardiac magnetic resonance imaging (MRI) without contrast material, for evaluation of morphology and function
75559	Cardiac magnetic resonance imaging (MRI) with stress imaging, without contrast material, for evaluation of morphology and function
75561	Cardiac magnetic resonance imaging (MRI) without contrast material, followed by contrast material and further sequences, for evaluation of morphology and function
75563	Cardiac magnetic resonance imaging (MRI) with stress imaging, without contrast material, followed by contrast material and further sequences, for evaluation of morphology and function
C9762	Cardiac magnetic resonance imaging for morphology and function, quantification of segmental dysfunction; with strain imaging
C9763	Cardiac magnetic resonance imaging for morphology and function, quantification of segmental dysfunction; with stress imaging
S8042	Mri low field

Service: Magnetic Resonance Angiogram (MRA), Cardiac

General Guidelines

- **Units, Frequency, & Duration:** Single instance as guided by medical necessity criteria.
- **Criteria for Subsequent Requests:** See Cardiac magnetic resonance imaging (MRI).
- **Recommended Clinical Approach:** Cardiac magnetic resonance angiogram (MRA) is an adjunct feature of cardiac MRI. Cardiac MRI is useful in the setting of structural abnormalities and assessment of anatomic factors which may have relevance to the prognosis and/or management of AV block. As an adjunct imaging protocol, angiography is also useful in understanding anatomic features that may impact pacemaker implant strategy.[16]
- **Exclusions:** Cardiac MRA can not be ordered as a standalone study; cardiac MRI with appropriate protocol must be the primary study requested (see previous section).

Medical Necessity Criteria

Indications

➔ **MRA** is considered appropriate if **ANY** of the following is **TRUE**[16] **(***Also see MRI indications***)**:

- For assessment of structural heart disease (cardiomyopathies, infiltrative disease, ischemic scar, etc.), which may be associated with conduction disease
- For evaluation of anatomy critical to cardiac device implantation.

Non-Indications

➔ **MRA** may not be considered appropriate if **ANY** of the following is **TRUE**[16]**:**

- Non-compatible implanted devices.
- Metallic foreign bodies.
- Possibly claustrophobia.
- There is a potential for adverse reactions to contrast media.
- If the patient has renal insufficiency (eGFR less than 30 mL/min per 1.73 m^2) and if gadolinium contrast is requested, an MRI/MRA may not be considered appropriate.

Site of Service Criteria

Outpatient.

Procedure Codes (HCPCS/CPT)

HCPCS Code	Code Description/Definition
71555	Magnetic resonance angiography (MRA) of chest with contrast material
C8909	Mra w/cont, chest
C8910	Mra w/o cont, chest
C8911	Mra w/o fol w/cont, chest

Service: Exercise ECG Stress

General Guidelines

- **Units, Frequency, & Duration:** Single instance when medical criteria are met.
- **Criteria for Subsequent Requests:** None.
- **Recommended Clinical Approach:** In select patients where symptoms suggest inadequate heart rate response during exercise (fatigue, shortness of breath, dizziness, syncope), ECG exercise testing can be helpful as a provocative test to determine if chronotropic incompetence is the cause of symptoms. In addition, for patients who have had documented AV block during routine monitoring, exercise can reveal cardiac conduction response to sympathetic input. These tests should be performed per standard protocols for known exertional workloads.[1,17]
- **Exclusions:** None.

Medical Necessity Criteria

Indications

➔ **Exercise ECG Stress** is considered appropriate if **ANY** of the following is **TRUE**[17]:

- ◆ The patient has exercise-related symptoms suspected to be due to chronotropic incompetence or AV block.
- ◆ Chronotropic incompetence or AV block has not been already demonstrated by other testing like Holter monitoring.

Non-Indications

➔ **Exercise ECG Stress** is not considered appropriate if **ANY** of the following is **TRUE**[17]:

- ◆ Pacing criteria have been met via other, non-exertional testing.

Site of Service Criteria

Outpatient.

Procedure Codes (HCPCS/CPT)

HCPCS Code	Code Description/Definition
93015	Cardiovascular stress test using maximal or submaximal treadmill or bicycle exercise, continuous

	electrocardiographic monitoring, and/or pharmacological stress; with supervision, interpretation and report
93016	Cardiovascular stress test using maximal or submaximal treadmill or bicycle exercise, continuous electrocardiographic monitoring, and/or pharmacological stress; supervision only, without interpretation and report
93017	Cardiovascular stress test using maximal or submaximal treadmill or bicycle exercise, continuous electrocardiographic monitoring, and/or pharmacological stress; tracing only, without interpretation and report
93018	Cardiovascular stress test using maximal or submaximal treadmill or bicycle exercise, continuous electrocardiographic monitoring, and/or pharmacological stress; interpretation and report only

Service: Stress Echocardiogram

General Guidelines

- **Units, Frequency, & Duration:** Single instance when medical criteria are met.
- **Criteria for Subsequent Requests:** None.
- **Recommended Clinical Approach:** An ECG stress test performed for evaluation of chronotropic incompetence can be accompanied by imaging when there are risk factors of reversible ischemia present. Patients with additional comorbidities like hypertension, diabetes, or hyperlipidemia are candidates for stress testing with imaging. More severe conduction abnormalities related to ischemia can be uncovered with exercise; clinical suspicion of these arrhythmias also supports the use of imaging modalities during stress testing. A stress echocardiogram can be accomplished using either exercise or pharmacologic agents (predominantly dobutamine) as the stress mechanism. This test results in no radiation exposure and is typically lower cost than myocardial perfusion imaging single-photon emission computed tomography (MPI-SPECT). Other advantages of stress echo compared to MPI-SPECT include shorter patient time commitment, additional information on cardiac structures (valves, ascending aorta, pericardial space), and the test is less technically demanding than MPI-SPECT.[1,18]
- **Exclusions:** None.

Medical Necessity Criteria

Indications

➔ **Stress echo** is considered appropriate if **ANY** of the following is **TRUE**:
- ◆ The patient has a conduction disease and symptoms or clinical history suggesting an intermediate or high pre-test likelihood of coronary artery disease (CAD).[3-4]
- ◆ There is a clinical suspicion of inducible conduction abnormalities related to ischemia.

Non-Indications

➔ **Stress Echo** may not be considered appropriate if **ANY** of the following is **TRUE**[1,18]:
- ◆ Normal coronary angiogram or CCTA with no stenosis or plaque within the last two years.

- Normal stress test (given adequate stress) within the last year.
- The patient is having a low-risk surgery (e.g., cataract, rotator cuff repair, etc.).
- The patient has a high-priority clinical illness to address before stress testing, such as:
  - Acute coronary syndrome (STEMI, NSTEMI, unstable angina),
  - Acute pericarditis/Myocarditis.
  - Severe aortic stenosis or new severe valvular disease
  - Uncontrolled arrhythmias.
  - Symptomatic heart failure.
  - Known left main coronary artery stenosis.
  - Severe hypertension (greater than 180/100mm Hg).
- Inability to exercise sufficiently or tolerate pharmacologic agents to simulate exercise.

Site of Service Criteria

Outpatient.

Procedure Codes (HCPCS/CPT)

HCPCS Code	Code Description/Definition
93350	Real time transthoracic echocardiography with 2-dimensional (2D) image documentation during rest and cardiovascular stress test using treadmill and pharmacologically induced stress, with interpretation and report
93351	Real time transthoracic echocardiography with 2-dimensional (2D) image documentation during rest and cardiovascular stress test using treadmill, bicycle exercise and pharmacologically induced stress, with interpretation and report, including performance of continuous electrocardiographic monitoring, with physician supervision
C8928	Tte w or w/o fol w/con,stres
C8930	Tte w or w/o contr, cont ecg

Service: Myocardial Perfusion Imaging Single Photon Emission Computed Tomography (MPI-SPECT)

General Guidelines

- **Units, Frequency, & Duration:** None.
- **Criteria for Subsequent Requests:** None.
- **Recommended Clinical Approach:** Myocardial perfusion imaging single-photon emission tomography (MPI-SPECT) can be an option for the evaluation of conduction abnormalities related to ischemia. As high-grade AV block can be uncovered with exercise, clinical suspicion of these arrhythmias also support the use of imaging modalities during stress testing. MPI-SPECT can be performed to both assess heart rate and conduction response to exercise, as well as provide relatively high sensitivity for reversible ischemia.[19]
    - If the patient is unable to exercise or has ECG abnormalities that interfere with an ECG interpretation during exercise, then MPI-SPECT or stress echo should be considered.
    - Limitations of MPI-SPECT include cost and radiation. In addition, interpretation of MPI-SPECT can be affected by attenuation artifacts related to soft tissue overlying the heart or extracardiac radioisotope (e.g., liver or gastrointestinal uptake may be adjacent to the heart).
- **Exclusions:** None.

Medical Necessity Criteria

Indications

➔ **MPI-SPECT** is considered appropriate if **ALL** of the following are **TRUE:**
- There is an intermediate or high pre-test probability of CAD.[3-4]
- There is clinical suspicion for inducible conduction abnormalities related to ischemia.

Non-Indications

➔ **MPI-SPECT** is not considered appropriate if **ANY** of the following is **TRUE**[20-21]:
- Normal coronary angiogram or CCTA with no stenosis or plaque within the last two years.
- Normal stress test (given adequate stress) within the last year..
- The patient is pregnant.
- The patient is having a low-risk surgery (e.g., cataract, rotator cuff repair, etc.)
- Vasodilators (i.e., adenosine, regadenoson, and dipyridamole) are contraindicated in patients with hypotension, sinus node

dysfunction, high-degree atrioventricular (AV) block (in the absence of back up pacemaker capability), and reactive airway disease.

Site of Service Criteria

Outpatient.

Procedure Codes (HCPCS/CPT)

HCPCS Code	Code Description/Definition
78451	Single-photon emission computed tomography (SPECT) myocardial perfusion imaging study with stress
78452	Multiple single-photon emission computed tomography (SPECT) myocardial perfusion imaging studies with stress

Service: Transthoracic Echocardiogram (TTE)

General Guidelines

- **Units, Frequency, & Duration:** Single procedures performed as needed for defined criteria**.**
- **Criteria for Subsequent Requests:** None.
- **Recommended Clinical Approach:** Transthoracic echocardiography (TTE) can be useful for patients with conduction disorders, including various degrees of AV block and new fascicular or bundle branch block when structural heart disease is suspected. In addition, assessments of left ventricular function are more standardized from a transthoracic approach. However, TTE imaging has poor sensitivity for evaluating posterior cardiac structures (e.g., mitral valve abnormalities) and coronary anatomy in adult patients.[19]
- **Exclusions:** None.

Medical Necessity Criteria

Indications

➔ **TTE** is considered appropriate if **ANY** of the following are **TRUE**[19,22]:
- ◆ The patient has any form or degree of conduction disease and clinical evidence of valvular, pericardial, or primary myocardial disease.
- ◆ The patient has AV block with suspicion of reduced ventricular function at an initial or follow-up evaluation.
- ◆ The patient has AV Block with abnormal findings (including chest X-ray, ECG, or physical exam) suggesting structural heart disease.
- ◆ The patient has AV block and a history of a congenital heart disease.
- ◆ The patient has any form of conduction disease and an additional sign or symptom including chest pain, shortness of breath, palpitations, TIA, stroke, or peripheral embolic event.

Non-Indications

➔ **TTE** is not considered appropriate if **ANY** of the following is **TRUE**:
- ◆ Echocardiography has no contraindications. Echocardiography may have limited benefit in patients at the extremes of adult body weight because a thick chest wall (in markedly obese patients) or overcrowded ribs (in severely underweight patients) may limit the penetration of ultrasound waves.[23-24]

Site of Service Criteria

Outpatient.

Procedure Codes (HCPCS/CPT)

HCPCS Code	Code Description/Definition
93303	Complete transthoracic echocardiography for congenital cardiac anomalies
93304	Follow-up transthoracic echocardiography for congenital cardiac anomalies
93306	Real time transthoracic echocardiography with 2-dimensional (2D) image documentation, M-mode recording with spectral Doppler echocardiography, and color flow Doppler echocardiography
93307	Complete real time transthoracic echocardiography with 2-dimensional (2D) image documentation
93308	Follow-up real time transthoracic echocardiography with 2-dimensional (2D) image documentation
C8921	Tte w or w/o fol w/cont, com
C8922	Tte w or w/o fol w/cont, f/u
C8923	2d tte w or w/o fol w/con,co
C8924	2d tte w or w/o fol w/con,fu
C8929	Tte w or wo fol wcon,doppler

Non-Surgical Management

Service: Cardiac Rehabilitation

General Guidelines

- **Units, Frequency, & Duration:** Cardiac rehabilitation is generally appropriate for 36 sessions, 60 minutes each, typically over 12 - 18 weeks. Additional sessions can be requested.[25]
- **Criteria for Subsequent Requests:** Current guidelines do not support the need for repeat cardiac rehabilitation in the absence of a new cardiac event.
- **Recommended Clinical Approach:** Cardiac rehabilitation (CR) is an evidence-based intervention that uses patient education, health behavior modification, and exercise training to improve secondary prevention outcomes and is recognized as an integral component of care for patients with cardiovascular disease.[25-26] Referral to CR is recommended within 12 months after a myocardial infarction (MI), percutaneous coronary intervention, or coronary artery bypass graft surgery or in the setting of stable angina or symptomatic peripheral arterial disease (i.e., intermittent claudication).[25] Referral to CR is also recommended after heart valve surgery or cardiac transplantation, or in the setting of chronic heart failure (NYHA Class I-III) with reduced ejection fraction (HFrEF).[25] The effects of cardiac rehabilitation on mortality, cardiovascular events, hospitalizations, and/or health-related quality of life are less certain in patients with atrial fibrillation, Adult Congenital Heart Disease, and after permanent pacemaker/ICD implantation, but are described as useful by various National and International specialty societies.[27-29]
- **Exclusions:** None.

Medical Necessity Criteria

Indications

➔ **Cardiac Rehabilitation** is considered appropriate if **ANY** of the following are **TRUE** (within a one year period)[28-30]:

- Acute myocardial infarction
- Acute coronary artery syndrome
- Chronic stable angina
- Chronic heart failure (NYHA Class I-III, including with LV assist devices)
- After coronary artery bypass surgery
- After a percutaneous coronary intervention

- After valvular surgery
- Cardiac transplantation
- Symptomatic peripheral arterial disease
- Atrial fibrillation
- Adult Congenital Heart Disease
- After permanent pacemaker/ICD implantation

Non-Indications

➔ **Cardiac Rehabilitation** may not be considered appropriate if **ANY** of the following are present[30]:

- Active unstable angina
- Decompensated cardiac failure
- Active dangerous or complex arrhythmias
- Dissecting aneurysm
- Myocarditis
- Acute pericarditis
- Severe obstruction of the left ventricular outflow tract
- Severe hypertension
- Exertional hypotension or syncope
- Severe orthopedic limitations
- Recent systemic or pulmonary embolus
- Severe or symptomatic aortic stenosis
- Previous cardiac rehabilitation in the absence of a new cardiac event.

Site of Service Criteria

Outpatient.

Procedure Codes (HCPCS/CPT)

HCPCS Code	Code Description/Definition
S9472	Cardiac rehabilitation program, nonphysician provider, per diem
93798	Physician or other qualified healthcare professional services for outpatient cardiac rehabilitation; with continuous ECG monitoring (per session)

Surgical and Interventional Management

Service: Electrophysiology study (EPS)

General Guidelines

- **Units, Frequency, & Duration:** One instance, as indicated by clinical guidelines.
- **Criteria for Subsequent Requests:** None.
- **Recommended Clinical Approach:** There are very specific indications for performing electrophysiology testing for evaluation of manifest high-grade AV block. With a IIb (weak level of evidence) recommendation by AHA/ACC/HRS consensus, there may be consideration of EPS when there is suspicion of conduction disease and non-invasive testing does not reveal the location of the AV block. EPS can help to identify infranodal conduction disease, which is particularly helpful in determining which patients need permanent pacing.[1] While EP studies can be used to formally evaluate AV nodal function, this is usually done as part of a comprehensive EPS for other arrhythmias, especially when symptoms suspicious for ventricular arrhythmias are present.
- **Exclusions:** None.

Medical Necessity Criteria

Indications

➔ **EPS** is considered appropriate if **ANY** of the following is **TRUE**:
- ◆ In a patient with symptoms of significant bradycardia and non-invasive evaluations have been inconclusive, including extended ECG monitoring and stress testing.[1]
- ◆ In a patient with unexplained syncope and all non-invasive evaluations have been inconclusive, including extended ECG monitoring and stress testing.
- ◆ In a patient with bifascicular block and syncope to evaluate for ventricular arrhythmias.[1]

Non-Indications

➔ **EPS** is not considered appropriate if **ANY** of the following is **TRUE**:
- ◆ Symptomatic AV block was correlated with patient symptoms on other outpatient testing.

Site of Service Criteria

Inpatient or outpatient.

Procedure Codes (HCPCS/CPT)

HCPCS Code	Code Description/Definition
93600	Bundle of His recording
93602	Intra-atrial recording
93603	Right ventricular recording
93610	Intra-atrial pacing
93612	Intraventricular pacing
93618	Induction of arrhythmia by electrical pacing
93619	Comprehensive electrophysiologic evaluation with insertion and repositioning of multiple electrode catheters, with right atrial pacing and recording, right ventricular pacing and recording, and His bundle recording
93620	Comprehensive electrophysiologic evaluation with insertion and repositioning of multiple electrode catheters, with attempted induction of arrhythmia, with right atrial pacing and recording, right ventricular pacing and recording, and His bundle recording
93624	Electrophysiologic follow-up study with pacing and recording to test effectiveness of therapy with attempted induction of arrhythmia
93631	Intra-operative epicardial and endocardial pacing and mapping to localize the site of tachycardia or zone of slow conduction for surgical correction

Service: Cardiac Implantable Device

General Guidelines

- **Units, Frequency, & Duration:** One instance, as needed per inclusion criteria.
- **Criteria for Subsequent Requests:** Subsequent requests may be considered for device replacement due to battery end of life (EOL) or elective replacement interval (ERI), replacement after infection, clinical need for different pacing modes, or replacement after manufacturer recall.
- **Recommended Clinical Approach:** In patients with acquired second-degree Mobitz type II atrioventricular block, 3rd degree atrioventricular block, or various forms of infranodal block not caused by reversible or physiologic causes, permanent pacing is recommended regardless of symptoms. In high-grade AV block, ventricular pacing is a minimum requirement and may be ideal for patients with multiple comorbidities and have limited mobility. However, as pacing requirements can increase with time, "pacemaker syndrome," or symptomatic contraction of the atria against closed AV valves, is a risk. Dual-chamber pacing is recommended in these patients to avoid additional procedures and to promote AV synchrony.[1-2]
- **Exclusions:** None.

Medical Necessity Criteria

Indications

➔ **Cardiac implantable device** is considered appropriate if **ANY** of the following is **TRUE**:

- ◆ In patients with acquired 2nd-degree Mobitz II, 3rd degree, or other high-grade AV block on ECG, which is not expected to improve.[1]
- ◆ In a patient with third-degree and advanced second-degree AV block at any anatomic level associated with postoperative AV block that is not expected to resolve after cardiac surgery or transcatheter intervention.[2]
- ◆ In a patient with alternating bundle branch block.[2]
- ◆ In a patient with symptoms associated with 3rd degree or 2nd-degree Mobitz II AV block on ambulatory monitoring.[1,2]
- ◆ When infranodal block is (HV interval greater than 100 msec) found on EP study.

- In patients with genetic syndromes (e.g., Emery-Dreyfuss syndrome, myofibrillar myopathies) known to develop heart block when detection of progressive conduction abnormalities are seen.[31]

Non-Indications

➔ **Cardiac implantable device** is not considered appropriate if **ANY** of the following is **TRUE**[1]:

- In a patient with transient AV block after myocardial infarction or a cardiac procedure that resolves spontaneously.
- Fascicular block without AV block or symptoms.
- Syncope of undetermined etiology or has a diagnosis unrelated to conduction system disease.

Site of Service Criteria

Outpatient or Observation.

Procedure Codes (HCPCS/CPT)

HCPCS Code	Code Description/Definition
33206	Insertion of permanent atrial pacemaker with transvenous electrode
33207	Insertion of permanent ventricular pacemaker with transvenous electrode
33208	Insertion of permanent atrial and ventricular pacemaker with transvenous electrode
33212	Insertion of pacemaker pulse generator with connection to existing single lead
33213	Insertion of pacemaker pulse generator with connection to existing dual leads
33214	Conversion of single chamber implanted pacemaker system to dual chamber system
33216	Insertion of transvenous electrode of permanent pacemaker
33217	Insertion of 2 transvenous electrodes of permanent cardioverter-defibrillator
33221	Insertion of pacemaker pulse generator with existing multiple leads
33224	Transvenous insertion of pacing electrode for left ventricular pacing, with connection to existing pacemaker

33230	Insertion of pacing cardioverter-defibrillator pulse generator with connection to existing dual leads
33231	Insertion of pacing cardioverter-defibrillator pulse generator with connection to existing multiple leads
33270	Insertion of permanent subcutaneous implantable defibrillator system with subcutaneous electrode
33271	Insertion of subcutaneous implantable defibrillator electrode
33273	Repositioning of subcutaneous implantable defibrillator electrode
33274	Transcatheter insertion of permanent leadless right ventricular pacemaker
33275	Transcatheter removal of permanent leadless pacemaker from right ventricle using imaging guidance
0571T	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
0572T	Insertion of substernal implantable defibrillator electrode
0574T	Repositioning of previously implanted substernal implantable defibrillator-pacing electrode
C1721	Aicd, dual chamber
C1722	Aicd, single chamber
C1777	Lead, aicd, endo single coil
C1779	Lead, pmkr, transvenous vdd
C1785	Pmkr, dual, rate-resp
C1786	Pmkr, single, rate-resp
C1882	Aicd, other than sing/dual
C1895	Lead, aicd, endo dual coil
C1898	Lead, pmkr, other than trans
C1899	Lead, pmkr/aicd combination
C1900	Lead, coronary venous
C2619	Pmkr, dual, non rate-resp

C2620	Pmkr, single, non rate-resp
C2621	Pmkr, other than sing/dual
C1896	Lead, aicd, non sing/dual

Surgical Risk Factors

Patient Medical Risk Stratification

Patient Risk Score	Patient Characteristic	Min Range	Max Range	Guidance
1- Very Low Risk	No known medical problems			
2- Low Risk	Hypertension		180/110 mm Hg	
2- Low Risk	Asthma	peak flow >80% of predicted or personal best value		
2- Low Risk	Prior history of alcohol abuse			Screen for liver disease and malnutrition
2- Low Risk	Prior history of tobacco use			
3- Intermediate Risk	Asthma	peak flow <80% of predicted or personal best value		
3- Intermediate Risk	Active alcohol abuse			
3- Intermediate Risk	Age	65	75	
3- Intermediate Risk	History of treated, stable coronary artery disease (CAD)			
3- Intermediate Risk	Stable atrial fibrillation			
3- Intermediate Risk	Diabetes mellitus	HbA1C >7%		
3- Intermediate Risk	Morbid obesity	BMI 30	BMI 40	
3- Intermediate Risk	Anemia	hemoglobin <11 (females), <12 (males)		Workup to identify etiology
3- Intermediate Risk	HIV	CD4 <200 cells/mm3		Get clearance from HIV specialist
3- Intermediate Risk	Rheumatologic disease			Preoperative consultation with rheumatologist re: perioperative medication management
3- Intermediate Risk	Peripheral vascular disease or history of peripheral vascular bypass	ankle-brachial pressure index (ABPI) <0.9		Preoperative consultation with vascular surgeon

3- Intermediate Risk	History of venous thromboembolism (VTE)			
3- Intermediate Risk	Well-controlled obstructive sleep apnea			
3- Intermediate Risk	Malnutrition	transferrin <200 mg/dL albumin <3.5 g/dL prealbumin <22.5 mg/dL total lymphocyte count <1200-1500 cell/mm3 BMI <18		Preoperative consultation with nutritionist
3- Intermediate Risk	Active tobacco Use			Enroll patient in smoking cessation program
3- Intermediate Risk	Known allergy or hypersensitivity to medication needed for procedure			
4- High Risk	Advanced Renal Disease (Creatinine > 2)			
4- High Risk	Diabetes mellitus with complications	HbA1c >8%		
4- High Risk	Age	76	85	
4- High Risk	Oxygen dependent pulmonary disease			
4- High Risk	Sickle cell anemia			
4- High Risk	Obesity	BMI 40		
4- High Risk	Cirrhosis, history of hepatic decompensation or variceal bleeding			
4- High Risk	Impaired cognition; dementia			
4- High Risk	Compensated CHF			
4- High Risk	Cerebrovascular disease			
4- High Risk	Uncontrolled or suspected obstructive sleep apnea (OSA)			
4- High Risk	Renal insufficiency	serum creatinine >1.5 mg/dL or creatinine clearance <100 mL/min		

4- High Risk	Opioid dependence			
5- Very High Risk	Percutaneous Coronary Intervention (PCI) within 1 month			
5- Very High Risk	Cardiovascular: unstable angina, recent myocardial infarction (60 days), uncontrolled atrial fibrillation or other high-grade abnormal rhythm, severe valvular disease, decompensated heart failure			
5- Very High Risk	Primary pulmonary hypertension			Preoperative consultation with pulmonologist warranted
5- Very High Risk	Cirrhosis or severe liver disease, history of hepatic decompensation or variceal bleeding			
5- Very High Risk	Severe frailty, dependence for ADLs, or history of 3 or more falls in last 6 mos			
5- Very High Risk	Obesity		BMI >50	
5- Very High Risk	Age		>85	
5- Very High Risk	History of VTE with CI to anticoagulation, failure of anticoagulation, cessation of anticoagulation therapy secondary to bleeding			Preoperative consultation with hematologist or internist
5- Very High Risk	Renal failure requiring dialysis			
5- Very High Risk	Immunosuppression			
5- Very High Risk	Chronic Pain			

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Clinical Guideline Revision History/Information

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Review History	
March 10, 2022 (V.1)	**Physician author:** Alisa Niksch, MD (Pediatric Cardiologist/ Electrophysiologist), Mary Krebs, MD (Primary Care Physician) **Peer reviewed by:** Carter Newton, MD FACC (Cardiologist), Russell Rotondo, MD FACC (Cardiologist) **Approving Physician:** Russell Rotondo, MD FACC (Cardiologist)
October 21, 2022 (V.2)	**Peer reviewed by:** Ankeet Bhatt, MD (Cardiologist) **Approving Physician:** Russell Rotondo, MD FACC (Cardiologist)