Supraventricular Tachycardia

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: Supraventricular Tachycardia
Type: [**X**] Adult (18+ yo) | [_] Pediatric (0-17yo)

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Care Path Overview

Care Path Clinical Discussion

Supraventricular tachycardia (SVT) is a broad term used to describe a collection of tachycardias (heart rates over 100 BPM at rest), the mechanism of which involves cardiac conduction tissue from the His bundle or above. These SVTs include inappropriate sinus tachycardia, AT (including focal and multifocal AT), junctional tachycardia, AV nodal reentrant tachycardia (AVNRT), and various forms of accessory pathway-mediated reentrant tachycardias. Atrial Fibrillation and Atrial Flutter are not covered in this document. Please see the individual documents related to these diagnoses.

SVT can be due to a reentrant mechanism (an electrical circuit that continually propagates) or an automatic mechanism (via an excitable area of tissue). Reentrant circuits are typically triggered by an ectopic beat and have a sudden onset and offset of tachycardia. Automatic tachycardias have a much slower, "ramp"-like onset and offset. SVT is typically seen in younger patients who have no ischemic heart disease. While some forms of SVT can be triggered by hemodynamic conditions (e.g., valve stenosis, pulmonary hypertension), other forms of SVT are found in structurally abnormal hearts. In either case, an approach to treating the arrhythmia is often still needed, either with medication or an interventional approach.

AV nodal reentrant tachycardia (AVNRT) is a reentrant tachycardia involving two functionally distinct pathways in the area of the AV node, generally referred to as "fast" and "slow" pathways. Most commonly, the fast pathway is located near the apex of Koch's triangle*, and the slow pathway is inferoposterior to the compact AV node tissue. Anatomic mapping makes this type of SVT very amenable to catheter ablation. Variant pathways have been described, allowing for "slow-slow" AVNRT. AVNRT is common in young adults without other cardiac diseases and has a higher frequency in female patients.[1]

Atrioventricular reentrant tachycardia (AVRT) describes a tachycardia that is mediated by an extranodal accessory pathway. Likely the best-known type of AVRT is associated with Wolff-Parkinson-White Syndrome, where evidence of the accessory connection is manifested on the 12 lead ECG in sinus rhythm. However, accessory pathways can be concealed, and their properties and locations can only be found during intracardiac mapping.

A rare reentrant SVT is permanent junctional reciprocating tachycardia (PJRT). PJRT is more commonly seen in younger patients and is known to

cause tachyarrhythmia-induced heart failure. Usually quite resistant to antiarrhythmics, the rhythm is mediated by a slowly conducting retrograde accessory pathway, usually located in the right posterior septal area and amenable to ablation.

A focal atrial tachycardia is a type of SVT arising from a localized atrial site characterized by regular, organized atrial activity with discrete P waves. This is an "automatic" type of tachycardia that is sensitive to sympathetic inputs. At times, variable rates are seen, especially at onset ("warm-up") and termination ("warm-down"). Atrial mapping reveals a focal point of origin.

Multifocal atrial tachycardia (MAT) is defined as a rapid, irregular rhythm with at least three distinct morphologies of P waves on the surface ECG. It may be difficult to distinguish MAT from atrial fibrillation on a single lead ECG. A 12-lead ECG will show an isoelectric interval between P waves. MAT is highly associated with comorbidities such as pulmonary disease, pulmonary hypertension, coronary artery disease (CAD), and valvular heart disease.[1] Rhythm control is quite difficult; calcium channel blockers and beta-are used to slow the rate to prevent symptomatic episodes.

Inappropriate sinus tachycardia is a resting HR generally over 100 BPM or an average HR of at least 24 hours of monitoring greater than 90 BPM. To have this diagnosis, the tachycardia cannot be due to another systemic illness like endocrinopathy or severe anemia, and heart failure from cardiomyopathy must be excluded. It is almost always associated with debilitating fatigue or lightheadedness and is extremely difficult to manage with medication. The most promising medication for this condition is Ivabradine. Ablation is a last resort.

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.

Key Information

- ➢ SVT has a prevalence of 2.29 in 1000 patients. Patients tend to be younger adults with no associated cardiac disease.[1]
- ➢ AVNRT is the most common SVT. It is usually seen in young adults without structural heart disease or ischemic heart disease, and greater than 60% of cases are observed in women.[1]
- ➢ The distribution of symptom presentation of SVT related to WPW Syndrome included documented SVT in 38%, palpitations in 22%, chest pain in 5%, syncope in 4%, AF in 0.4%, and sudden cardiac death (SCD) in 0.2%.[1]
- ➢ Nonsustained focal AT is very common and benign. However, about 10% of patients who have incessant arrhythmia develop reversible cardiomyopathy treatable with successful ablation.[1,2]
- ➢ Catheter ablation is a highly successful procedure (greater than 90%) for AT, AVRT, and AVNRT. These can be done with zero or near zero fluoroscopic exposure given new visualization and mapping techniques.[3]

Definitions

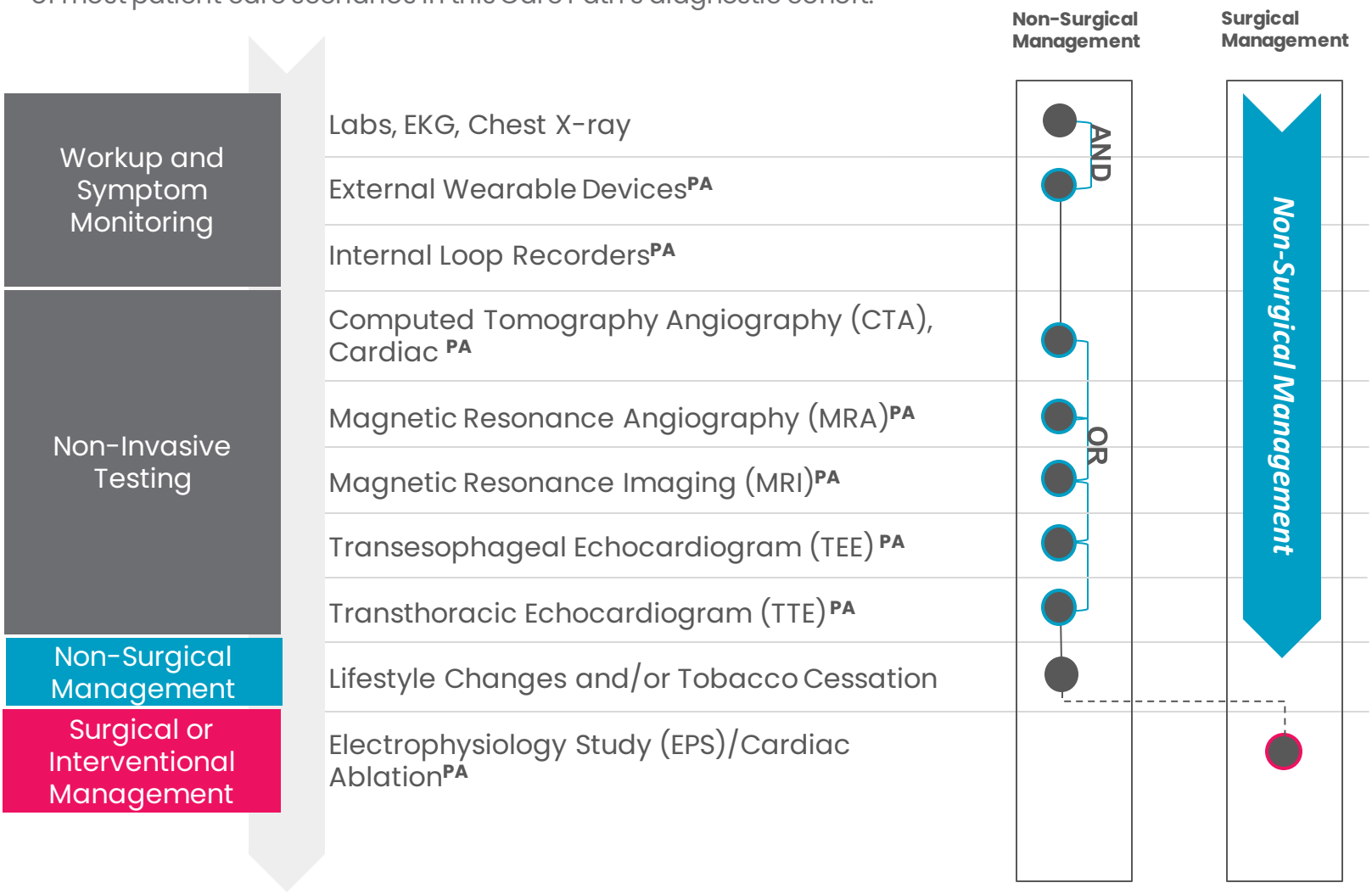
- **Reentrant tachycardia:** A type of rapid cardiac arrhythmia rotating in a circuitous pattern, usually created by the presence of an abnormal electrical connection.
- **Automatic tachycardia:** A type of rapid cardiac arrhythmia caused by an excitable focal area of cardiac tissue.
- **Accessory pathway:** An extra electrical connection outside the AV node, which most commonly connects the atrial and ventricular myocardium. These can also be described as conducting either anterograde (foreword), retrograde (backward), or both.
- **Ventricular Preexcitation:** The ECG appearance in sinus rhythm of a short PR interval and “delta wave” indicating the presence of an accessory pathway able to conduct in an antegrade fashion.
- **Wolff-Parkinson-White (WPW) Syndrome:** The presence of ventricular preexcitation and clinical SVT mediated by the accessory pathway.
- **AV nodal reentrant tachycardia (AVNRT):** A reentrant tachycardia within the AV node involving two functionally distinct pathways, generally referred to as “fast” and “slow” conduction pathways.
- **Atrioventricular reentrant tachycardia (AVRT):** A reentrant tachycardia utilizing an extranodal accessory pathway to generate a circuit around which electrical impulses travel.

- **Ectopic atrial tachycardia:** An automatic tachycardia originating from a focal spot in the atria.
- **Persistent junctional reentrant tachycardia (PJRT):** A rare type of SVT caused by a slowly conducting concealed accessory pathway, usually located at the right-sided posterior septal area.
- ***Koch's Triangle:** defined by the following structures within the right atrium: (1) The ostium of the coronary sinus, posteriorly; (2) the anterior-septal leaflet commissure; and (3) the tendon of Todaro (a tendinous structure connecting the valve of the inferior vena cava ostium to the central fibrous body), posteriorly.

Supraventricular Tachycardia

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, Supraventricular

ICD-10 Codes Associated with Classification

ICD-10 Code	Code Description/Definition
I45.6	Pre-excitation syndrome
I47	Paroxysmal tachycardia
I47.1	Supraventricular tachycardia
I47.9	Paroxysmal tachycardia, unspecified
I49.1	Atrial premature depolarization
I49.2	Junctional premature depolarization
I49.40	Unspecified premature depolarization
I49.49	Other premature depolarization
I49.8	Other specified cardiac arrhythmias
I49.9	Cardiac arrhythmia, unspecified
R00.0	Tachycardia, unspecified
R00.9	Unspecified abnormalities of heart beat
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
Z4502	Encounter for adjustment and management of automatic implantable cardiac defibrillator

Presentation and Etiology

Causes and Risk Factors

The prevalence of SVT in the general population is 2.29 per 1000 people.[4] As previously stated, SVT more commonly occurs in younger patients without a history of other cardiac diseases. 60% of patients with paroxysmal SVT will be diagnosed with AVNRT, and there is a female predominance within that group. The prevalence of "slow pathway" physiology ranges from 10-35%, making the majority of these asymptomatic. These substrates, along with other accessory connections (AVRT, PJRT), are often congenital but may deteriorate in function with time.[5]

Focal atrial tachycardias can originate from unexplained increased automaticity of the electrical properties of atrial cells. However, other factors can contribute to atrial dysfunction and scarring, including:

- Hypertension.
- Heart failure.
- Diabetes.
- Myocarditis.
- Amyloidosis.
- General aging processes.

Multifocal atrial tachycardia is often associated with pulmonary disease and pulmonary hypertension, treatment of the underlying conditions is key in controlling this arrhythmia.

Clinical Presentation

Supraventricular tachycardias most often present with a feeling of palpitations, fluttering, or fullness in the neck.[1] Supraventricular tachycardias that are frequent, rapid, or prolonged can easily cause low blood pressure and reduce perfusion to the body. Symptoms that may be observed include:

- Dizziness.
- Chest discomfort.
- Dyspnea.
- Worsening heart failure.
- Fatigue and exercise intolerance.
- Feelings of anxiety.[1,6,7]
- Syncope

Typical Physical Exam Findings

The focus of the physical examination should evaluate for hemodynamic consequences due to frequent or sustained SVT, including:

- Weak or dampened pulses.
- Sluggish capillary refill.
- Lung crackles or liver congestion suggesting heart failure.
- Peripheral edema.

The cardiac exam should focus on evidence of:

- Evidence of ongoing rhythm disturbances on auscultation.
- Murmurs suggesting structural heart disease.
- Exaggerated or irregular jugular venous pulsation.

Typical Diagnostic Findings

Initial diagnostic workup should begin with a 12-lead ECG. The frequency of any ectopic beats or more sustained arrhythmia should be noted. Morphology of the P waves in any tachycardia suspicious for an atrial tachycardia should be noted. The presence of ventricular preexcitation is important to document. The 12 lead ECG should also be examined for signs of other cardiac pathology, including ischemic changes.[1,8] In certain patients, especially those with multifocal atrial tachycardia, a chest x-ray to evaluate for pulmonary disease is appropriate.

With suspicion of SVT causing recurring and episodic symptoms, extended ambulatory electrocardiographic monitoring is recommended. Implantable loop recorders in the context of SVT are not commonly used. However, they

can be helpful for symptoms that infrequently occur, especially unexplained syncope, when external monitoring does not yield a definitive diagnosis.[1,8]

In certain clinical scenarios, after an exam and assessment of the presenting rhythm, initial interventions may include:

- Removing any medications or other drugs which might contribute to the development of tachyarrhythmias.
- Treatment of underlying systemic conditions (e.g., hyperthyroidism).
- Use of heart rate-controlling medications and possibly antiarrhythmics to control frequent or symptomatic supraventricular rhythms.
- Performing laboratory studies evaluating electrolytes, drug levels, hemoglobin, and thyroid panel to detect conditions that can be corrected (e.g., anemia, dehydration, thyroid disorders, exposure to stimulant drugs).[1]

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

- Transthoracic echocardiography can better assess cardiac function and define anatomic abnormalities which underlie or complicate a supraventricular arrhythmia.
- Cardiac MRI can define structural heart disease and myocardial fibrosis/infiltrative disease, which may inform the risk of future atrial arrhythmias.
- Cardiac CT imaging can be useful for assessing cardiac anatomy and function, especially to visualize those that are pertinent for planning an ablation strategy.
- ECG Stress testing can be useful as a provocative test when symptoms are related to exercise and is used in risk stratification in patients who have asymptomatic ventricular preexcitation.

Almost all forms of SVT are amenable to mapping and catheter ablation. In most forms of SVT, ablation is considered a first-line treatment for these arrhythmias and offers the chance of a definitive cure.[1] Some patients may opt to try medical therapy initially; however, there is no requirement for patients to undergo a trial of medications before undergoing these procedures.

Care Path Services & Medical Necessity Criteria

Workup and Symptom Monitoring

Service: Genetic Testing, CYP2D6

General Guidelines

- **Units, Frequency, & Duration:** None.
- **Criteria for Subsequent Requests:** Complete testing for a specific genetic disease only once unless new capabilities for detecting additional mutations develop.
- **Recommended Clinical Approach:** Cytochrome P450 2D6 (CYP2D6) is a pre-dominant metabolizing enzyme for up to 20% of commonly used drugs, and its human gene displays substantial genetic variability. The genetic variation can cause vast differences in clinical responses to drugs between patients.[9] Cardiovascular drugs such as propafenone, metoprolol, and carvedilol are partially metabolized through this enzyme.[10] However, there is not yet a consensus on which *CYP2D6* variants should be routinely tested for clinical use.[11] The pace of genetic discovery has outstripped the generation of the evidence justifying its clinical adoption.[12]
- **Exclusions:** None.

Medical Necessity Criteria

Indications

➔ **Genetic testing** [CYP2D6 genotyping (Cytochrome P450, family 2, subfamily D, polypeptide 6) (eg, drug metabolism), gene analysis, common variants] is considered appropriate if **ALL** of the following are **TRUE**:

- ◆ The use of the drug propafenone.[10,13]
- ◆ The patient has not had prior genetic testing for the gene.

Non-Indications

➔ **Genetic testing** is not considered appropriate if **ANY** of the following is **TRUE**:

- ◆ Genetic testing for the CYP2D6 gene was already completed.

Site of Service Criteria

Outpatient.

Procedure Codes (HCPCS/CPT)

HCPCS Code	Code Description/Definition
81226	CYP2D6 (cytochrome P450, family 2, subfamily D, polypeptide 6) (eg, drug metabolism), gene analysis, common variants (eg, *2, *3, *4, *5, *6, *9, *10, *17, *19, *29, *35, *41, *1XN, *2XN, *4XN)

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.[14,15]
- **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 sensing.
- **Recommended Clinical Approach:** Non-invasive ambulatory ECG monitoring is first recommended in patients with suspicion of supraventricular tachycardia.[1,6] 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.[15,16]
- **Exclusions:** None.

Medical Necessity Criteria

Indications

➔ **ILR** is considered appropriate if **ALL** of the following are **TRUE**:
- ◆ The patient has **ANY** of the following:[17]
  - Irregular heartbeat.
  - Dizziness.
  - Shortness of breath.
  - Chest discomfort.
  - Syncope.
  - Hemodynamic collapse.
  - Cool or pale extremities.
  - Generalized listless affect or signs of mental confusion.
  - Irregular size or rate of jugular venous pulsations.
  - Palpable liver enlargement.
  - Bibasilar rales on lung auscultation.

        - Physical findings suggestive of structural heart disease (e.g., heart murmurs, displaced PMI).
    - No diagnostic conclusions were achieved with non-invasive monitoring methods, such as an external loop recorder or mobile cardiac telemetry.[18,19]
    - 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**:
    - 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.

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 exclusionary criteria are absent. Non-invasive external cardiac monitoring may be conducted using external wearable devices 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 or brief ongoing episodes of symptoms suspicious for SVT 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.[20,21]
- **Exclusions:** 2 types of monitors cannot be ordered simultaneously.

Medical Necessity Criteria

Indications

➔ **External Wearable Device** is considered appropriate if **ALL** of the following is **TRUE**[22]:

- ◆ The patient experiences symptoms suggestive of SVT once every 21 days.
- ◆ 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**[22]:

- Palpitations are associated with symptoms suggestive of angina or clinically significant coronary artery obstruction, and monitoring would delay other needed testing 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.

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 in the assessment of acquired or congenital cardiac disease. Angiography as an adjunct imaging protocol is also helpful in understanding anatomic features, which may impact the success of accessing various cardiac structures.[23,24,25]
- **Exclusions:** Cardiac CTA for evaluation for cardiac anatomic evaluations may not include other study protocols, e.g., CCTA or 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**[25]:
- ◆ For pre-procedural evaluation of cardiac anatomy when structural heart factors may impact access for mapping and ablation of SVT.

Non-Indications

➔ **Cardiac CTA** may not be considered appropriate if **ANY** of the following is **TRUE**[25]:
- The patient has non-rate controlled atrial fibrillation.
- The patient has contrast dye hypersensitivity.
- In pregnant patients.
- The patient has impaired renal function because angiographic contrast is utilized for the study.
- 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: 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 management of SVT, including areas of focus for an ablation procedure.[26] As an adjunct imaging protocol, angiography is also useful in understanding anatomic features. Cardiac MRI with late gadolinium enhancement is beneficial for studying fibrosis within the myocardium, the extent of which can impact the cardiac conduction system.[27] This is useful in patients with a history of cardiac surgery, infiltrative diseases like sarcoidosis or hemochromatosis, lymphoma, or past myocardial infarction.
- **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 contrast is requested.

Medical Necessity Criteria

Indications

➔ **MRI** is considered appropriate if **ALL** of the following are **TRUE**[28,29]:
- ◆ For evaluation of cardiac anatomy, which may impact the strategy for catheter ablation.
- ◆ For evaluation of suspected cardiac anomalies relevant to atrial arrhythmias not well seen by echocardiography.

Non-Indications

➔ **MRI** may not be considered appropriate if **ANY** of the following is **TRUE**[29]:
- ◆ Simultaneous or recent cardiac CT scan for the same indication.
- ◆ Non-compatible implanted devices.
- ◆ Metallic intraocular foreign bodies.
- ◆ There is a potential for adverse reactions to contrast media.
- ◆ Claustrophobia.

- 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
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,[30] which may have relevance to the prognosis or management of supraventricular tachycardia (SVT). As an adjunct imaging protocol, angiography is also useful in understanding anatomic features that may impact catheter ablation strategy.
- **Exclusions:** Cardiac MRA can not be ordered as a standalone study; cardiac MRI with appropriate protocol must be the primary study requested (see next section).

Medical Necessity Criteria

Indications

➔ **MRA** is considered appropriate if **ANY** of the following is **TRUE**[28,29] **(***Also see MRI indications***)**:

- ◆ For evaluation of cardiac anatomy, which may impact the planning of a catheter ablation procedure.
- ◆ For evaluation of suspected cardiac anomalies relevant to atrial arrhythmias not seen by echocardiography.

Non-Indications

➔ **MRA** may not be considered appropriate if **ANY** of the following is **TRUE**[30,31]:

- ◆ When a cardiac CT is requested for the same indication.
- ◆ Non-compatible implanted devices.
- ◆ Metallic intraocular foreign bodies.
- ◆ There is a potential for adverse reactions to contrast media.
- ◆ Claustrophobia.
- ◆ 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: Transesophageal Echocardiogram (TEE)

General Guidelines

- **Units, Frequency, & Duration:** Single procedures performed as needed for defined criteria.
- **Criteria for Subsequent Requests:** Based on subsequent events as described in medical necessity criteria.
- **Recommended Clinical Approach[32]:** Transesophageal echocardiography is utilized for a more comprehensive evaluation of the presence of intracardiac thrombus in the setting of prolonged episodes of atrial fibrillation or episodes of undefined duration. Its superior visualization of the left atrial appendage compared to transthoracic echo imaging is used to assess the safety of both outpatient elective cardioversions and acute inpatient cardioversions of atrial fibrillation. TEE is also useful in evaluating other heart structures, including better imaging of mitral valve function and the atrial septum, both of which can have clinical significance for a patient with SVT substrate on the left side of the atrial septum. This imaging is usually performed by a dedicated cardiac sonographer and a trained cardiologist.
- **Exclusions:** None.

Medical Necessity Criteria

Indications

➔ **TEE** is considered appropriate if **ANY** of the following conditions is **TRUE**[32]:

- ◆ For better visualization of cardiac structures, which may hemodynamically contribute to atrial arrhythmias.
- ◆ For visualization of the atrial septum during transseptal puncture during ablation of left-sided arrhythmia substrate.

Non-Indications

➔ **TEE** may not be considered appropriate if **ANY** of the following is **TRUE**[32]:

- ◆ Another imaging modality (e.g., CT, MRI) is requested simultaneously to evaluate for intracardiac thrombus.
- ◆ The patient has a history of esophageal stricture, malignancy, recent surgery of the esophagus, active GI bleeding, esophageal varices (relative), or prior surgery (relative).
- ◆ The patient has a suspected atrioesophageal fistula following atrial fibrillation ablation.
- ◆ The patient has a history of undiagnosed dysphagia.

Site of Service Criteria

Inpatient, outpatient, or observation status apply.

Procedure Codes (HCPCS/CPT)

HCPCS Code	Code Description/Definition
93312	Real time transesophageal echocardiography with 2-dimensional (2D) image documentation, M-mode recording, probe placement, image acquisition, interpretation, and report
93313	Real time transesophageal echocardiography with 2-dimensional (2D) image documentation and placement of transesophageal probe only
93314	Interpretation and report only of real time transesophageal echocardiography with 2-dimensional (2D) image documentation and image acquisition
93315	Transesophageal echocardiography (TEE) with probe placement, image acquisition, interpretation, and report
93316	Transesophageal echocardiography (TEE) for placement of transesophageal probe only
93317	Interpretation and report only of transesophageal echocardiography (TEE) with image acquisition
93318	Real time transesophageal echocardiography (TEE) with probe placement, 2-dimensional (2D) image acquisition and interpretation
93355	Transesophageal echocardiography (TEE) for guidance of transcatheter closure of left atrial appendage, with quantitative measurements, probe manipulation, interpretation and report
C8925	2d tee w or w/o fol w/con,in
C8926	Tee w or w/o fol w/cont,cong
C8927	Tee w or w/o fol w/cont, mon

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.[33]
- **Exclusions:** None.

Medical Necessity Criteria

Indications

➔ **TTE** is considered appropriate if **ANY** of the following is **TRUE**[33]:
- ◆ For standard evaluation after any initial documented episode of SVT.
- ◆ For evaluations of cardiac structure and function to exclude arrhythmia-induced cardiomyopathy.

Non-Indications

➔ **TTE** is not considered appropriate if **ALL** 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.[33-35]

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

Surgical or Interventional Management

Service: Electrophysiology Study (EPS)/Cardiac Ablation

General Guidelines

- **Units, Frequency, & Duration:** Single event, no applicable frequency.
- **Criteria for Subsequent Requests:** Unsuccessful initial procedure or recurrence of arrhythmia.
- **Recommended Clinical Approach[36]:** Catheter ablation is an acceptable first-line therapy for the treatment of SVT. Catheter ablation can be used before any medication because of its high success and low complication rate. Arrhythmia substrate can be approached using radiofrequency or cryothermal energy, depending on location. Cryoablation has dramatically reduced the probability of inadvertent AV block during ablation procedures.[37]
- **Exclusions:** None.

Medical Necessity Criteria

Indications

➔ **Cardiac Electrophysiology Study/Ablation** is considered appropriate if **ANY** of the following is **TRUE**:
- ◆ Symptomatic or sustained SVT
- ◆ WPW pattern and syncope[37]
- ◆ After any episode of pre-excited atrial fibrillation[36]
- ◆ A focal atrial tachycardia which is the likely etiology of new cardiomyopathy
- ◆ For evaluation of asymptomatic patients with ventricular preexcitation pattern to determine **ANY** of the following:
  - Inducibility of AVRT
  - Rapidity of antegrade conduction as a risk factor for sudden cardiac arrest
- ◆ For the presence of manifest ventricular preexcitation which would interfere with certain types of employment (e.g., pilots, military service)[37]

Non-Indications

➔ **Cardiac Electrophysiology Study/Ablation** is not considered appropriate if **ANY** of the following is **TRUE:**
- ◆ Nonsustained, asymptomatic supraventricular tachycardia

Site of Service Criteria

Outpatient or observation status.

Procedure Codes (HCPCS/CPT)

HCPCS Code	Code Description/Definition
93631	Intra-operative epicardial and endocardial pacing and mapping to localize the site of tachycardia or zone of slow conduction for surgical correction
93653	Comprehensive electrophysiologic evaluation with insertion and repositioning of multiple electrode catheters, with attempted induction of arrhythmia, with right atrial pacing and recording, with treatment of supraventricular tachycardia by ablation
+93655	Intracardiac catheter ablation of a discrete mechanism of arrhythmia which is distinct from the primary ablated mechanism, including repeat diagnostic maneuvers, to treat a spontaneous or induced arrhythmia
+93662	Intracardiac echocardiography during therapeutic/diagnostic intervention, including imaging supervision and interpretation
+93462	Left heart catheterization by transseptal puncture through intact septum or by transapical puncture

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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October 25, 2022 (V.2)	**Peer reviewed by:** Ania Garlitski, MD (Cardiologist) **Approving Physician:** Russell Rotondo, MD FACC (Cardiologist)