Atrial Flutter

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

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Care Path Overview

Care Path Clinical Discussion

Atrial flutter is a tachyarrhythmia that originates from the heart's upper chambers, making it a subtype of supraventricular tachycardia. It is an arrhythmia associated with many of the same risk factors as atrial fibrillation. Many times it is associated with comorbidities like hypertension, pulmonary disease, and hyperthyroidism. It is also common in patients with a history of cardiac surgery and scarring in the atria, creating a more complex substrate. However, it can also occur in otherwise healthy young people with no identifiable cause, and atrial flutter has even been associated with participation in endurance sports. Atrial flutter is also associated with a significant risk of thromboembolism; a study of non-anticoagulated patients evaluated at the time of catheter ablation revealed an incidence of thromboembolic events of 13.9%.[1]

Atrial flutter is caused by an organized, fast electrical circuit, most commonly located in the right atrium. This electrical activity from the atria conducts down to the ventricles in usually a 2:1 or 3:1 ratio, which creates the tachycardia. The heart rate of patients in atrial flutter typically ranges between 120-150 bpm; however, more rapid conduction can cause extreme tachycardia and cardiovascular instability requiring emergency treatment.[2] Atrial flutter can be rapidly identified on a 12-lead ECG; typical atrial flutter has a characteristic “sawtooth wave” appearance, best seen in the frontal leads.

As opposed to atrial fibrillation, atrial flutter is usually a paroxysmal arrhythmia. However, the circuit can be sustained for a prolonged period and can create tachycardia-induced cardiomyopathy, which is reversible with appropriate rhythm control. It is also common for atrial flutter to coexist with atrial fibrillation, and those patients presenting with atrial flutter should also be screened for atrial fibrillation. In a follow-up study of patients who initially presented with atrial flutter, 50% of this cohort ultimately developed atrial fibrillation.[3] Atrial flutter has about a third of the risk of thromboembolism compared to atrial fibrillation, but there is a well-documented phenomenon of stasis and myocardial “stunning” following cardioversion.[4] There is still a significant role of anticoagulants in the management of atrial flutter.

Treatment of atrial flutter centers around two main goals-alleviating symptoms and preventing thromboembolism. Rate control is the first priority for patients presenting with symptomatic atrial flutter. Initiation of intravenous (IV) AV nodal blocking agents, such as digoxin, beta-blockers, and calcium

channel blockers, are widely available but often fail to control ventricular rate adequately. Class IA and IC antiarrhythmic agents have also not proven to be consistently effective at medically terminating atrial flutter.[5,6] Better success at the conversion of atrial flutter has been seen with pure Class III drugs like ibutilide or dofetilide.

Electrical cardioversion is extremely successful in terminating episodes of atrial flutter. Like atrial fibrillation, anticoagulation should be initiated before cardioversion. If the duration of the atrial flutter is 48 hours or longer or the onset is undefined, expert consensus also recommends 3-4 weeks of therapeutic anticoagulation with adequate rate control before cardioversion.[1,7,8] Post-cardioversion, patients at low risk for thromboembolism should continue anticoagulation therapy for another 4 weeks; high-risk patients should be anticoagulated indefinitely. This procedure is also applicable to patients who can be pace terminated via overdrive pacing through a dual-chamber pacemaker.[9]

Catheter ablation is a favorable long-term therapeutic option as atrial flutter is often refractory to chronic medication administration. Typical atrial flutter usually has a very predictable anatomic location; however, atypical substrate, often scar-mediated, can have extremely variable locations within the atria and will require more detailed evaluation, including advanced imaging (CCTA, MRI/MRA) if involving complex anatomy.[10] Ablation of typical atrial flutter meeting known endpoints has a greater than 90% success rate. There are many cases of atrial fibrillation where empiric ablation of typical atrial flutter substrate is performed, as these arrhythmias often coexist.[11,12]

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

- ➢ Patients with atrial flutter typically present with regular tachycardia; this rhythm can cause varied symptoms but can develop severe complications, including heart failure, hemodynamic instability, thromboembolic stroke, or myocardial ischemia.
- ➢ Atrial flutter is more common in male patients and is associated with the development of atrial fibrillation in 50% of patients.
- ➢ Atrial flutter can be confirmed with 12-lead electrocardiography. Longer-term monitoring may be warranted if atrial fibrillation is suspected of contributing to patient symptoms.
- ➢ Acute treatment of atrial flutter focuses on rate control and prevention of thromboembolism. The use of antiarrhythmics and anticoagulants stabilizes patients in advance of electrical (or paced) cardioversion.
- ➢ Long-term rhythm control with medication is often unsuccessful. Catheter ablation is quite effective in treating typical atrial flutter. Flutter circuits originating in other areas of the atria may carry more complexity, especially in the setting of scar-mediated or incisional tachycardias.

Definitions

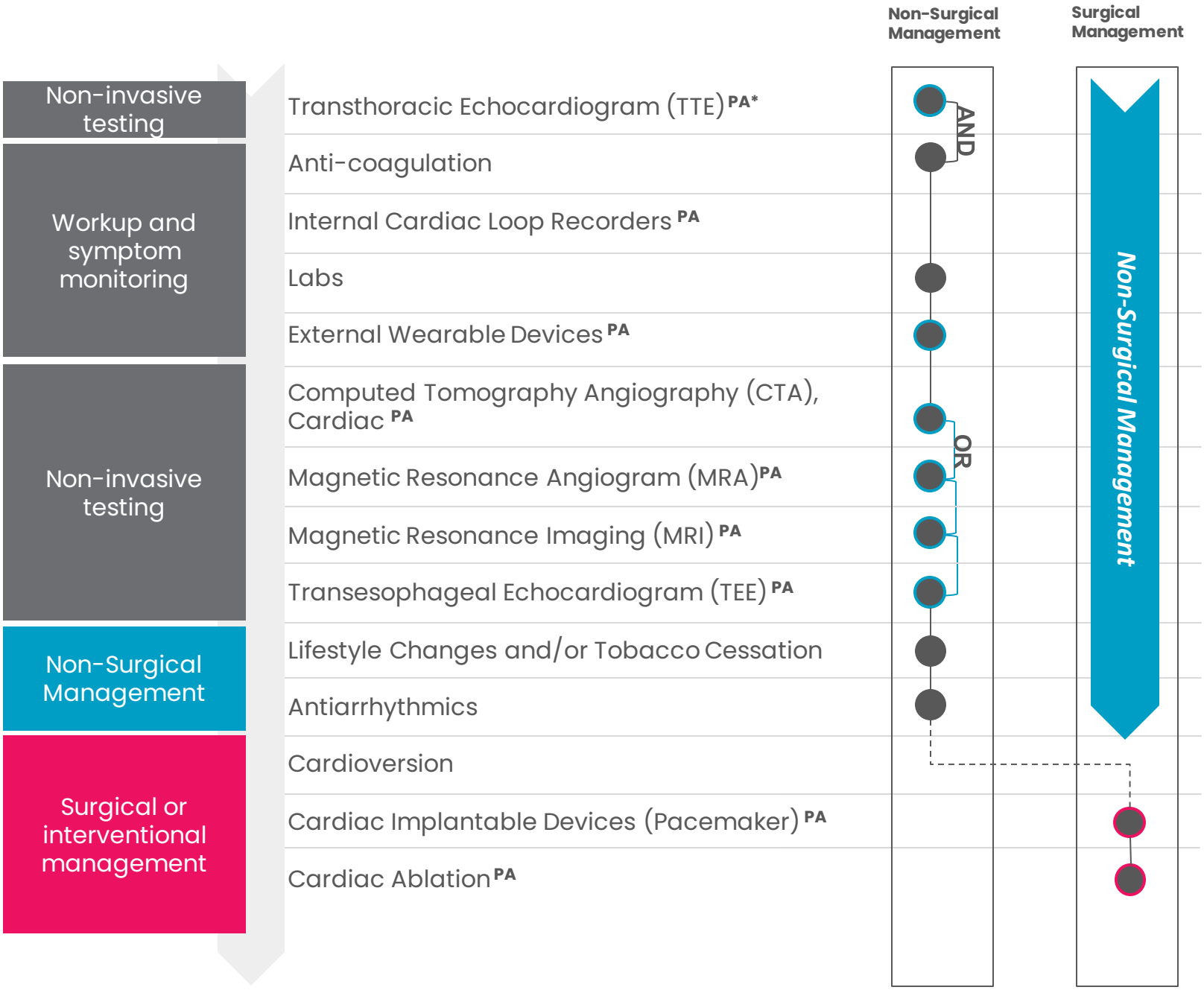
- **Typical Atrial Flutter:** A tachyarrhythmia caused by a macroreentrant electrical circuit rotating around the tricuspid annulus, usually in a counterclockwise fashion (less commonly in a clockwise direction, called "reverse" typical atrial flutter). The typical appearance of typical atrial flutter is a "sawtooth wave" seen on the 12 lead ECG.[11]
- **Scar-Mediated Atrial Flutter:** A tachyarrhythmia caused by a macroreentrant electrical circuit rotating around an area of scar or fibrosis in the atria, often caused by prior cardiac surgery or post atrial fibrillation ablation. These areas can be located in either right or left atria and may involve several sites.
- **CHA_2DS_2-VASc Score:** A composite score of clinical factors to predict future stroke risk in patients with nonvalvular atrial fibrillation. Points are assigned for the presence of comorbidities like **C**ongestive Heart Failure (+1), **H**ypertension (+1), **A**ge greater than or equal to 75y (+2), **D**iabetes (+1), **S**troke history, TIA, or thromboembolism (+2), **V**ascular disease, e.g., prior MI, PVD, aortic plaque (+1), **A**ge 65-74y, and **S**ex **c**ategory (Female +1). This scoring system is likely more specific for identifying patients at low risk for stroke. A score of 0-1 is considered low risk, with

about a 1.3% estimated annual risk of stroke. Each point over this threshold increases an individual's annual risk for stroke, up to a maximum score of 9, which carries an annual risk of stroke of 15.2%

- **Warfarin**: A traditional oral anticoagulant taken daily which inactivates an enzyme that allows vitamin K to be used in the body, thus preventing the synthesis of several clotting factors (II, VII, IX, X). Due to many factors that impact metabolism, patients taking this drug need regular measurements of coagulation function, including prothrombin time (PT) and international normalized ratio (INR).
- **Direct Oral Anticoagulants (DOACs)**: This is a newer class of oral anticoagulant drugs including apixaban (Eliquis®), betrixaban (BevyxXa®), dabigatran (Pradaxa®), edoxaban (Savaysa®) and rivaroxaban (Xarelto®). Dabigatran is a direct thrombin inhibitor; rivaroxiban, apixiban, and edoxaban are factor Xa inhibitors. Because of their more targeted action, these medications have demonstrated reduced bleeding risks compared to warfarin and do not require blood testing for clinical monitoring.

Atrial Flutter

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, Atrial Flutter

ICD-10 Codes Associated with Classification

ICD-10 Code	Code Description/Definition
I48	Atrial fibrillation and flutter
I48.3	Typical atrial flutter
I48.4	Atypical atrial flutter
I48.9	Unspecified atrial fibrillation and atrial flutter
I48.91	Unspecified atrial fibrillation
I48.92	Unspecified atrial flutter
I49.8	Other specified cardiac arrhythmias
I51.3	Intracardiac thrombosis, not elsewhere classified
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
T82598A	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

Atrial flutter is caused by a macroreentrant electrical circuit, usually in the right atrium, which can cause sustained tachyarrhythmia. It is associated with comorbidities like:

- Hypertension
- Obstructive sleep apnea
- Pulmonary diseases like emphysema
- Pulmonary embolism
- Hyperthyroidism
- History of cardiac surgery or atrial fibrillation ablation and scarring in the atria
- It can also occur in otherwise healthy young people with no identifiable cause, and atrial flutter has even been associated with participation in endurance sports.

Clinical Presentation

- Palpitations
- Chest discomfort
- Dizziness
- Shortness of breath
- Syncope
- Fatigue

As with other suspected arrhythmias, patients should be evaluated by taking a detailed history. This should include:

- Duration and frequency of their symptoms.
- History of arrhythmias.
- History of cardiac or pulmonary disease.
- History of cardiac surgeries or procedures.
- History of sleep disorders.
- Medications.
- History of stimulant drugs or alcohol intake.

The diagnosis of atrial flutter is often very clear from a 12-lead ECG. Typical atrial flutter, caused by a macroreentrant circuit in the right atrium rotating counterclockwise around the tricuspid annulus, is characterized by a

"sawtooth wave" pattern best seen in the frontal leads. Atypical or scar-mediated atrial flutter may have atrial activity on ECG, which is much more subtle and usually occurs at a lower rate. There is a high incidence of seeing both atrial flutter and atrial fibrillation on longer-term monitoring evaluations (e.g., Holter, event, continuous telemetry monitors).

Typical Physical Exam Findings

The physical examination should focus on vital signs and physical findings of any complications of atrial flutter, as well as comorbid conditions. Patients currently in atrial flutter are usually:

- Tachycardic with a regular pulse.
- Heart rate typically between 120-150 but can be higher depending on the patient's age and mechanism of the flutter circuit.
- Rhythm can be irregular if there is variable atrioventricular conduction.

Other associated exam findings might be observed:

- Findings of thyroid disease:
    - Exophthalmos.
    - Thyromegaly.
- Carotid artery bruits, which may suggest peripheral arterial disease and increase the likelihood of coronary artery disease (CAD) and cerebrovascular disease.
- Congestive heart failure, including rales or pleural effusion.
- Jugular venous distension.

A thorough cardiac examination is crucial for patients with atrial flutter. Careful auscultation is necessary to evaluate for murmurs indicating valve disease and evidence of heart failure. A displaced point of maximal impulse could indicate ventricular enlargement. A prominent P2 suggests pulmonary hypertension. As normal atrial contraction is lost during atrial flutter, there will never be an S4 heart sound present during atrial flutter. This heart sound is produced when atrial contraction forces blood into a non-compliant left ventricle.

The presence of ascites or hepatomegaly may indicate right ventricular failure or liver disease. Examination of the lower extremities may reveal cyanosis, clubbing, or edema due to chronic pulmonary or cardiac disease. The neurologic exam should evaluate for signs of a transient ischemic attack or cerebrovascular accident. Increased deep tendon reflexes suggest hyperthyroidism.[13]

Typical Diagnostic Findings

Suspected atrial flutter can be assessed with the following testing:

- 12-lead electrocardiography
- Initial blood tests (e.g., thyroid panel, brain natriuretic peptide)
- Transthoracic echocardiography to evaluate cardiac structure and function[14]
- Holter or extended ambulatory ECG monitoring
- Chest x-ray to evaluate for pulmonary disease
- Transesophageal echocardiography in cases where an atrial flutter event is considered high risk for intracardiac thrombus and cardioversion is indicated [3,4]
- Cardiac Computed Tomography (CT)
- Cardiac Magnetic Resonance Imaging/Magnetic Resonance Angiography.

Additional testing may be necessary depending on the patient's history and risk factors for coronary artery disease (CAD):

- Stress echocardiography.
- Nuclear perfusion imaging.
- Coronary computed tomography angiography (CCTA).
- Cardiac catheterization.

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.[16] Cardiovascular drugs such as propafenone, metoprolol, and carvedilol are partially metabolized through this enzyme. However, there is not yet a consensus on which *CYP2D6* variants should be routinely tested for clinical use. The pace of genetic discovery has outstripped the generation of the evidence justifying its clinical adoption.[17]
- **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.[18]
- ◆ 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 (cardiology arrhythmia specialist) or trained cardiologist for the implant of an internal loop recorder (ILR) can be indicated. A single outpatient procedure is anticipated. The implant duration can be up to four 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 which requires removal of the initial device, or incorrect placement resulting in poor R-wave sensing.
- **Recommended Clinical Approach:** Noninvasive ambulatory ECG monitoring is recommended in patients with risk factors for atrial flutter with or without atrial fibrillation before this intervention. Identification of atrial flutter as an arrhythmic diagnosis should render an ILR unnecessary. However, in the setting of new or unusual symptoms which do not correspond to known clinical patterns may lead a physician to recommend an ILR for their patient.[8,19] A cardiac electrophysiologist or trained cardiologist performs this procedure, and referral to a center that supports this service is required.
- **Exclusions:** None.

Medical Necessity Criteria

Indications

➔ **Internal Cardiac Loop Recorder** is considered appropriate if **ALL** of the following are **TRUE**[20-22]:

- ◆ The patient has an existing diagnosis of atrial flutter, the use of ILRs should not be needed if symptoms correlate with the existing diagnosis. However, if new symptoms emerge that are not consistent with atrial flutter and noninvasive monitoring fails to identify the cause, an ILR would be appropriate.

Non-Indications

➔ **Internal Cardiac Loop Recorder** is not considered appropriate if **ANY** of the following is **TRUE**[21]:

- The patient has a confirmed diagnosis of atrial flutter identified on noninvasive monitoring.
- The patient has an existing implanted cardiac device that can provide similar clinical information.
- 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 exclusionary criteria are absent, noninvasive external cardiac monitoring may be conducted using external wearable devices for 24 hours to 30 days, depending on symptom frequency.
- **Criteria for Subsequent Requests:** Subsequent requests may be considered for device malfunction, high burden of poor quality data/artifact, or inability to capture a recording of patient symptoms. The latter would be pertinent if the initial monitor chosen were of shorter duration or solely dependent on patient-activated data.
- **Recommended Clinical Approach:** In the setting of atrial flutter, the most appropriate external wearable monitor should be selected based on patient symptom frequency and suspected duration of the episodes. Monitoring can be useful for detecting asymptomatic atrial flutter events and for measuring the efficacy of medical therapy. Daily symptoms or brief ongoing episodes of atrial flutter may be addressable with a 24-48 hour Holter monitor. Less frequent or asymptomatic 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 the patient's ability to trigger a device effectively may also guide device selection in favor of those with more passive event recording capability.[23,24]
- **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**[25,26]:

- ◆ The patient has atrial flutter needing evaluation of associated rhythm abnormalities (e.g., sinus node dysfunction, atrial fibrillation)
- ◆ The frequency of atrial flutter should be reasonably expected to have a frequency of at least once every 21 days.
- ◆ In a patient with atrial flutter on antiarrhythmic treatment to evaluate for drug efficacy.
- ◆ The patient has suspicion of recurrence of atrial flutter after an initial ablation procedure.

- 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**:

- Palpitations are associated with symptoms suggestive of angina or clinically significant coronary artery obstruction, and monitoring would delay other needed testing or intervention.[27]
- The patient has an implantable cardiac device capable of acquiring clinical data of a similar or equivalent quality to an external cardiac monitor.
- The patient presents with atrial flutter with a rapid ventricular response and requires acute treatment for rhythm control and anticoagulation.

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 scanning has a limited role in the management of atrial flutter alone. Cardiac CTA is useful in the setting of structural abnormalities and assessment of acquired or congenital anatomic factors which may impact ablation strategy. As an adjunct imaging protocol, angiography is also useful in understanding anatomic features that may impact the success of atrial flutter ablation[28]. CTA is often not feasible in contrast dye allergy, renal failure, or arrhythmias with uncontrolled or irregular rates. When atrial fibrillation is also a component of the clinical arrhythmias identified, please also refer to the "Atrial Fibrillation" guidance document.
- **Exclusions:** Cardiac CT for evaluation for cardiac anatomy may not include other study protocols (e.g., calcium scoring or coronary CT angiography (CCTA)), which may require a different diagnostic indication.

Medical Necessity Criteria

Indications

➔ **Cardiac CTA** is considered appropriate if **ALL** of the following are **TRUE**:
- ◆ For pre-procedural evaluation of cardiac anatomy for suspected incisional or scar-mediated reentrant circuits.[2,15,28]

Non-Indications

➔ **Cardiac CTA** may not be considered appropriate if **ANY** of the following are **TRUE**[28]:
- ◆ If an MRI/MRA has been ordered for the same indications within three months of a CTA/CCTA request.
- ◆ 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

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. Post-ablation MRI may be requested for medically necessary indications even when a pre-ablation study has been performed.
- **Recommended Clinical Approach:** Cardiac MRI has a limited role in the management of atrial flutter alone. Cardiac MRI is useful in the setting of acquired or congenital structural abnormalities and assessment of anatomic factors which may impact ablation strategy.[29,30] As an adjunct imaging protocol, angiography is also useful in understanding anatomic features that may impact the success of atrial flutter ablation. Cardiac MRI can also be used to assess the depth and quality of ablation lesions post atrial flutter ablation and can identify gaps in the ablation lines, which can allow tachycardia recurrence. MRI/MRA is often not feasible with non-compatible implanted devices, metallic foreign bodies, or severe claustrophobia.[31,32](***When atrial fibrillation is also a component of the clinical arrhythmias identified, please refer to the "Atrial Fibrillation" guidance document.)
- **Exclusions:** Indications for cardiac MRI for atrial fibrillation treatment strategy should be distinct from other cardiac anatomic or myocardial disease indications. 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 **ALL** of the following are **TRUE** [2,15,33-35]:
- ◆ For pre-procedural evaluation of cardiac anatomy for suspected incisional or scar-mediated reentrant circuits
- ◆ For assessment of cardiac ablation lesion integrity and continuity in case of recurrence of atrial flutter.

Non-Indications

➔ **MRI** may not be considered appropriate if **ANY** of the following is **TRUE**:[31,36]

- When a cardiac CTA is requested for the same indications within three months of an MRI/MRA request.
- Non-compatible implanted devices.
- Metallic foreign bodies.
- There is a potential for adverse reactions to contrast media.
- The patient has significant 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 non-contrast 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:** Post-ablation MRI may be requested for medically necessary indications even when a pre-ablation study has been performed.
- **Recommended Clinical Approach:** Cardiac MRI/MRA has a limited role in managing atrial flutter alone. Cardiac MRI is useful in the setting of structural abnormalities and assessment of anatomic factors which may impact ablation strategy. As an adjunct imaging protocol, angiography is also useful in understanding anatomic features that may impact the success of atrial flutter ablation.[35] MRI/MRA is often not feasible with non-compatible implanted devices, metallic foreign bodies, or severe claustrophobia.
- **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 are **TRUE (Also see MRI indications)**[31,32]:

- ◆ For pre-procedural evaluation of cardiac anatomy for suspected incisional or scar mediated reentrant circuits.

Non-Indications

➔ **MRA** may not be considered appropriate if **ANY** of the following is **TRUE**[31,36]:

- ◆ When a cardiac CTA has been ordered for the same indications within the last three months of an MRI/MRA request.
- ◆ Non-compatible implanted devices.
- ◆ Metallic intraocular foreign bodies.
- ◆ There is a potential for adverse reactions to contrast media.
- ◆ The patient has significant 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, and 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:** Transesophageal echocardiography is utilized for a more comprehensive evaluation of the presence of intracardiac thrombus in the setting of prolonged episodes of atrial flutter or episodes of undefined duration. Though atrial fibrillation is more tightly associated with left atrial appendage thrombus, the incidence of this complication in the setting of persistent atrial flutter is around 6%. Because of its superior visualization of the left atrial appendage compared to transthoracic echo imaging, it is used to assess the safety of both outpatient elective cardioversions and acute inpatient cardioversions. TEE is also useful in evaluating other heart structures, including better imaging of mitral valve function and the atrial septum.
- **Exclusions:** None.

Medical Necessity Criteria

Indications

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

- ◆ A patient with persistent atrial flutter with a duration of 48 hours or longer and a CHA_2DS_2-VASc score greater than 1 presenting for planned cardioversion.
- ◆ The patient is presenting with atrial flutter with any history of left atrial appendage thrombus, regardless of anticoagulation status.
- ◆ As a follow-up procedure, if initial imaging yielded an intracardiac thrombus or evidence of left atrial stasis and the patient has had a minimum of 4 weeks of therapeutic anticoagulant therapy when a change in therapy is anticipated.[34]
- ◆ In a patient with a CHA_2DS_2-VASc score greater than or equal to 2 (high-risk for thromboembolism) before catheter ablation.[37]
- ◆ As an imaging modality to visualize atrial anatomy for left atrial appendage occlusion/obliteration and **ANY** of the following:[38]
  - During catheter or surgical procedure.
  - 45 days after a catheter or surgical procedure.

***As Atrial Flutter often coexists with or triggers atrial fibrillation. Please refer to Atrial Fibrillation guidelines for additional context.

Non-Indications

- ➔ **TEE** may not be considered appropriate if **ANY** of the following conditions are present
  - ◆ Duration of atrial flutter/fibrillation is reliably defined and is less than 48 hours in a patient with CHA_2DS_2-VASc score of 0 in males or 1 in females.[30]
  - ◆ If another imaging modality (CT or MRI) has been requested simultaneously for evaluation of intracardiac thrombus.
  - ◆ The patient has a history of undiagnosed dysphagia.
  - ◆ Patient has a history of esophageal stricture, malignancy, recent surgery of the esophagus, active GI bleeding, esophageal varices (relative), or prior surgery (relative).

Site of Service Criteria

Outpatient status.

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 can be useful for patients with atrial flutter 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 detecting left atrial appendage thrombi and assessing posterior cardiac structures (e.g., mitral valve abnormalities).[39]
- **Exclusions:** None.

Medical Necessity Criteria

Indications

➔ **TTE** is considered appropriate if **ANY** of the following is **TRUE**[14]:
- ◆ In patients with atrial flutter and clinical evidence of valvular, pericardial, or myocardial disease.
- ◆ In patients with atrial flutter who have a documented history or risk factors for reduced ventricular function (less than 50%), initial or follow-up evaluation.
- ◆ Prior testing that is concerning for heart disease or structural abnormality, including but not limited to chest X-ray, ECG, or cardiac biomarkers.
- ◆ The patient has atrial flutter and a significant change in clinical status including chest pain, shortness of breath, abnormal ECG, palpitations, TIA, stroke, or peripheral embolic event.

Non-Indications

➔ **TTE** is not considered appropriate if **ANY** of the following is **TRUE**:
- ◆ As part of a pre-operative workup if the patient is having a low-risk surgery (e.g., cataract, rotator cuff repair, etc.).
- ◆ Technical limitations that would limit the quality of diagnostic echocardiography imaging (e.g., obesity, severely underweight, chest wall deformity, the patient cannot be in the appropriate position).[13]

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.[40]
- **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.[40,41] 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). 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).[40] The effects of cardiac rehabilitation on mortality, cardiovascular events, hospitalizations, 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.[42-44]
- **Exclusions:** None.

Medical Necessity Criteria

Indications

➔ **Cardiac Rehabilitation** is considered appropriate if **ANY** of the following is **TRUE** (within a one year period):[43-45]

- Acute myocardial infarction
- Acute coronary artery syndrome
- Chronic stable angina
- Chronic congestive 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/atrial flutter
- 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:[45]

- 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 or Interventional Management

Service: 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:** Catheter ablation is a procedural approach to rhythm control for atrial flutter. As atrial flutter is often symptomatic and can be a trigger for atrial fibrillation, ablation is often recommended for patients who have become refractory to medical therapy. Ablation of typical flutter at minimum entails isolation of tissue involved in the macroreentrant circuit rotating around the tricuspid annulus, using radiofrequency or cryothermal energy. Alternatively, an atrial flutter circuit created by a past cardiac surgical scar can be identified using available mapping techniques, and an ablation line can be drawn through this circuit to disrupt continuity.[15] Scar-mediated atrial flutter circuits can be located in either right or left atrium, traverse across chambers, and be multiple in number.[10]
- **Exclusions:** None.

Medical Necessity Criteria

Indications

➔ **Cardiac Ablation** is considered appropriate if **ANY** of the following is **TRUE**[7,46,47,48]:

- ◆ The patient has symptomatic atrial flutter and has become refractory or cannot tolerate treatment with a Class I or III antiarrhythmic.
- ◆ The patient has new-onset atrial flutter who is determined to be a favorable candidate for ablation as a first-line therapy vs antiarrhythmic medication.
- ◆ Recurrence of atrial flutter with a reasonable expectation of success with a redo procedure.
- ◆ Recurrent episodes of symptomatic atrial flutter

Non-Indications

➔ **Cardiac Ablation** is not considered appropriate if **ANY** of the following is **TRUE**[7,46,47,48]:

- ◆ There are very few factors that make ablation of atrial flutter inappropriate. The ablation of typical atrial flutter is low risk and is

a relatively straightforward procedure. Scar-mediated flutter ablations can be much more complex anatomically but still have good success rates with catheter ablation.

Site of Service Criteria

Outpatient or observation status.

Procedure Codes (HCPCS/CPT)

HCPCS Code	Code Description/Definition
93650	Intracardiac catheter ablation of atrioventricular node function, atrioventricular conduction for creation of complete heart block
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

Service: Electrical Cardioversion, Elective

General Guidelines

- **Units, Frequency, & Duration:** Single procedures performed as needed for defined criteria.
- **Criteria for Subsequent Requests:** Recurrence of identical or similar arrhythmia necessitating electrical cardioversion when there is reasonable evidence that sinus rhythm will be sustained.
- **Recommended Clinical Approach:** Electrical cardioversion aims to achieve rhythm control of atrial flutter and fibrillation. Cardioversion may be pursued in the acute setting with a hemodynamically unstable arrhythmic event. However, it is more commonly used in an outpatient setting for patients with rate-controlled paroxysmal or persistent atrial fibrillation, which can alternate or occur simultaneously with atrial flutter.[15] Patients who are candidates for this approach are usually symptomatic with their atrial arrhythmia and have been treated on a long-term basis with oral anticoagulants. Alternatively, paroxysmal episodes of atrial fluttercan be addressed with electrical cardioversion, with an anticoagulation strategy based on individual CHA_2DS_2-VASc scores.[7,15,49] In patients with a CHA_2DS_2-VASc score greater than 1, elective cardioversions are often preceded with a transesophageal echocardiogram to rule out the presence of an intracardiac thrombus. The overwhelming proportion of these procedures is done externally, with rare cases approached with an internal defibrillation catheter.
- **Exclusions:** Emergent, inpatient cardioversions are usually done for a hemodynamically unstable atrial flutter or fibrillation and would not be subject to prior authorization and cannot use the listed CPT codes.

Medical Necessity Criteria

Indications

➔ **Electrical Cardioversion** is considered appropriate if **ANY** of the following is **TRUE**[7,15]:

- ◆ The patient is hemodynamically stable, with persistent atrial flutter, and received at least 3-4 weeks of anticoagulant therapy.
- ◆ For patients with atrial flutter of unknown or at least a 48 hours duration and without full anticoagulation for the preceding 3-4 weeks, transesophageal echocardiography with cardioversion can be considered provided that anticoagulation can be maintained after cardioversion for at least 4 weeks.

- The patient has paroxysmal or persistent atrial flutter with a rapid ventricular response that is not responsive to pharmacologic therapy.
- In a patient with symptomatic atrial flutter with a known duration of episode less than 48 hours.
- In a patient in active atrial flutter where cardioversion is expected to be necessary prior to an ablation procedure.

Non-Indications

➔ **Electrical Cardioversion** is not considered appropriate if **ANY** of the following is **TRUE**[7,15]:

- In a patient documented to have a permanent atrial flutter, where sinus rhythm is unlikely to be maintained.
- Rate control is the primary management strategy for the patient's atrial flutter

Site of Service Criteria

Outpatient.

Procedure Codes (HCPCS/CPT)

HCPCS Code	Code Description/Definition
92960	Cardioversion, elective, electrical cardioversion of arrhythmia, external
92961	Cardioversion, elective, electrical cardioversion of arrhythmia, internal

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, the clinical need for different pacing modes, or replacement after manufacturer recall.
- **Recommended Clinical Approach:** Pacing has an extremely limited role in the setting of atrial flutter. Pacing may assist patients with sick sinus syndrome associated with atrial flutter (and often, atrial fibrillation). Adequate atrial pacing may reduce the frequency of atrial tachyarrhythmic events; however, pacemaker functions that attempt to actively treat episodes of atrial flutter have not shown consistent effectiveness. Many antiarrhythmics used to control atrial flutter/fibrillation can exacerbate sick sinus syndrome, which may require pacing to prevent symptomatic bradycardia.[15,50]
- **Exclusions:** Isolated pacemaker insertion should not be requested with atrial flutter as the only active diagnosis. Pacing is a treatment for symptomatic bradycardic rhythms, of which atrial flutter is not one.

Medical Necessity Criteria

Indications

➔ **Cardiac Implantable Device** is considered appropriate if **ANY** of the following is **TRUE**[15,50]:

- ◆ The patient has atrial flutter with documented and serious associated sinus node dysfunction, AV node dysfunction, or symptomatic bradycardia, with or without antiarrhythmic treatment.

Non-Indications

➔ **Cardiac Implantable Device** is not considered appropriate if **ANY** of the following is **TRUE**[15,50]:

- ◆ The patient has atrial flutter without other conduction abnormalities, which would merit permanent pacing.

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
33227	Removal and replacement of permanent pacemaker pulse generator in single lead system
33228	Removal and replacement of permanent pacemaker pulse generator in dual lead system
33229	Removal and replacement of permanent pacemaker pulse generator in multiple lead system
33233	Removal of permanent pacemaker pulse generator
33249	Insertion of dual chamber permanent pacing cardioverter-defibrillator system with transvenous lead
33274	Transcatheter insertion of permanent leadless right ventricular pacemaker

33275	Transcatheter removal of permanent leadless pacemaker from right ventricle using imaging guidance
C1779	Lead, pmkr, transvenous vdd
C1785	Pmkr, dual, rate-resp
C1786	Pmkr, single, rate-resp
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

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	
January 1, 2022 (V.1)	**Physician author:** Alisa Niksch, MD (Pediatric Cardiologist/ Electrophysiologist) **Peer reviewed by:** Carter Newton, MD FACC (Cardiologist), Russell Rotondo, MD FACC (Cardiologist) **Approving Physician:** Russell Rotondo, MD FACC (Cardiologist)
October 20, 2022 (V.2)	**Peer reviewed by:** Ania Garlitski, MD (Cardiologist) **Approving Physician:** Russell Rotondo, MD FACC (Cardiologist)