

MEDICAL POLICY

POLICY TITLE	OPEN AND THORACOSCOPIC APPROACHES TO TREAT ATRIAL FIBRILLATION AND ATRIAL FLUTTER (MAZE AND RELATED PROCEDURES)
POLICY NUMBER	MP 2.083

CLINICAL BENEFIT	☒ MINIMIZE SAFETY RISK OR CONCERN. ☒ MINIMIZE HARMFUL OR INEFFECTIVE INTERVENTIONS. ☐ ASSURE APPROPRIATE LEVEL OF CARE. ☐ ASSURE APPROPRIATE DURATION OF SERVICE FOR INTERVENTIONS. ☒ ASSURE THAT RECOMMENDED MEDICAL PREREQUISITES HAVE BEEN MET. ☐ ASSURE APPROPRIATE SITE OF TREATMENT OR SERVICE.
Effective Date:	RETIRED 7/1/2026

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I. POLICY

The maze or modified maze procedures, performed on a non-beating heart during cardiopulmonary bypass with concomitant cardiac surgery may be considered **medically necessary** for treatment of symptomatic, atrial fibrillation or flutter.

Stand-alone minimally invasive, off-pump maze procedures (ie, modified maze procedures), including those done via mini-thoracotomy, are considered **investigational** for the treatment of atrial fibrillation or flutter as there is insufficient evidence to support a general conclusion concerning the health outcomes or benefits associated with this procedure.

Hybrid ablation (defined as a combined percutaneous and thoracoscopic approach) is considered **investigational** for the treatment of atrial fibrillation or flutter as there is insufficient evidence to support a general conclusion concerning the health outcomes or benefits associated with this procedure.

The use of an open maze or modified maze procedure performed on a non-beating heart during cardiopulmonary bypass without concomitant cardiac surgery is considered **investigational** for the treatment of atrial fibrillation or flutter as there is insufficient evidence to support a general conclusion concerning the health outcomes or benefits associated with this procedure.

Policy Guidelines

Given the availability of less-invasive alternative approaches in the treatment of atrial fibrillation (AF) performing the maze procedure without concomitant cardiac surgery should rarely be needed.

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Per the 2017 Expert Consensus Statement by the Heart Rhythm Society, European Heart Rhythm Association, and European Cardiac Arrhythmia Society (Calkins et al, 2017), the indication for concomitant open or closed surgical ablation, stand-alone, and hybrid surgical ablation of atrial fibrillation is symptomatic disease refractory or intolerant to at least 1 Class I or III antiarrhythmic medication.

II. PRODUCT VARIATIONS

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This policy is only applicable to certain programs and products administered by Capital BlueCross and subject to benefit variations as discussed in Section VI. Please see additional information below.

FEP PPO - Refer to FEP Medical Policy Manual. The FEP Medical Policy manual can be found at:

<https://www.fepblue.org/benefit-plans/medical-policies-and-utilization-management-guidelines/medical-policies>

III. DESCRIPTION/BACKGROUND

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There are various surgical approaches to treat atrial fibrillation (AF) that work by interrupting abnormal electrical activity in the atria. Open surgical procedures, such as the Cox maze procedure were first developed for this purpose and are now generally performed in conjunction with valvular or coronary artery bypass graft surgery. Surgical techniques have evolved to include minimally invasive approaches that use epicardial radiofrequency ablation, a thoracoscopic or mediastinal approach, and hybrid catheter ablations/open procedures.

Atrial Fibrillation

Atrial Fibrillation (AF) is a supraventricular tachyarrhythmia characterized by disorganized atrial activation with ineffective atrial ejection. The underlying mechanism of AF involves the interplay between electrical triggering events that initiate AF and the myocardial substrate that permits propagation and maintenance of the aberrant electrical circuit. The most common focal trigger of AF appears to be located within the cardiac muscle that extends into the pulmonary veins. The atria are frequently abnormal in patients with AF and demonstrate enlargement or increased conduction time. Atrial flutter is a variant of AF.

Epidemiology

In the US, more than 3 to 6 million people have AF, and it has been estimated that more than 12 million people will have AF by 2030. Age, body mass index, height, hypertension, diabetes mellitus, obstructive sleep apnea, myocardial infarction, heart failure, hyperthyroidism, chronic kidney disease, smoking, moderate to heavy alcohol consumption, and genetic predisposition are all risk factors for AF. Age-adjusted AF incidence and prevalence is higher among men than women, although the lifetime risk is similar at 24% for men and 22% for women. AF incidence and prevalence appear lower in individuals who are Black compared to White, despite

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a higher burden of comorbidities. However, this difference is likely largely explained by differential detection of AF by race/ethnicity.

Treatment

The first-line treatment for AF usually includes medications to maintain sinus rhythm and/or control the ventricular rate. Antiarrhythmic medications are only partially effective; therefore, medical treatment is not sufficient for many patients. Percutaneous catheter ablation, using endocardial ablation, is an accepted second-line treatment for patients who are not adequately controlled on medications and may also be used as first-line treatment. Catheter ablation is successful in maintaining sinus rhythm for most patients, but long-term recurrences are common and increase over time. Performed either by open surgical techniques or thoracoscopy, surgical ablation is an alternative approach to percutaneous catheter ablation.

Open Surgical Techniques

The classic Cox maze III procedure is a complex surgical procedure for patients with AF. It involves sequential atriotomy incisions that interrupt the aberrant atrial conduction pathways in the heart. The procedure is also intended to preserve atrial pumping function. It is indicated for patients who do not respond to medical or other surgical antiarrhythmic therapies and is often performed in conjunction with correction of structural cardiac conditions such as valve repair or replacement. This procedure is considered the criterion standard for the surgical treatment of drug-resistant AF, with a success rate of approximately 90%.

The maze procedure entails making incisions in the heart that:

- direct an impulse from the sinoatrial node to the atrioventricular node;
- preserve activation of the entire atrium; and
- block re-entrant impulses responsible for AF or atrial flutter.

The classic Cox maze procedure is performed on a non-beating heart during cardiopulmonary bypass. Simplification of the maze procedure has evolved with the use of different ablation tools such as microwave, cryotherapy, ultrasound, and radiofrequency energy sources to create the atrial lesions instead of employing the incisional technique used in the classic maze procedure. The Cox maze IV procedure involves the use of radiofrequency energy or cryoablation to create transmural lesions analogous to the lesions created by the “cut-and-sew” maze.

Minimally Invasive (Thoracoscopic) Techniques

Less invasive, transthoracic, endoscopic, off-pump procedures to treat drug-resistant AF have been developed. The evolution of these procedures involves both different surgical approaches and different lesion sets. Alternative surgical approaches include mini-thoracotomy and total thoracoscopy with video assistance. Open thoracotomy and mini-thoracotomy employ cardiopulmonary bypass and open-heart surgery, while thoracoscopic approaches are performed on the beating heart. Thoracoscopic approaches do not enter the heart and use epicardial ablation lesion sets, whereas the open approaches use either the classic “cut-and-sew” approach or endocardial ablation.

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Lesion sets may vary independent of the surgical approach, with a tendency toward less extensive lesion sets targeted to areas most likely to be triggers of AF. The most limited lesion sets involve pulmonary vein isolation and exclusion of the left atrial appendage. More extensive lesion sets include linear ablations of the left and/or right atrium and ablation of ganglionic plexi. Some surgeons perform left atrial reduction in cases of left atrial enlargement.

The type of energy used for ablation also varies; radiofrequency energy is most commonly applied. Other energy sources such as cryoablation and high-intensity ultrasound have been used. For our purposes, the variations on surgical procedures for AF will be combined under the heading of “modified maze” procedures.

Hybrid Techniques

“Hybrid” ablation refers to the use of both thoracoscopic and percutaneous approaches in the same patient. Ablation is performed on the outer surface of the heart (epicardial) via the thoracoscopic approach, and on the inner surface of the heart (endocardial) via the percutaneous approach. The rationale for a hybrid procedure is that a combination of both techniques may result in a complete ablation. Thoracoscopic epicardial ablation is limited by the inability to perform all possible ablation lines because the posterior portions of the heart are not accessible via thoracoscopy. Percutaneous, endoscopic ablation is limited by incomplete ablation lines that often require repeat procedures. By combining both procedures, a full set of ablation lines can be performed, and incomplete ablation lines can be minimized.

The hybrid approach first involves thoracoscopy with epicardial ablation. Following this procedure, an electrophysiologic study is performed percutaneously followed by endocardial ablation as directed by the results of electrophysiology. Most commonly, the electrophysiology study and endocardial ablation are done immediately after the thoracoscopy as part of a single procedure. However, some hybrid approaches perform the electrophysiology study and endocardial ablation on separate days, as directed by the electrophysiology study.

Regulatory Status

Several radiofrequency ablation systems have been cleared for marketing by the U.S. Food and Drug Administration through the 510(k) process for cardiac tissue ablation (product code OCL). Table 1 provides a select list.

Table 1. Radiofrequency Ablation Approved by the Food and Drug Administration

Device	Manufacturer
Epi-Sense Guided Coagulation System	Atricure
Medtronic DiamondTemp™ System	Medtronic
Cobra Fusion Ablation System	AtriCure
Medtronic Cardioblate® System and Cardioblate Gemini™ Systems	Medtronic
Cardima Ablation System	Cardima
Epicor™ Medical Ablation System	Epicor Medical

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Isolator™ Systems	AtriCure
Estech COBRA® Cardiac Electrosurgical Unit	Endoscopic Technologies
Coolrail™ Linear Pen	AtriCure
Numeris® Guided Coagulation System with VisiTrax®	nContact Surgical
Epi-Sense® Guided Coagulation System with VisiTrax®	nContact Surgical

A number of cryoablation systems, which may be used during cardiac ablation procedures, have also been cleared for marketing, including those in Table 2.

Table 2. Cryoablation Systems Approved by the Food and Drug Administration

Device	Manufacturer
Cryocare® Cardiac Surgery System	Endocare
SeedNet™ System	Galil Medical
SurgiFrost® XL Surgical CryoAblation System	CryoCath Technologies; now Medtronic
Isis™ cryosurgical unit	Galil Medical
Arctic Front Advance™ and Arctic Front Advance Pro™ and the Freezer Max™ Cardiac Cryoablation Catheters	Medtronic

IV. RATIONALE

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Summary of Evidence

For individuals who have symptomatic AF or flutter who are undergoing cardiac surgery with bypass who received a Cox maze or a modified maze procedure, the evidence includes several randomized controlled trials (RCTs) and nonrandomized comparative studies, along with systematic reviews of these studies. Relevant outcomes are overall survival, medication use, and treatment-related morbidity. Several small RCTs have provided most of the direct evidence confirming the benefit of a modified maze procedure for patients with AF who are undergoing mitral valve surgery. These trials have established that the addition of a modified maze procedure results in a lower incidence of atrial arrhythmias following surgery, with minimal additional risks. Observational studies have supported these RCT findings. The evidence is sufficient to determine that the technology results in a meaningful improvement in the net health outcome.

For individuals who have symptomatic, drug-resistant AF or flutter who are not undergoing cardiac surgery with bypass who receive minimally invasive, off-pump thoracoscopic maze procedures, the evidence includes RCTs and observational studies, some of which identify control groups. Relevant outcomes are overall survival, medication use, and treatment-related morbidity. Two RCTs reported significantly higher rates of freedom from AF at 1-year with surgical ablation but also reported significantly higher rates of serious adverse events. The remaining 2 RCTs found no significant differences between treatment groups in rates of

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freedom from AF and either did not assess or did not find significant differences in serious adverse events. The comparative observational studies consistently found significantly higher rates of freedom from atrial arrhythmias but lacked assessment of serious adverse events. The noncomparative studies generally only reported short-term outcomes and did not consistently report adverse events. Therefore, this evidence does not permit definitive conclusions about whether a specific approach is superior to the other. Factors, such as previous treatment, the probability of maintaining sinus rhythm, the risk of complications, contraindications to anticoagulation, and patient preference, may all affect the risk-benefit ratio for each procedure. Additionally, the studies do not permit conclusions about harm due to heterogeneous measurement across studies, with mixed results. The evidence is insufficient to determine that the technology results in an improvement in the net health outcome. However, The Society of Thoracic Surgeons 2017 clinical practice guidelines for the surgical treatment of atrial fibrillation (AF) supports this surgical treatment in certain circumstances.

For individuals who have symptomatic, drug-resistant AF or flutter who are not undergoing cardiac surgery with bypass who receive hybrid thoracoscopic and endocardial ablation procedures, the evidence includes 5 RCTs (sample sizes ranging from 41 to 154), comparative observational studies, single-arm case series, and systematic reviews of these studies. Evidence from randomized and nonrandomized studies found an increased rate of AF-free survival, reduced risk of cardioversion, and increased risk of periprocedural adverse events with hybrid procedures relative to standard ablation. The largest RCT (CEASE-AF) reported composite major complications at 1 year in 9% vs 6% with hybrid vs standard ablation. The surgical ablation lesion sets varied across studies and have not been standardized in practice. The evidence is insufficient to determine that the technology results in an improvement in the net health outcome. However, The Society of Thoracic Surgeons 2017 clinical practice guidelines for the surgical treatment of atrial fibrillation (AF) supports this surgical treatment in certain circumstances.

V. DEFINITIONS

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ATRIAL FLUTTER is a cardiac arrhythmia marked by rapid (about three hundred beats per minute) regular atrial beating, and, usually, a regular ventricular response.

ATRIOVENTRICULAR (AV) NODE is an area of specialized cardiac muscle that receives the cardiac impulse from the sinoatrial (SA) node and conducts it to the AV bundle and then to the Purkinje fibers and the walls of the ventricles. The AV node is located in the septal wall between the left and right atria.

ATRIUM is the upper chamber of each half of the heart. Atria is the plural of atrium.

MYOCARDIUM is the middle layer of the walls of the heart, composed of cardiac muscle.

SINOATRIAL (SA) NODE is a specialized group of cardiac muscle cells in the wall of the right atrium at the entrance to the superior vena cava. These cells depolarize spontaneously and rhythmically to initiate normal heartbeats.

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SUPRAVENTRICULAR TACHYCARDIA (SVT) is any cardiac rhythm with a rate exceeding one hundred (100) beats per minute that originates above the branching part of the atrioventricular bundle, that is, in the sinus node, atria, or AV junction.

TACHYCARDIA is an abnormally rapid heart rate, greater than one hundred (100) beats per minute.

VI. BENEFIT VARIATIONS

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The existence of this medical policy does not mean that this service is a covered benefit under the member's health benefit plan. Benefit determinations should be based in all cases on the applicable health benefit plan language. Medical policies do not constitute a description of benefits. A member's health benefit plan governs which services are covered, which are excluded, which are subject to benefit limits, and which require preauthorization. There are different benefit plan designs in each product administered by Capital Blue Cross. Members and providers should consult the member's health benefit plan for information or contact Capital Blue Cross for benefit information.

VII. DISCLAIMER

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Capital BlueCross' medical policies are developed to assist in administering a member's benefits, do not constitute medical advice and are subject to change. Treating providers are solely responsible for medical advice and treatment of members. Members should discuss any medical policy related to their coverage or condition with their provider and consult their benefit information to determine if the service is covered. If there is a discrepancy between this medical policy and a member's benefit information, the benefit information will govern. If a provider or a member has a question concerning the application of this medical policy to a specific member's plan of benefits, please contact Capital BlueCross' Provider Services or Member Services. Capital BlueCross considers the information contained in this medical policy to be proprietary and it may only be disseminated as permitted by law.

VIII. CODING INFORMATION

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Note: This list of codes may not be all-inclusive, and codes are subject to change at any time. The identification of a code in this section does not denote coverage as coverage is determined by the terms of member benefit information. In addition, not all covered services are eligible for separate reimbursement.

Investigational; therefore, not covered for Maze procedures without cardiac bypass and concomitant cardiac surgery

Procedure Codes							
33255	33258	33265	33266				

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Covered when medically necessary:

Procedure Codes								
33254	33256	33257	33259					

ICD-10-CM Diagnosis Codes	Description
I48.0	Paroxysmal atrial fibrillation
I48.1	Persistent atrial fibrillation
I48.11	Longstanding persistent atrial fibrillation
I48.19	Other persistent atrial fibrillation
I48.20	Chronic atrial fibrillation, unspecified
I48.21	Permanent atrial fibrillation
I48.3	Typical atrial flutter
I48.4	Atypical atrial flutter
I48.91	Unspecified atrial fibrillation
I48.92	Unspecified atrial flutter

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X. POLICY HISTORY

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MP 2.083	07/20/2020 Minor Review. Changed “Open Maze or modified maze procedure on a non-beating heart during cardiopulmonary bypass without concomitant cardiac surgery”, “Hybrid ablation” and “Minimally invasive, off pump maze procedure” from investigational to medically necessary with criteria. Description, Background and Rationale updated. References added.
	09/27/2021 Consensus Review. No change to policy statement. References reviewed and updated.
	11/22/2022 Consensus Review. Clarification for INV statement but no change to coverage. References and background updated, and coding reviewed.
	12/14/2023 Consensus Review. No change to policy statement. Background and Rationale updated. References added.

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06/11/2024 Consensus Review. No change to policy statements. References reviewed and updated. Added ICD-10 diagnosis codes I48.91 and I48.92. No procedure code changes.
12/5/2025 Minor Review. Maze/modified Maze without concomitant cardiac surgery and cardiopulmonary bypass changed from medically necessary to investigational. Policy Guidelines, Background, Rationale and References updated. Cross Referenced Policy removed.
02/12/2026 Retirement Review.

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