



2024 CODING AND REIMBURSEMENT FOR

# Cardiac Ablation and Left Atrial Appendage Management

*Updated CPT Rates: Valid from 3/15/2024 – 12/31/2024*

**AtriCure**

## 2024 Coding and Reimbursement Considerations

### Introduction

This information is shared for educational purposes and current as of March 15, 2024. Healthcare providers are solely responsible for the accuracy of codes selected for the services rendered and reported in the patient's medical record. AtriCure does not assume responsibility for coding decisions, nor recommend codes for specific cases. Items and services that are billed to payers must be medically necessary and supported by appropriate documentation. AtriCure does not promote the off-label use of its devices. While a code may exist describing certain procedures and/or technologies, this does not guarantee payment by payers.

### Product Offerings

AtriCure product offerings include, but are not limited to, BiPolar Radiofrequency (RF) and Cryoablation surgical ablation devices; the AtriClip® Left Atrial Appendage Management System (LAAM); EPI-Sense® coagulation device, LARIAT® suture delivery device and cryoICE® Cryo Nerve Block (cryoNB).

**Table 1. Physician Coding and Reimbursement**

Current Procedure Terminology (CPT®) are codes describing the procedure during the patient visit. CPT codes that may be appropriate for procedures used in conjunction with cardiac ablation surgery, catheter ablation or LAAM are included below.

| CPT*                             | Description  | CY 2024<br>Physician Work<br>Relative Value<br>Units (RVUs) | CY 2024<br>Physician<br>Total<br>RVU | CY 2024<br>National<br>Payment<br>Rate \$ |
|----------------------------------|--|---|--------------------------------------|---|
| <b>Cardiac Surgical Ablation</b> |  |   |                                      |   |
| 33250                            | Operative ablation of supraventricular arrhythmogenic focus or pathway without cardiopulmonary bypass  | 25.90   | 42.78                                | \$1,226                                   |
| 33251                            | Operative ablation of supraventricular arrhythmogenic focus or pathway with cardiopulmonary bypass   | 28.92   | 48.07                                | \$1,600                                   |
| 33254                            | Operative tissue ablation and reconstruction of atria, limited (e.g., modified Maze procedure)   | 23.71   | 40.21                                | \$1,338                                   |
| 33255                            | Operative tissue ablation and reconstruction of atria, extensive (e.g., Maze procedure); without cardiopulmonary bypass  | 29.04   | 47.73                                | \$1,589                                   |
| 33256                            | Operative tissue ablation and reconstruction of atria, extensive (e.g., Maze procedure); with cardiopulmonary bypass   | 34.90   | 56.51                                | \$1,881                                   |
| +33257                           | Operative tissue ablation and reconstruction of atria, performed at the time of other cardiac procedure(s), limited (e.g., modified Maze procedure)                          | 9.63  | 17.25                                | \$574                                     |
| +33258                           | Operative tissue ablation and reconstruction of atria, performed at the time of other cardiac procedure(s), extensive (e.g., Maze procedure); without cardiopulmonary bypass | 11.00   | 19.16                                | \$638                                     |
| +33259                           | Operative tissue ablation and reconstruction of atria, performed at the time of other cardiac procedure(s), extensive (e.g., Maze procedure); with cardiopulmonary bypass    | 14.14   | 25.06                                | \$834                                     |
| 33265                            | Endoscopy, surgical; operative tissue ablation and reconstruction of atria, limited (e.g., modified Maze procedure); without cardiopulmonary bypass                          | 23.71   | 40.18                                | \$1,337                                   |
| 33266                            | Endoscopy, surgical; operative tissue ablation and reconstruction of atria, extensive (e.g., Maze procedure); without cardiopulmonary bypass                                 | 33.04   | 54.20                                | \$1,804                                   |
| <b>Mitral Valve Surgery</b>      |  |   |                                      |   |
| 33420                            | Valvotomy mitral valve; closed heart   | 25.79   | 42.63                                | \$1,419                                   |
| 33422                            | Valvotomy mitral valve; open heart, with cardiopulmonary bypass  | 29.73   | 48.85                                | \$1,626                                   |
| 33425                            | Valvuloplasty, mitral valve, with cardiopulmonary bypass   | 49.96   | 80.23                                | \$2,671                                   |
| 33426                            | Valvuloplasty, mitral valve, with cardiopulmonary bypass; with prosthetic ring   | 43.28   | 70.08                                | \$2,333                                   |
| 33427                            | Valvuloplasty, mitral valve, with cardiopulmonary bypass; radical reconstruction, with or without ring   | 44.83   | 71.66                                | \$2,385                                   |
| 33430                            | Replacement, mitral valve, with cardiopulmonary bypass   | 50.93   | 82.37                                | \$2,742                                   |
| <b>Aortic Valve Surgery</b>      |  |   |                                      |   |
| 33390                            | Valvuloplasty, aortic valve, open, with cardiopulmonary bypass; simple (i.e., valvotomy, debridement, debulking, and/or simple commissural resuspension)                     | 35.00   | 56.48                                | \$1,880                                   |
| 33391                            | Valvuloplasty, aortic valve, open, with cardiopulmonary bypass; complex (e.g., leaflet extension, leaflet resection, leaflet reconstruction, or annuloplasty)                | 41.50   | 66.94                                | \$2,228                                   |
| 33405                            | Replacement, aortic valve, open, with cardiopulmonary bypass; with prosthetic valve other than homograft or stentless valve  | 41.32   | 66.76                                | \$2,222                                   |
| 33406                            | Replacement, aortic valve, open, with cardiopulmonary bypass with allograft valve (freehand)   | 52.68   | 84.81                                | \$2,823                                   |
| 33410                            | Replacement, aortic valve, open, with cardiopulmonary bypass with stentless tissue valve   | 46.41   | 74.68                                | \$2,486                                   |
| 33411                            | Replacement, aortic valve; with aortic annulus enlargement, noncoronary sinus  | 62.07   | 98.40                                | \$3,276                                   |
| 33412                            | Replacement, aortic valve with transventricular aortic annulus enlargement (Konno procedure)   | 59.00   | 91.94                                | \$3,060                                   |
| 33413                            | Replacement, aortic valve; by translocation of autologous pulmonary valve with allograft replacement of pulmonary valve (Ross procedure)                                     | 59.87   | 94.24                                | \$3,137                                   |

**Table 1. Physician Coding and Reimbursement** *continued*

| CPT*  | Description  | CY 2024<br>Physician Work<br>Relative Value<br>Units (RVUs)** | CY 2024<br>Physician<br>Total<br>RVU | CY 2024<br>National<br>Payment<br>Rate \$ |
|---|--|---|--------------------------------------|---|
| <b>CABG</b>   |  |   |                                      |   |
| 33533   | Coronary artery bypass, using arterial graft(s); single arterial graft   | 33.75   | 55.09                                | \$1,834                                   |
| 33534   | Coronary artery bypass, using arterial graft(s); 2 arterial grafts   | 39.88   | 64.69                                | \$2,153                                   |
| 33535   | Coronary artery bypass, using arterial graft(s); 3 arterial grafts   | 44.75   | 71.87                                | \$2,392                                   |
| 33536   | Coronary artery bypass, using arterial graft(s); 4 or more arterial grafts   | 48.43   | 77.44                                | \$2,577                                   |
| <b>Surgical LAAM and Select Imaging Studies</b>   |  |   |                                      |   |
| 33267   | Exclusion of left atrial appendage, open, any method   | 18.50   | 30.80                                | \$1,025                                   |
| +33268  | Exclusion of left atrial appendage, concomitant, any method†   | 2.50  | 3.79                                 | \$126                                     |
| 33269   | Exclusion of left atrial appendage, thoracoscopic, any method  | 14.31   | 24.50                                | \$816                                     |
| 93312.26  | Transesophageal echocardiogram; complete   | 2.30  | 3.11                                 | \$104                                     |
| +93662.26   | Intracardiac echocardiography during therapeutic/diagnostic intervention   | 1.44  | 2.05                                 | \$68                                      |
| <b>Electrophysiology Cardiac Ablation, Percutaneous LAAM and Select Imaging Studies</b> |  |   |                                      |   |
| 33340   | Percutaneous transcatheter closure of the left atrial appendage with endocardial implant, including fluoroscopy, transseptal puncture, catheter placement, left atrial angiography, left atrial appendage angiography, when performed, and radiological supervision and interpretation   | 14.00   | 22.84                                | \$760                                     |
| 33999   | Unlisted procedure, cardiac surgery  | At payer discretion   |                                      |   |
| 93312.26  | Transesophageal echocardiogram; complete   | 2.30  | 3.11                                 | \$104                                     |
| +93462  | Left heart catheterization by transseptal puncture through intact septum or by transapical puncture  | 3.73  | 6.06                                 | \$202                                     |
| 93600.26  | Bundle of His recording  | 2.12  | 3.38                                 | \$113                                     |
| 93602.26  | Intracardiac recording   | 2.12  | 3.32                                 | \$111                                     |
| 93603.26  | Right ventricular pacing and recording   | 2.12  | 3.32                                 | \$111                                     |
| +93613  | Intracardiac EP 3-dimensional mapping  | 5.23  | 8.52                                 | \$284                                     |
| 93621.26  | With left atrial pacing and recording from coronary sinus or left atrium   | 1.50  | 2.39                                 | \$80                                      |
| 93622.26  | With left ventricular pacing and recording   | 3.10  | 4.93                                 | \$164                                     |
| 93631.26  | Intra-operative epicardial and endocardial pacing and mapping to localize the site of tachycardia or zone of slow conduction for surgical correction   | 7.59  | 11.49                                | \$382                                     |
| 93653   | Comprehensive electrophysiologic evaluation with insertion and repositioning of multiple electrode catheters, induction or attempted induction of an arrhythmia with right atrial pacing and recording and catheter ablation of arrhythmogenic focus, including intracardiac electrophysiologic 3-dimensional mapping, right ventricular pacing and recording, left atrial pacing and recording from coronary sinus or left atrium, and His bundle recording, when performed; with treatment of supraventricular tachycardia by ablation of fast or slow atrioventricular pathway, accessory atrioventricular connection, cavo-tricuspid isthmus or other single atrial focus or source of atrial re-entry | 15.00   | 24.42                                | \$813                                     |
| 93654   | Comprehensive electrophysiologic evaluation with insertion and repositioning of multiple electrode catheters, induction or attempted induction of an arrhythmia with right atrial pacing and recording and catheter ablation of arrhythmogenic focus, including intracardiac electrophysiologic 3-dimensional mapping, right ventricular pacing and recording, left atrial pacing and recording from coronary sinus or left atrium, and His bundle recording, when performed; with treatment of ventricular tachycardia or focus of ventricular ectopy including left ventricular pacing and recording, when performed   | 18.10   | 29.42                                | \$979                                     |
| +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   | 5.50  | 8.95                                 | \$298                                     |
| 93656   | Comprehensive electrophysiologic evaluation including transseptal catheterizations, insertion and repositioning of multiple electrode catheters with intracardiac catheter ablation of atrial fibrillation by pulmonary vein isolation, including intracardiac electrophysiologic 3-dimensional mapping, intracardiac echocardiography including imaging supervision and interpretation, induction or attempted induction of an arrhythmia including left or right atrial pacing/recording, right ventricular pacing/recording, and His bundle recording, when performed   | 17.00   | 27.69                                | \$922                                     |
| +93657  | Additional linear or focal intracardiac catheter ablation of the left or right atrium for treatment of atrial fibrillation remaining after completion of pulmonary vein isolation  | 5.50  | 8.96                                 | \$298                                     |
| +93662.26   | Intracardiac echocardiography during therapeutic/diagnostic intervention   | 1.44  | 2.05                                 | \$68                                      |

†Atrial appendage ligation, plication, or AtriClip is included in mitral valve and Maze procedures and should not be reported separately when performed in the same session as these procedures.

§The facility payment is the physician's professional fee in a facility setting. Average national rates are unadjusted by Geography Practice Cost Index. Payment rates reflect a conversion factor of \$33.2875 (effective 3/15/2024) multiplied by the total relative value units (RVUs).

\*Indicates a secondary add-on procedure code to be listed with primary procedure code.

**Limited operative ablation:** Surgical isolation of triggers of supraventricular dysrhythmias by operative ablation that isolates the pulmonary veins or other anatomically defined triggers in the left or right atrium.

**Extensive operative ablation:** Services in limited ablation definition and additional ablation of atrial tissue to eliminate supraventricular dysrhythmias. This must include operative ablation that involves either the right atrium, the atrial septum or left atrium in continuity with the atrioventricular annulus.

**Table 2. Endocardial Ablation Grid**

| Procedure/Services Included with Ablations  | SVT ABLATION (93653) |         |                                  | VT ABLATION (93654) |         |                                  | AF ABLATION (93656) |         |                                  |
|---|----------------------|---------|----------------------------------|---------------------|---------|----------------------------------|---------------------|---------|----------------------------------|
|   | Inherent             | Bundled | Not Bundled; sometimes performed | Inherent            | Bundled | Not Bundled; sometimes performed | Inherent            | Bundled | Not Bundled; sometimes performed |
| Insert/reposition multiple catheters  | X                    |         |                                  | X                   |         |                                  | X                   |         |                                  |
| Transseptal catheterization(s) (93462)  |                      |         | X                                |                     |         | X                                | X                   |         |                                  |
| Induction or attempted induction of arrhythmia with right atrial pacing and recording   | X                    |         |                                  | X                   |         |                                  |                     | X       |                                  |
| Intracardiac ablation of arrhythmia   | X                    |         |                                  | X                   |         |                                  | X                   |         |                                  |
| SVT ablation  | X                    |         |                                  |                     |         |                                  |                     |         |                                  |
| VT ablation   |                      |         |                                  | X                   |         |                                  |                     |         |                                  |
| AF ablation   |                      |         |                                  |                     |         |                                  | X                   |         |                                  |
| Intracardiac 3D mapping (93613)   |                      | X       |                                  |                     | X       |                                  |                     | X       |                                  |
| Right ventricular pacing and recording (93603)  |                      | X       |                                  |                     | X       |                                  |                     | X       |                                  |
| Left atrial pacing and recording from coronary sinus or left atrium (93621)   |                      | X       |                                  |                     | X       |                                  |                     | X       |                                  |
| His bundle recording (93600)  |                      | X       |                                  |                     | X       |                                  |                     | X       |                                  |
| Intracardiac recording (93602)  | X                    |         |                                  | X                   |         |                                  | X                   |         |                                  |
| Left ventricular pacing and recording (93622)   |                      |         |                                  |                     | X       |                                  |                     |         |                                  |
| Intracardiac echocardiography (93662)   |                      |         | X                                |                     |         | X                                |                     | X       |                                  |
| Additional linear or focal intracardiac catheter ablation of the left or right atrium (93657)                                     |                      |         |                                  |                     |         |                                  |                     |         | X                                |
| Intracardiac catheter ablation of a discrete mechanism of arrhythmia which is distinct from the primary ablated mechanism (93655) |                      |         | X                                |                     |         | X                                |                     |         | X                                |

**Table 3. Inpatient Facility Coding and Reimbursement**

The site of service depends on the patient's chief complaint, clinical presentation and is solely determined by the admitting physician. The ICD-10-CM (Internal Classification of Disease, Tenth Revision, Clinical Modification) Diagnosis Code(s) and primary ICD-10-PCS (procedure coding system(s)) determine the MS-DRG (Medicare Severity Diagnosis Related Group).

| MS-DRG**                              | Description  | FY 2024<br>Weighting<br>System | FY 2024<br>Arithmetic<br>Mean LOS | FY 2024<br>Inpatient<br>Prospective<br>Payment System |
|---------------------------------------|--|--------------------------------|-----------------------------------|---|
| <b>Cardiac Valve</b>                  |  |                                |                                   |   |
| 212                                   | Concomitant aortic and mitral valve procedures (three procedures must be met)                          | 10.77                          | 15.7                              | \$75,412  |
| 216                                   | Cardiac valve and other major cardiothoracic procedures with cardiac catheterization with MCC          | 9.71                           | 14.5                              | \$67,953  |
| 217                                   | Cardiac valve and other major cardiothoracic procedures with cardiac catheterization with CC           | 6.37                           | 7.1                               | \$44,567  |
| 218                                   | Cardiac valve and other major cardiothoracic procedures with cardiac catheterization without CC/MCC    | 5.70                           | 3.1                               | \$39,886  |
| 219                                   | Cardiac valve and other major cardiothoracic procedures without cardiac catheterization with MCC       | 7.71                           | 10.7                              | \$53,991  |
| 220                                   | Cardiac valve and other major cardiothoracic procedures without cardiac catheterization with CC        | 5.24                           | 6.3                               | \$36,721  |
| 221                                   | Cardiac valve and other major cardiothoracic procedures without cardiac catheterization without CC/MCC | 4.65                           | 4.0                               | \$32,548  |
| <b>CABG</b>                           |  |                                |                                   |   |
| 231                                   | Coronary bypass with PTCA with MCC   | 8.12                           | 12.0                              | \$56,819  |
| 232                                   | Coronary bypass with PTCA without MCC  | 5.95                           | 8.3                               | \$41,650  |
| 233                                   | Coronary bypass with cardiac catheterization or open ablation with MCC                                 | 7.80                           | 12.8                              | \$54,610  |
| 234                                   | Coronary bypass with cardiac catheterization or open ablation without MCC                              | 5.20                           | 8.6                               | \$36,394  |
| 235                                   | Coronary bypass without cardiac catheterization with MCC   | 5.88                           | 9.5                               | \$41,174  |
| 236                                   | Coronary bypass without cardiac catheterization without MCC  | 4.04                           | 6.3                               | \$28,295  |
| <b>Cardiac Surgical Ablation</b>      |  |                                |                                   |   |
| 228                                   | Other cardiothoracic procedures with MCC   | 5.04                           | 9.1                               | \$35,279  |
| 229                                   | Other cardiothoracic procedures without MCC  | 3.18                           | 3.4                               | \$22,262  |
| <b>Percutaneous Catheter Ablation</b> |  |                                |                                   |   |
| 273                                   | Percutaneous intracardiac procedures with MCC  | 3.90                           | 5.5                               | \$27,285  |
| 274                                   | Percutaneous intracardiac procedures without MCC   | 3.24                           | 1.5                               | \$22,691  |

CC = comorbidity or complication, MCC = major complication or comorbidity, w/o = without, PTCA = percutaneous transluminal coronary angioplasty.  
 \*\*Source: FY 2024 Medicare inpatient rates based upon Final Rule release. Conversion Factor = \$7,001.60

**Table 4. Outpatient Hospital Reimbursement**

| CPT                                   | Procedure Description  | CY 2024<br>Comprehensive<br>APC* | CY 2024<br>APC<br>Title | CY 2024<br>Medicare National<br>Standardized APC<br>Payment (HOPPS) |
|---------------------------------------|--|----------------------------------|-------------------------|---|
| <b>Percutaneous Catheter Ablation</b> |  |                                  |                         |   |
| 93653                                 | Comprehensive electrophysiologic evaluation with insertion and repositioning of multiple electrode catheters, induction or attempted induction of an arrhythmia with right atrial pacing and recording and catheter ablation of arrhythmogenic focus, including intracardiac electrophysiologic 3-dimensional mapping, right ventricular pacing and recording, left atrial pacing and recording from coronary sinus or left atrium, and His bundle recording, when performed; with treatment of supraventricular tachycardia by ablation of fast or slow atrioventricular pathway, accessory atrioventricular connection, cavo-tricuspid isthmus or other single atrial focus or source of atrial re-entry | 5213                             | Level 3 EP Procedure    | \$22,653  |
| 93654                                 | Comprehensive electrophysiologic evaluation with insertion and repositioning of multiple electrode catheters, induction or attempted induction of an arrhythmia with right atrial pacing and recording and catheter ablation of arrhythmogenic focus, including intracardiac electrophysiologic 3-dimensional mapping, right ventricular pacing and recording, left atrial pacing and recording from coronary sinus or left atrium, and His bundle recording, when performed; with treatment of ventricular tachycardia or focus of ventricular ectopy including left ventricular pacing and recording, when performed   |                                  |                         |   |
| 93656                                 | Comprehensive electrophysiologic evaluation including transeptal catheterizations, insertion and repositioning of multiple electrode catheters with intracardiac catheter ablation of atrial fibrillation by pulmonary vein isolation, including intracardiac electrophysiologic 3-dimensional mapping, intracardiac echocardiography including imaging supervision and interpretation, induction or attempted induction of an arrhythmia including left or right atrial pacing/recording, right ventricular pacing/recording, and His bundle recording, when performed  |                                  |                         |   |

**Table 5. Common ICD-10 codes used during LAAM, cardiac surgery and EP ablation procedures**

| ICD-10 CM  | Diagnosis Description  |
|------------|--|
| I47.1      | Supra ventricular tachycardia  |
| I47.11     | Inappropriate sinus tachycardia, so stated   |
| I48.0      | Paroxysmal atrial fibrillation   |
| I48.1      | Persistent atrial fibrillation   |
| I48.11     | Longstanding persistent atrial fibrillation  |
| I48.19     | Other persistent atrial fibrillation   |
| I48.2      | Chronic 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   |
| I49.8      | Other specified cardiac arrhythmias  |
| G90.A      | Postural orthostatic tachycardia syndrome [POTS]                                     |
| R00.0      | Tachycardia unspecified  |
| R55        | Syncope and collapse   |
| ICD-10 PCS | Procedure Description  |
| 02563ZZ    | Destruction of right atrium, percutaneous  |
| 02564ZZ    | Destruction of right atrium, percutaneous endoscopic                                 |
| 02560ZZ    | Destruction of right atrium, open  |
| 02573ZZ    | Destruction of left atrium, percutaneous   |
| 02574ZZ    | Destruction of left atrium, percutaneous endoscopic                                  |
| 02570ZZ    | Destruction of left atrium, open   |
| 02583ZZ    | Destruction, conduction mechanism, percutaneous                                      |
| 02584ZZ    | Destruction, conduction mechanism, percutaneous endoscopic                           |
| 02580ZZ    | Destruction, conduction mechanism, open  |
| 025S0ZZ    | Destruction of right pulmonary vein, open  |
| 025S3ZZ    | Destruction of right pulmonary vein, percutaneous                                    |
| 025S4ZZ    | Destruction of right pulmonary vein, percutaneous endoscopic                         |
| 025T0ZZ    | Destruction of left pulmonary vein, open   |
| 025T3ZZ    | Destruction of left pulmonary vein, percutaneous                                     |
| 025T4ZZ    | Destruction of left pulmonary vein, percutaneous endoscopic                          |
| 02B70ZK    | Excision of left atrial appendage, open  |
| 02B73ZK    | Excision of left atrial appendage, percutaneous                                      |
| 02B74ZK    | Excision of left atrial appendage, percutaneous endoscopic                           |
| 02L73DK    | Occlusion of left atrial appendage with intraluminal device, percutaneous            |
| 02L74DK    | Occlusion of left atrial appendage with intraluminal device, percutaneous endoscopic |
| 02L73ZK    | Occlusion of left atrial appendage, percutaneous                                     |
| 02L74ZK    | Occlusion of left atrial appendage, percutaneous endoscopic                          |
| 02L70CK    | Occlusion of left atrial appendage with extraluminal device, open                    |
| 02L73CK    | Occlusion of left atrial appendage with extraluminal device, percutaneous            |
| 02L74CK    | Occlusion of left atrial appendage with extraluminal device, percutaneous endoscopic |

**Open approach:** An open approach is defined as cutting through the skin or mucous membrane and any other body layers necessary to expose the site of the procedure.

**Percutaneous approach:** A procedure performed via a percutaneous approach (character value 3) is one in which there is entry, by puncture or minor incision, of instrumentation through the skin or mucous membrane and any other body layers necessary to reach the site of the procedure.

**Percutaneous endoscopic approach:** Percutaneous endoscopic approach (character value 4) is defined as entry, by puncture or minor incision, of instrumentation through the skin or mucous membrane and any other body layers necessary to reach and visualize the site of the procedure.



## Peer-Reviewed Evidence

Clinical evidence in support of surgical cardiac ablation and left atrial appendage surgical closure, includes, but is not limited to, the following peer-reviewed publications. Citations are available upon request.

### Cardiac surgical ablation with/without concomitant cardiac surgery (CABG, MVR, AVR)

- Ad, N. et al. (2012). Surgical ablation of atrial fibrillation trends and outcomes in North America. *J Thorac Cardiovasc Surg*, 144(5):1051-60.
- Amin, A.K. et al. (2022). Healthcare Utilization and Costs in Patients with Atrial Fibrillation before and after Hybrid Ablation. *Journal of Atrial Fibrillation and EP*, 15(6).
- Badhwar, V. et al. (2017). The Society of Thoracic Surgeons 2017 clinical practice guidelines for the surgical treatment of atrial fibrillation. *Ann Thorac Surg*, 103(1):329-41.
- Badhwar, V. et al. (2017). Surgical ablation of atrial fibrillation in the United States: Trends and propensity matched outcomes. *Ann Thorac Surg*, 104(2):493-500.
- DeLurgio, D.B. et al. (2020). Hybrid Convergent Procedure for the Treatment of Persistent and Long-Standing Persistent Atrial Fibrillation: Results of CONVERGE Clinical Trial. *Circ Arrhythm Electrophysiol*, 13(12):e009288.
- Doll, N. et al. (2023). Efficacy and safety of hybrid epicardial and endocardial ablation versus endocardial ablation in patients with persistent and longstanding persistent atrial fibrillation: A randomised, controlled trial. *EClinicalMedicine*, 61(102052).
- Gillinov, A.M. et al. (2015). Surgical ablation of atrial fibrillation during mitral-valve surgery. *N Engl J Med*, 372(15):1399-409.
- Musharbash, F.N. et al. (2018). Performance of the Cox-maze IV procedure is associated with improved long-term survival in patients with atrial fibrillation undergoing cardiac surgery. *J Thorac Cardiovasc Surg*, 155(1):159-70.
- Philpott, J.M. et al. (2015). The ABLATE trial: safety and efficacy of Cox Maze-IV using a bipolar radiofrequency ablation system. *Ann Thorac Surg*, 100(5):1541-8.
- Rankin J.S. et al. (2020). Surgical ablation of atrial fibrillation concomitant to coronary-artery bypass grafting provides cost-effective mortality reduction. *J Thorac Cardiovasc Surg*, 160(3): 675-86.

### Concomitant cardiac surgery with either (CABG, MVR, AVR) and surgical left atrial appendage management

- Caliskan, E. et al. (2018). Epicardial left atrial appendage AtriClip occlusion reduces the incidence of stroke in patients with atrial fibrillation undergoing cardiac surgery. *Europace*, 20(7):e105-14.
- Elbadawi, A. et al. (2017). Impact of left atrial appendage exclusion on cardiovascular outcomes in patients with atrial fibrillation undergoing coronary artery bypass grafting (From the National Inpatient Sample Database). *Am J Cardiol*, 120(6):953-8.
- Friedman, D.J. et al. (2018). Association between left atrial appendage occlusion and readmission for thromboembolism among patients with atrial fibrillation undergoing concomitant cardiac surgery. *JAMA*, 23;319(4):365-74.
- Mehaffey, J.H., et al. (2023). Surgical ablation of atrial fibrillation is associated with improved survival compared with appendage obliteration alone: An analysis of 100,000 Medicare beneficiaries. *J Thorac Cardiovasc Surg*, Epub ahead of print.
- Park-Hansen, J. et al. (2018). Adding left atrial appendage closure to open heart surgery provides protection from ischemic brain injury six years after surgery independently of atrial fibrillation history: the LAACS randomized study. *J Cardiothorac Surg*, 23;13(1):53.
- Soltesz, E.G. et al. (2021). Improved outcomes in CABG patients with atrial fibrillation associated with surgical left atrial appendage exclusion. *J Card Surg*, 36(4):1201-8.
- Whitlock, R.P. et al. (2021). LAAOS III Investigators. Left Atrial Appendage Occlusion during Cardiac Surgery to Prevent Stroke. *N Engl J Med*, 384(22):2081-91.

## Additional Sources

CPT® is a registered trademark of the American Medical Association

\*Source: American Medical Association. CPT 2024 Professional Edition.

The facility payment is the physician's professional fee in a facility setting. Average national rates are unadjusted by Geography Practice Cost Index. Payment rates reflect a conversion factor of \$33.2875 (effective 03/15/2024).

CC = comorbidity or complication, MCC = major complication or comorbidity, w/o = without, PTCA = percutaneous transluminal coronary angioplasty.

\*\*Source: FY 2024 Medicare inpatient rates based upon Final Rule release. Conversion Factor = \$7,001.60

CY 2024 Medicare outpatient rates based upon Final Rule release.

FY24 AMA ICD-10 PCS codebook

Sample/No Cost device: If you received a device as a sample or at no cost, unrelated to a recall, please notify your reimbursement staff. The hospital procedure claim could require additional modifiers or supplemental information to properly account for the reduction in sale price. Please refer to the Medicare claims manual for the most up to date guidance, the following link is provided: <https://www.cms.gov/Regulations-and-Guidance/Guidance/Manuals/Downloads/clm104c04.pdf>

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