

# SUMMARY

## Predictors of Cardiac Perforation with Catheter Ablation of Atrial Fibrillation

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## STUDY QUESTION

What factors are associated with the occurrence of cardiac perforation caused during a catheter ablation procedure for atrial fibrillation (AF)?

## METHODOLOGY

### DATA SOURCE:

CENTERS FOR MEDICARE & MEDICAID SERVICES (CMS) STANDARD ANALYTIC FILES



The CMS Standard Analytic File (SAF) database patient-level data on diagnoses, procedures, outcomes and cost of care in inpatient/outpatient settings for Medicare fee-for-service beneficiaries enrolled in Medicare Part A and Part B.

**Design:** Retrospective, observational cohort study.

**Population:** Medicare fee-for-service beneficiaries undergoing AF catheter ablation.

**Analysis:** Logistic regression models were used to assess predictors of cardiac perforation and develop weighted risk scores.

## OUTCOMES



**30-Day Occurrence of Cardiac Perforation**

## RESULTS

### STUDY SAMPLE

**102,398**

fee-for-service Medicare beneficiaries underwent AF catheter ablation between 2013-2017

**Use of ICE was one of the strongest predictors of reduced cardiac perforation. ICE use was observed to be associated with a 5x lower rate of perforation.**

### FACTORS THAT WERE ASSOCIATED WITH AN INCREASED RISK FOR CARDIAC PERFORATION



FEMALE SEX



OBESITY

### FACTORS THAT WERE ASSOCIATED WITH A DECREASED RISK FOR CARDIAC PERFORATION



PRIOR CARDIAC SURGERY



INTRACARDIAC ECHOCARDIOGRAPHY (ICE)

## CONCLUSION



This study demonstrated that obesity, female sex and not using ICE are associated with increased risk for cardiac perforation, while prior cardiac surgery is associated with a decreased risk for perforation. **Use of ICE was one of the strongest predictors of reduced cardiac perforation. ICE use was observed to be associated with a 5% lower rate of perforation.**

## OBJECTIVE

To examine the factors associated with the occurrence of cardiac perforation among patients undergoing catheter ablation procedures for atrial fibrillation (AF).

## METHODS

### Experimental Design

STUDY DESIGN	Retrospective, observational cohort study
IDENTIFICATION AND SCREENING	Data from the 2013-2017 CMS Standard Analytic Files
ANALYSIS	<ul style="list-style-type: none"><li>• Logistic regression analysis was used to examine the patient, procedure, and hospital characteristics associated with cardiac perforation</li><li>• Study population differences as categorized by outcomes were compared using chi-square test or ANOVA</li><li>• A weighted risk score was developed based on results from the regression analysis</li><li>• Sensitivity analyses were performed using generalized estimating equations to assess for the potential impact of clustering by site</li></ul>

INCLUSION CRITERIA	EXCLUSION CRITERIA
<ul style="list-style-type: none"><li>• Age <math>\geq</math> 65</li><li>• Patients who had an ablation procedure (inpatient or outpatient) between July 1, 2013 and December 31, 2017</li><li>• 6 months of continuous Medicare enrollment prior to the index procedure</li><li>• 30 days of follow-up post-procedure</li></ul>	<ul style="list-style-type: none"><li>• Patients enrolled in a health maintenance organization (HMO) or those who received care outside of the US</li><li>• Patients with a concomitant diagnosis of anomalous atrioventricular excitation or paroxysmal supraventricular tachycardia when the ablation occurred in an inpatient setting</li></ul>

## OUTCOMES



**30-Day Occurrence of Cardiac Perforation**

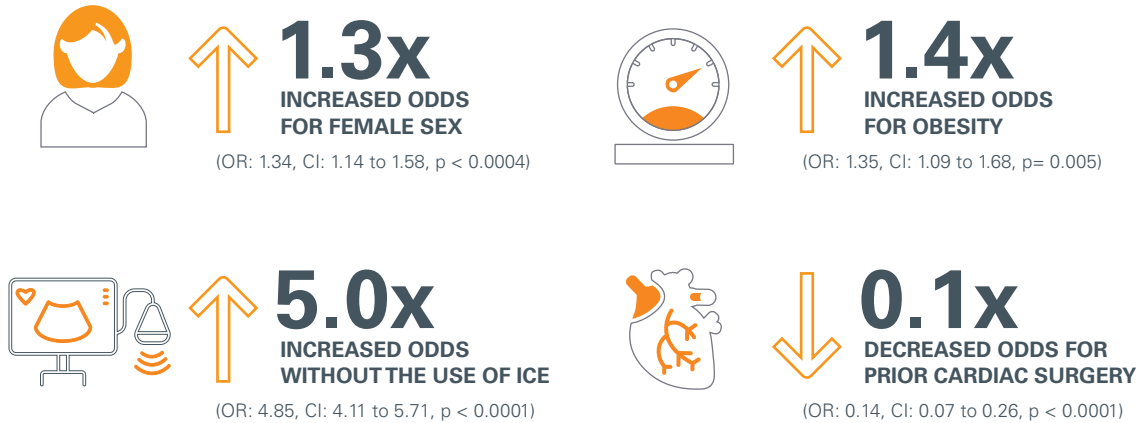
## STUDY CHARACTERISTICS

There were **102,398 patients** enrolled in fee-for-service Medicare that received catheter ablation for AF between 2013-2017. The median age was 71 years, 43.8% of patients were female, 94.2% were white and 59.9% of patients had a CHA<sub>2</sub>DS<sub>2</sub>VASc score of 3 or more.

## STUDY OUTCOMES

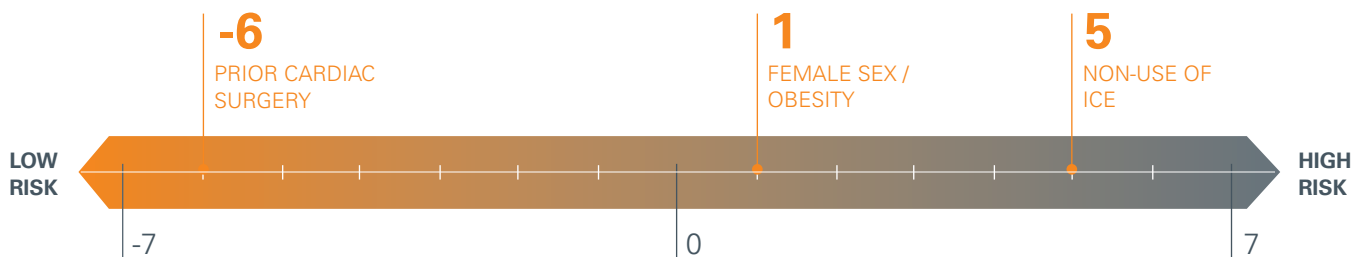
### Primary outcome

Cardiac perforation occurred in 0.61% (n=623) of patients within 30 days of index ablation procedure.



### Weighted risk scores of predictors of cardiac perforation

A weighted risk score for cardiac perforation at the time of AF ablation was generated, with higher point values indicating increased risk. Risk for perforation increased linearly with increasing point score, from 0.05% (score of -6) to 2.55% (score of 7).



## STUDY LIMITATIONS



Study limitations include:

- Limited sensitivity of billing codes
- Underestimation of comorbidity burden and event rates
- Inability to determine whether intraprocedural transesophageal echocardiography may be a reasonable substitute for ICE
- Lack of information on technology used for ablation and for ablation procedures
- The possibility of residual confounding factors.
- Results may not be generalizable to younger patients or those with different types of health insurance.
- ICE use was not randomized and was at the discretion of the treating physician. Residual confounding factors may have influenced differences in ICE use amongst patients.

## CONCLUSION



This study identified factors associated with cardiac perforation during AF ablation. Prior cardiac surgery was associated with a decreased risk for perforation, while an increased risk for perforation was associated with obesity, female sex and not using ICE. **Use of ICE was one of the strongest predictors of reduced cardiac perforation. ICE use was observed to be associated with a 5% lower rate of perforation.**