

# Healthcare Utilization and Costs in Patients with Atrial Fibrillation Before and After Hybrid Ablation

Amin, A.K., Billakanty, S.R., Manocchia, M. et al. 2022. JAFib-EP, 15(6).

## Introduction

A retrospective analysis with a contemporary data set led by Anish K Amin and Sreedhar R Billakanty (OhioHealth Heart and Vascular Physicians, Columbus, Ohio) evaluated real-world use of healthcare resources pre- and post-hybrid ablation in Medicare recipients with pre-existing AF.<sup>1</sup>

It is well known that atrial fibrillation (AF) is the most common arrhythmia<sup>2</sup> affecting nearly 3 to 6 million people in the United States (US),<sup>3,4</sup> responsible for more than half a million-emergency department (ED) visits<sup>5</sup> and yielding an annual cost burden of \$15,000- \$40,000 per patient.<sup>6-8</sup>

Hybrid ablation combines minimally invasive epicardial ablation with endocardial left atrial catheter ablation. Results of the recently published randomized CONVERGE Trial comparing hybrid ablation to endocardial catheter ablation alone demonstrates improved freedom from atrial arrhythmias including AF and greater AF burden reduction with hybrid ablation as compared to endocardial ablation alone.<sup>9</sup> However what remains unknown is the longer-term healthcare costs before and after hybrid ablation until now.

## Methods

A claims dataset identified 472 Medicare patients with AF (120 paroxysmal and 352 non-paroxysmal) who underwent hybrid ablation between October 1, 2016, and September 30, 2018, using the International Classification of Diseases-10th Revision-Clinical Modification (ICD-10-CM) diagnosis codes for AF and ICD-10 Procedure Coding System (ICD-10-PCS) and Current Procedural Terminology (CPT<sup>®</sup>) procedure codes for hybrid ablation. Only Medicare Part A and B patients with complete data one year prior and two years after ablation were included in the analysis. Hybrid procedures were performed either during a same day inpatient hospital treatment (epicardial ablation with endocardial catheter ablation) or sequential as two separate hospital visits (epicardial ablation followed by endocardial ablation as inpatient or outpatient within 90 days of the index epicardial ablation).

Baseline demographics were collected for both hybrid treatment groups, but collapsed into one group for resource use because both groups improved outcomes equally. Healthcare utilization variables compared pre to post intervention including all-causes and AF related admissions, emergency department (ED) visits, cardioversions, and repeat endocardial catheter ablation after index procedure.

Healthcare costs were determined as the amount paid by Medicare to hospitals. Costs were capped at the 99th percentile to remove outliers from each cost category, expressed as per member per month (PMPM), a common commercial insurance metric.

## Results

Baseline characteristics among patients who underwent single or sequential hybrid procedures were similar except for valve disease and previous arrhythmia which were more frequent among sequential vs same day procedure (45% vs 30%,  $p=0.006$ ; 48% vs 37%,  $P=0.01$ ), respectively. Conversely, incidence of cardiomyopathy was higher among same day as compared to sequential recipients (20% vs 12%,  $p=0.02$ , see Table 1). Prior to hybrid treatment, 55 (11.7%) of patients underwent previous catheter ablation.

Among all patients in the dataset, 28% had their left atrial appendage (LAA) excluded and this occurred more often in the sequential vs same day hybrid procedure (47% vs. 9%,  $p<0.001$ ).

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Mean length of stay for all hybrid was  $4.0 \pm 2.1$  days with no significant difference between hybrid groups (4.1 vs. 3.8 days,  $p=0.1579$ ). Most (89%) of the endocardial procedures in the sequential group were conducted as outpatient procedures.

**Table 1. Baseline Characteristics**

	Valve Disease	Previous Arrhythmia	Cardiomyopathy	LAA Management	Hospital Length of Stay
Same Day Procedure	30%	37%	20%	9%	4.1
Sequential Procedure	45%	48%	12%	47%	3.8
P-Value	0.006	0.01	0.02	0.001	0.1579

LAA=left atrial appendage management using exclusion device

A total of 9% of patients had a 30-day readmission and there were no reports of mortality within the first week post-procedure.

Mean all-cause hospital admission rates declined 16% and 50% during years one and two, respectively, ( $p<0.0001$ , Table 2). Maximal hospital admissions for any given patient decreased from six events in the pre-treatment period to two events in the second year after hybrid ablation ( $p<0.0001$ ). Hospital length of stay among admissions decreased from 1.9 to 0.9 days,  $p<0.0001$  during year two with first occurrence of hospital admission after hybrid ablation at  $253 \pm 223$  days.

Among hospital admissions post-treatment, AF as the primary diagnosis declined by 56% and 79% at one- and two-years post-treatment ( $p<0.0001$ ), respectively. All cause ED visits decreased significantly following hybrid ablation, decreasing by 38% per patient by year 2. ( $p<0.0001$ ). Similarly, AF as the primary diagnosis for ED visits decreased by 63% and 73% at one- and two-years post-treatment ( $p<0.0001$ ). Cardioversions following intervention decreased significantly, and by year 2 was reduced by 84% ( $p<0.0001$ ). Finally, repeat catheter ablation for AF decreased over time, reduced by 46% by year 2 ( $p<0.0049$ ).

Annual all-cause hospital costs for AF patients post-hybrid significantly decreased by year two and overall annual hospital costs, including inpatient and outpatient hospital costs declined per patient by 11% ( $p<0.001$ ), in the second year compared to pre-treatment. When amortized yearly, over all per patient cost savings to the health system was over \$1,400 by year 2 ( $p<0.001$ ).<sup>10</sup>

**Table 2. Overall Hospital admissions, AF related Hospital admissions, ED visits, Cardioversions, Repeat Catheter ablation, Overall Hospital Spend in Year 2\* Post-index Hybrid Ablation**

Overall hospital admissions after index procedure	Overall annual hospital costs	Cardioversions	Repeat Catheter Ablation
Declined 50% $p<0.0001$	Declined -11% ( $p<0.001$ )	Declined 84%, $p<0.0001$	Declined 46% $p=0.0049$

\*Year 2 post-treatment defined as after epicardial and endocardial (hybrid) ablations, same day or sequential days for procedures  
AF= atrial fibrillation; ED= emergency department. In regression analysis, older age was associated with higher cost.

### Key Takeaways

- In patients who undergo hybrid surgical ablation for AF, lower healthcare resource use was observed following the hybrid ablation treatment. Lower total healthcare spend was most likely a result from reduced hospital admission rate, ED visits, cardioversions, and repeat catheter ablations following hybrid ablation.
- Results may support positive hospital quality metrics in difficult-to-treat AF patients.

### Limitations

- Administrative databases contain less clinical information as compared to randomized trials and may be subject to selection bias.
- Physician fees and drug costs (anti-arrhythmic drug therapy, etc.) were not available, thus cost savings were likely underreported.
- A direct comparison to catheter ablation was not conducted.

### Reference:

1. Amin, A.K., Billakanty, S.R., Manocchia, M. et al. (2022). Healthcare Utilization and Costs in Patients with Atrial Fibrillation before and after Hybrid Ablation JAFib-EP, 15(6).
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10. Data on file at AtriCure Inc.

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