# Statistical Methods

We performed a retrospective observational analysis of atrial fibrillation (AF) ablation procedures to evaluate the effect of the Affera pulsed-field ablation (PFA) system on total procedure duration. The analytic cohort included all non–PFA AF ablations performed in the six months prior to Affera adoption (pre-Affera baseline), all Affera cases performed after adoption, and all non–PFA AF ablations performed after Affera introduction. Inclusion of both pre- and post-Affera non–PFA procedures allowed estimation of secular efficiency trends and separation of technology-specific effects from temporal changes in practice.

Procedure duration was modeled using a linear mixed-effects framework with the natural logarithm of duration as the dependent variable. Fixed effects included Affera use, procedural complexity (pulmonary vein isolation [PVI] vs. PVI with additional ablation [PVI+]), calendar time, and an interaction term assessing whether the Affera effect differed between PVI and PVI+ procedures. Operator identity was included as a random intercept to account for baseline differences in operator efficiency.

# Results

A total of 1,752 AF ablation procedures performed by 11 operators met inclusion criteria, including 513 pre-Affera non–PFA procedures, 225 post-Affera non–PFA procedures, and 1,014 Affera procedures. Of these, 617 were PVI-only and 1,135 were PVI+.

## Procedure Durations

| Group | n | Mean (min) | Median (min) |
|---|---|---|---|
| Pre-Affera non–PFA (all) | 513 | 97.5 | 92.0 |
| Pre-Affera non–PFA (PVI) | 180 | 84.5 | 80.0 |
| Pre-Affera non–PFA (PVI+) | 333 | 104.5 | 98.0 |
| Post-Affera non–PFA (all) | 225 | 87.5 | 84.0 |
| Post-Affera non–PFA (PVI) | 76 | 71.9 | 74.0 |
| Post-Affera non–PFA (PVI+) | 149 | 95.3 | 88.0 |
| Affera (all) | 1,014 | 74.2 | 69.0 |
| Affera (PVI) | 361 | 65.6 | 62.0 |
| Affera (PVI+) | 653 | 78.9 | 73.0 |

## Mixed-Effects Model Estimates

After adjustment for operator-level variation and secular time trends, use of the Affera PFA system was associated with an 8.1% reduction in procedure duration for PVI-only cases (95% CI: 2.3% to 13.6%). PVI+ procedures were 32% longer than PVI procedures overall (95% CI: 26% to 39%). The combined effect of Affera for PVI+ procedures corresponded to a 14.3% reduction in duration, representing an expected savings of approximately 12–15 minutes for a

| Effect | Estimate (log scale) | 95% CI | Percent Change |
|---|---|---|---|
| Affera use (PVI) | -0.085 | [-0.146, -0.023] | -8.1% |
| Affera effect in PVI+ (additional) | -0.064 | [-0.128, -0.000] | -6.2% |
| Calendar time (per day) | -0.001 | [-0.001, -0.000] | -0.1% per day |
| PVI+ vs. PVI | 0.280 | [0.230, 0.330] | +32.3% |

typical complex ablation. The secular trend indicated a 0.1% daily improvement in procedure duration, corresponding to roughly 27–30% annual gains independent of technology.

Weighting by the distribution of PVI and PVI+ procedures, the overall adjusted effect of Affera across all AF ablations was a 12.1% reduction in procedure duration.

# Conclusion

After accounting for secular improvements in laboratory efficiency and operator-level differences, the Affera PFA system was associated with meaningful reductions in AF ablation duration, particularly for more complex PVI+ procedures.