SUPPLEMENTARY MATERIAL

Supplementary Table 1: PubMed Search Strategy

("atrial fibrillation" [mesh] OR "atrial fibrillation" [tw]) AND (ablation [tw] OR "catheter ablation" [mesh] OR "catheter ablation" [tw] OR (ablation [ti] AND "pulmonary veins" [mesh]) OR "pulmonary vein" [tw] OR rotor* [tw] OR FIRM [tw] OR focal impulse [tw] OR driver [tw] OR “complex fractionated atrial electrogram” [tw] OR CFAE [tw] OR “complex fractionated electrogram” [tw] OR CFE [tw] OR “continuous electrical activity” [tw] OR CEA [tw] OR “fractionated electrogram” [tw] OR “ganglionated plexus” [tw] OR “ganglionated plexi” [tw] OR “autonomic denervation” [tw] OR “right atrial” [tw] OR “flutter line” [tw] OR “roof line” [tw] OR “superior vena cava isolation” [tw] OR linear [tw] OR "antral isolation" [tw] OR radiofrequen* [tw] OR cryocatheter* [tw] OR "cryosurgery" [mesh] OR cryosurg* [tw] OR cryoballoon* [tw] OR "cryo-balloon" [tw] OR "laser balloon" [tw] OR "force contact" [tw] OR cryocatheter* [tw]) NOT ("animals" [mesh] NOT "humans" [mesh]) AND english [lang] NOT ("Atrioventricular Node" [mesh] OR "Wolff-Parkinson-White Syndrome" [mesh] OR "Wolff-Parkinson-White" [tw] OR wpw [tw] OR "atrioventricular junction" [tw] OR "Atrioventricular conduction" [tw] OR "accessory pathway" [tw] OR "accessory pathways" [tw] OR "Accessory atrioventricular" [tw] OR maze [tw] OR letter [pt] OR "review" [pt] OR "editorial" [pt] OR "case reports" [pt] OR "case report" [ti]) AND ("1990/01/01"[PDAT] : "3000/12/31"[PDAT])

Supplementary Table 2: Exclusion Criteria

1. No treatment of interest (i.e., ablation of AF during surgery, catheter ablation of non-AF arrhythmias, ablate and pace procedure)
2. No outcome of interest (i.e., no/unclear description of success rate, adverse outcomes of interest, post-ablation quality of life, procedure cost)
3. Non-observational/randomized article type (i.e., review article, meta-analysis, editorial, letter, comment, case report, abstract)
4. Treatment arm does not report ablation lesion set, energy type, and at least one other aspect of ablation approach (i.e., equipment, mapping strategy or catheter, pre-procedural imaging, sedation technique, method of ascertaining electrical isolation)
5. Treatment arm with different ablation lesion sets for paroxysmal and non-paroxysmal patients without reporting outcomes of interest by AF type
6. Treatment arm with inconsistent linear ablation lesion set
7. Treatment arm with inconsistent CTI ablation lesion set (see CTI exclusion exception)
8. Treatment arm with inconsistent SVC ablation lesion set (see SVC exclusion exception)
9. Treatment arm performs macroreentrant AT ablations (see AT exclusion exception)
10. Treatment arm with unspecified/heterogeneous repeat ablation lesion set without reporting single procedure outcome of interest
11. Treatment arm with heterogeneous AF ablation lesion set, not otherwise specified (e.g., proceduralist discretion, etc)
12. Treatment arm uses heterogeneous energy types
13. Treatment arm uses heterogeneous sedation technique
14. <40 patients in a treatment arm
15. <30 day follow-up
16. Treatment arm (or sub-cohort of treatment arm) without any patient baseline characteristics reported
17. Non-adult population (any patients <18)
18. Non-English article
19. Non-human study
20. Study published prior to 1990
21. Identical cohort or sub-cohort study with entire cohort separately included
22. Full manuscript not available for review

Supplementary Table 3: Exclusions Exceptions and Clarifications

1. If treatment arm employs a clear and consistent single procedure stepwise ablation lesion set or repeat ablation lesion set (including ERAF) to achieve restoration of sinus rhythm (e.g., first PVI, then mitral isthmus), then do NOT exclude for reason "Treatment arm with heterogeneous ablation lesion sets, not otherwise specified."
2. If repeat ablation (including ERAF) meets exclusion criteria, however, initial ablation meets inclusion criteria AND single procedure outcome of interest is reported, include.
3. If treatment arm performs CTI ablation for patients with history of, or inducible, atrial flutter, then do NOT exclude for reason "Treatment arm with inconsistent CTI ablation lesion set."
4. If treatment arm performs SVC ablation/isolation for AF triggers when identified, then do NOT exclude for reason "Treatment arm with inconsistent SVC ablation lesion set."
5. If treatment arm specifies that AT ablations are for focal automaticity, then do NOT exclude for reason “Treatment arm performs macroreentrant AT ablations.”
6. If treatment arm performs ablation of "ectopic foci" when identified, then do NOT exclude for reason "Treatment arm with heterogeneous ablation lesion sets, not otherwise specified."
7. If treatment arm performs additional ablation to complete PVI after balloon ablation, then do NOT exclude for reason "Treatment arm with heterogeneous ablation lesion sets, not otherwise specified " as long as additional ablation approach only differs by ablation catheter type (i.e., if cryoballoon PVI touched up with RFA, exclude).
8. If treatment arm uses varied power settings (watts), then do NOT exclude for reason "Treatment arm with heterogeneous ablation lesion sets, not otherwise specified."
9. If treatment arm uses varied duration of ablation (seconds), then do NOT exclude for reason "Treatment arm with heterogeneous ablation lesion sets, not otherwise specified."
10. If treatment arm uses different sized balloons, then do NOT exclude for reason "Treatment arm with heterogeneous ablation lesion sets, not otherwise specified."
11. If study reports adverse outcomes of interest or procedure cost, then do not exclude for reason follow-up < 30 days.
12. If treatment arm does not report clear duration of follow-up and only outcome of interest is success rate, then exclude for reason "no outcome of interest".
13. If treatment arm only reports adverse outcome that is not of interest (i.e., adverse outcome not defined in adverse outcome abstraction protocol), then exclude for reason "no outcome of interest".
14. If treatment arm only reports outcomes of interest on a sub-cohort of patients stratified after ablation procedure (e.g., AF recurrence rate in the sub-cohort of patients who did not recur by 6 months), then exclude for reason "no outcome of interest".
15. If two studies use identical cohorts and report the same outcome of interest, exclude cohort with shorter follow-up. If equal follow-up, exclude second published.

Supplementary Table 4: Data Assumptions and Simplifications

1. For Ablation equipment group, if treatment arm uses different equipment from a single equipment group (e.g., treatment arm uses different sized conventional catheters), abstract as respective equipment group. If treatment arm uses different equipment from different equipment groups (e.g., conventional catheter and contact force catheters), abstract as "heterogeneous equipment groups".
2. For Adverse outcomes, only abstract adverse outcomes if there is at least clear and convincing evidence that adverse outcomes are from single procedure. If beyond a reasonable doubt adverse outcomes are from single procedure (i.e., explicitly stated that results are single procedure), select "beyond a reasonable doubt results single procedure."
3. For AF type, record non-paroxysmal AF that isn't subdivided into persistent, long-standing persistent, and permanent as "non-paroxysmal".
4. For Duration of follow-up, if treatment arm reports success rates at different durations of follow-up, abstract success rate closest to median/mean follow-up.
5. For Electrical isolation/ablation success: procedural success rate, if procedural success rates reported for components of ablation lesion set (e.g., PVI and lines) record composite procedural success rate. If composite procedural success rate cannot be calculate, then select "Not reported."
6. For Procedure success rate, if clear and convincing evidence that multiple ablations were NOT performed (i.e., no mention of repeat ablation procedures, average ablations performed per patient, etc.), abstract as single procedure success rate. If beyond a reasonable doubt (i.e., explicitly stated that results are single procedure), select "beyond a reasonable doubt results single procedure".
7. For Screening method/Interval of ascertaining AF recurrence, if symptoms prompted rhythm analysis, do NOT record subsequent rhythm analysis as a screening method. Record number of times each screening method was checked over mean/median duration of follow-up. If screening frequency range used (e.g., Holter performed every 1-3 months), calculate times checked over mean/median duration of follow-up using most conservative frequency (i.e., every 3 months).

Supplementary Table 5: Data Abstraction Categories

Study Level

1. Authors
2. Title
3. Journal of publication
4. Year of publication
5. Total number of patients included
6. Study design
7. Institutional participation
8. Country in which study was performed

Treatment Arm Level

Patient Level

1. Age
2. Sex
3. Comorbidities
4. CHADS2 Score
5. CHA2DS2-VASc Score
6. ECHO Parameters

AF level

1. AF type
2. AF duration
3. AF burden at baseline

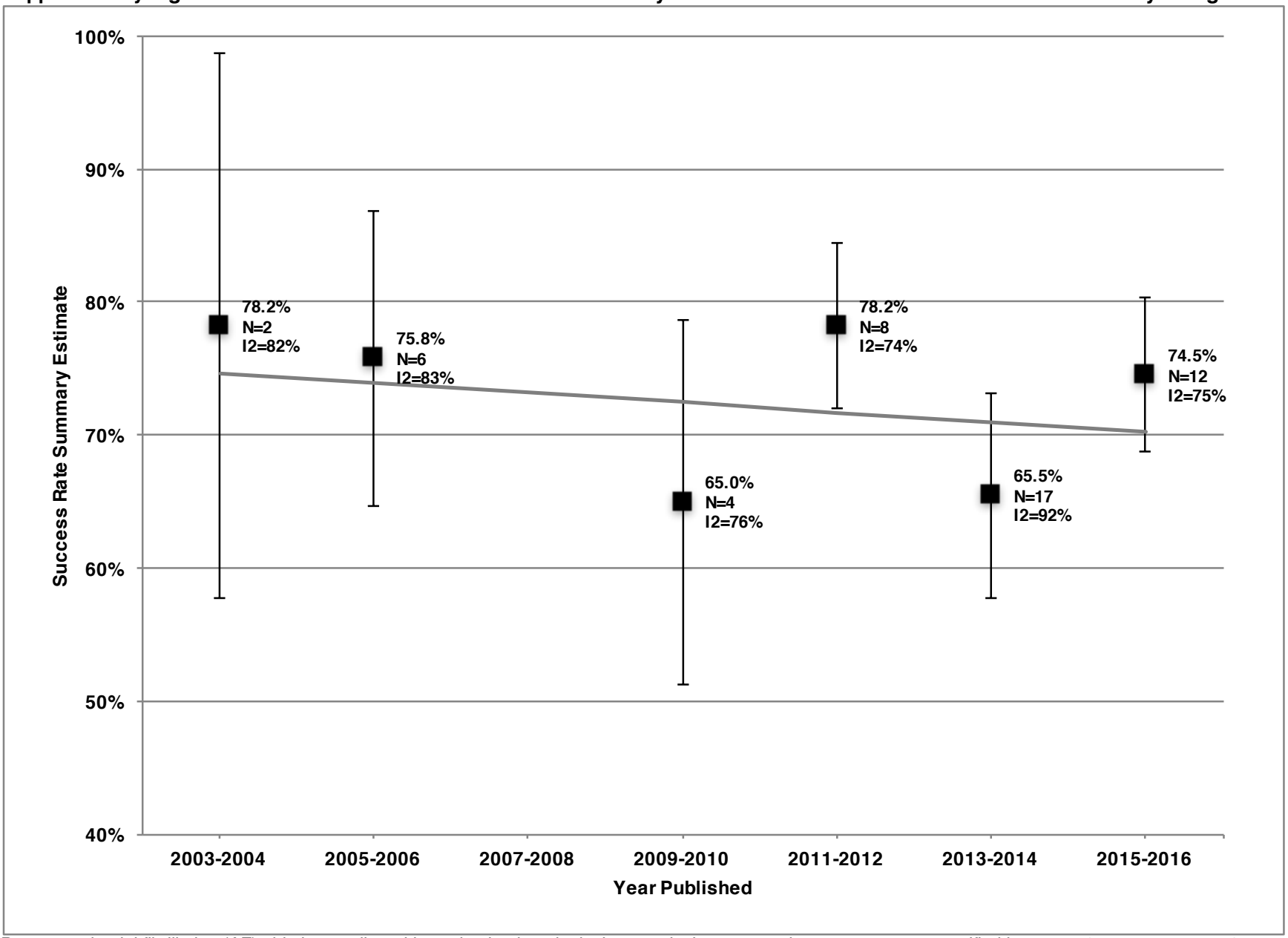
Procedure Level

1. Ablation lesion set
2. Ablation energy
3. Ablation equipment group
4. Mapping strategy
5. Mapping catheter
6. Pre-procedure imaging
7. Transeptal puncture
8. Electrical isolation/ablation success: procedural success rate
9. Electrical isolation/Existence of AF triggers: method of assessment
10. Sedation technique
11. Intra-ablation anticoagulation
12. Procedure duration
13. Fluoroscopy time
14. Ablation volume

Outcome Level

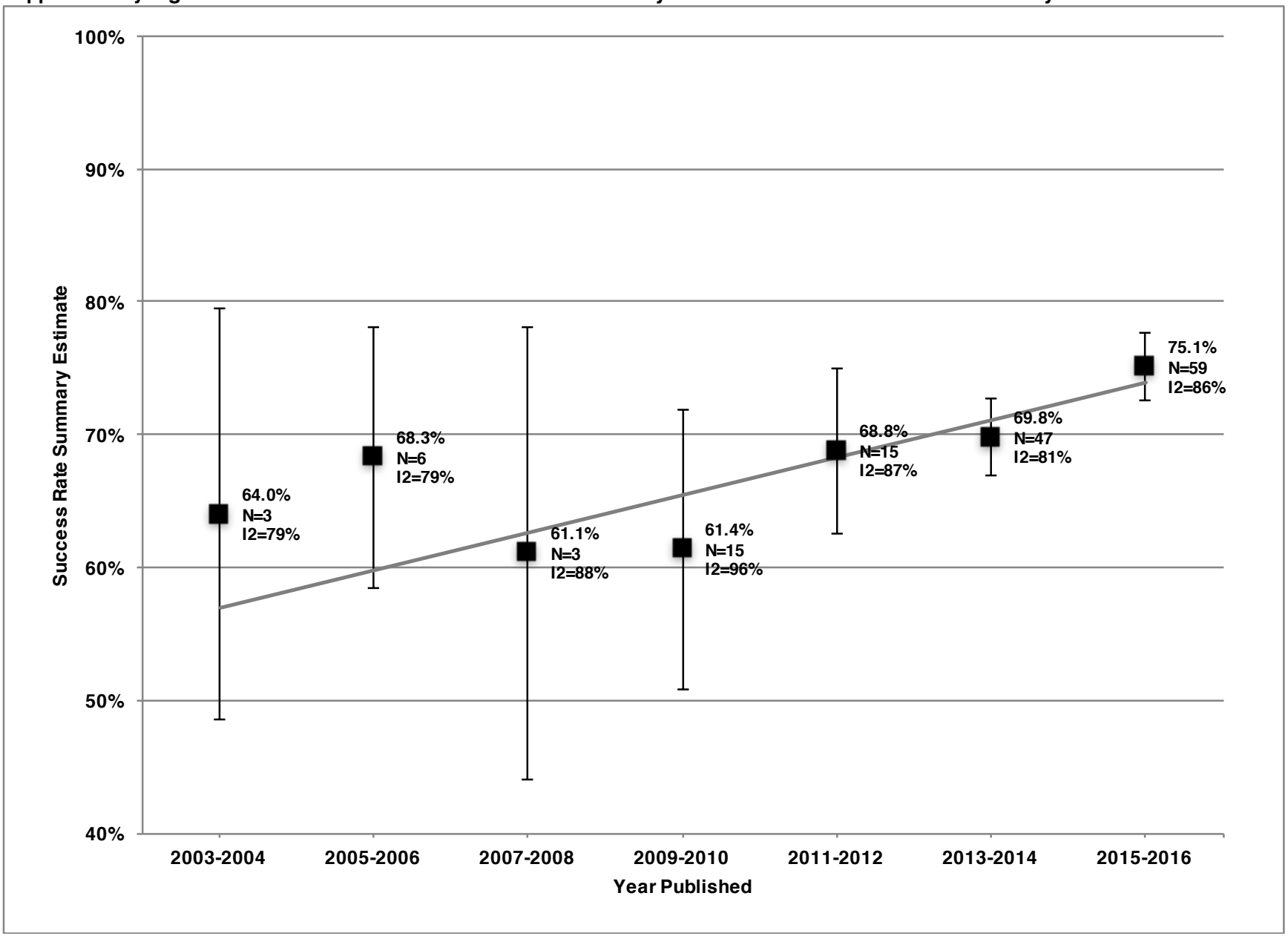
1. Duration of follow-up
2. Definition of AF recurrence
3. Screening method/Interval of ascertaining AF recurrence
4. Procedure success rate
5. Adverse outcomes
6. Post-procedure quality of life
7. Procedure cost

Supplementary Figure 1: Secular Trends in Success Rate for Paroxysmal AF Ablation Studies with Randomized Study Design



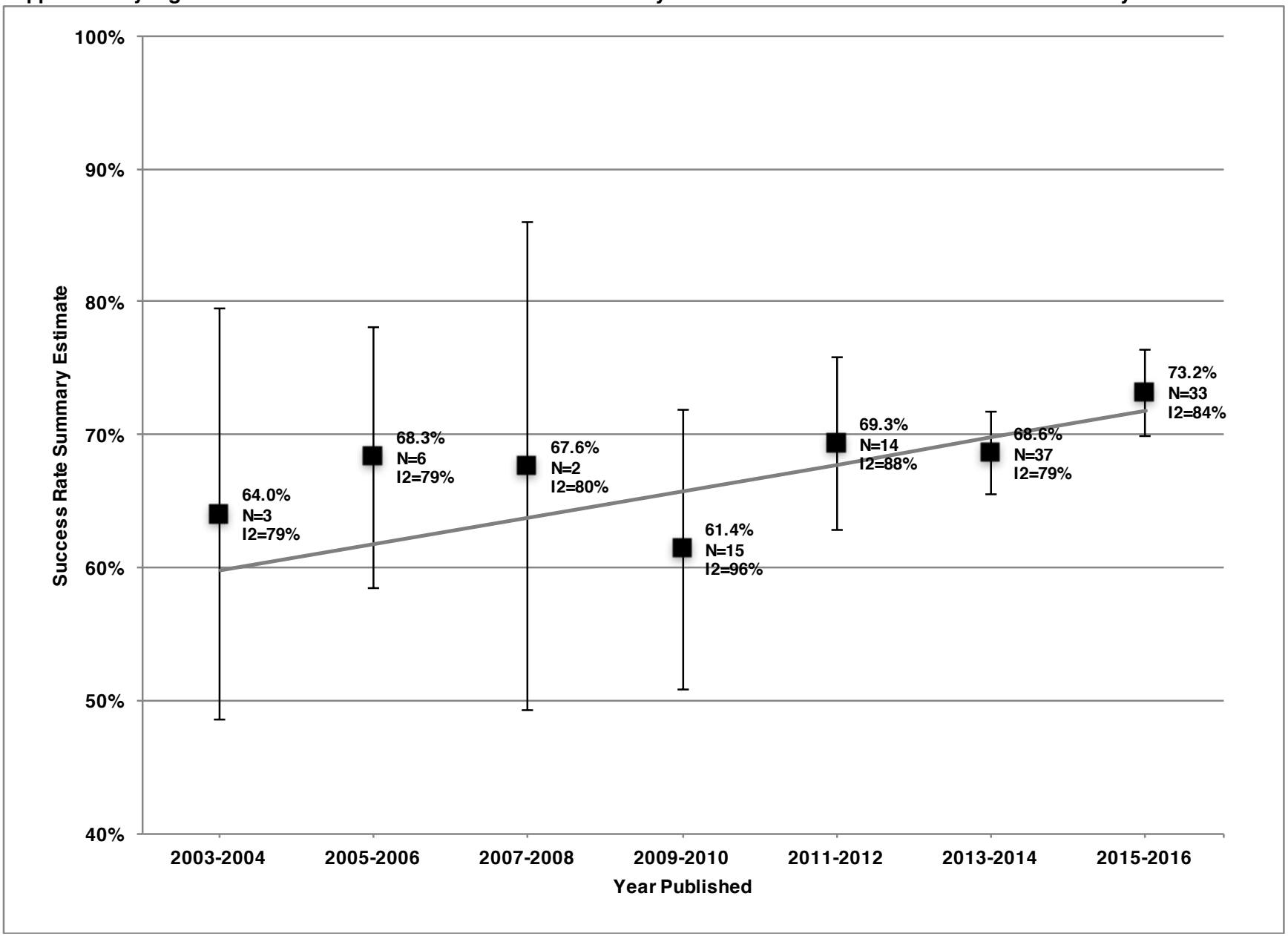
Paroxysmal atrial fibrillation (AF) ablation studies with randomized study design, any lesion sets, and any energy type, stratified by year. 49 treatment arms, 24 studies, 3,521 patients. Unadjusted summary estimates reported (-0.4%/year; 95% CI: -1.4% – 0.7%; p 0.48; I^2 86%). Overall summary estimate 71.5% (95% CI: 67.8% – 75.2%; I^2 86%). N = treatment arms.

Supplementary Figure 2: Secular Trends in Success Rate for Paroxysmal AF Ablation Studies with PVI Only



Paroxysmal atrial fibrillation (AF) ablation studies with any study design, pulmonary vein isolation (PVI) lesion set only, and any energy type, stratified by year. 148 treatment arms, 115 studies, 16,500 patients. Unadjusted summary estimates reported (1.4%/ year; 95% CI: 0.7% – 2.1%; $p < 0.001$; I^2 88%). Overall summary estimate 70.5% (95% CI: 68.4% – 72.6%; I^2 90%). N = treatment arms.

Supplementary Figure 3: Secular Trends in Success Rate for Paroxysmal AF Ablation Studies with PVI and RF Only



Paroxysmal atrial fibrillation (AF) ablation studies with any study design, pulmonary vein isolation (PVI) lesion set only, and radiofrequency (RF) energy type only, stratified by year. 110 treatment arms, 87 studies, 12,479 patients. Unadjusted summary estimates reported (1.0%/year; 95% CI: 0.2% – 1.8%; p 0.01; I^2 88%). Overall summary estimate 68.8% (95% CI: 66.4% – 71.2%; I^2 90%). N = treatment arms.