

Postoperative Atrial Fibrillation and Renal Failure – A Systematic Review

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OBJECTIVE

To assess the association between renal failure and postoperative atrial fibrillation (POAF) in cardiac surgery patients

CONCLUSIONS

The literature does not consistently report an association between POAF and preoperative renal failure

The literature consistently reports an association between POAF and postoperative renal failure

This systematic literature review highlights the need for further research into the association between POAF and preoperative renal failure

INTRODUCTION

- Postoperative atrial fibrillation (POAF) is a common complication following cardiac surgery with an incidence of approximately 35%¹
- Currently, there is no approved treatment indicated for the prevention of POAF
- POAF is associated with increased risk of stroke, mortality, and renal failure and increased healthcare cost and resource utilization (HCRU)^{1,2}
- Postoperative renal failure is associated with an increased risk of mortality and HCRU³
- The direction and magnitude of the association between POAF and renal failure is not well defined

METHODS

Table 1. Systematic Literature Review PECOTS Criteria

PECOTS	Objective 1: To assess the association between preoperative renal failure and POAF		Objective 2: To assess the association between POAF and postoperative renal failure	
	Inclusion Criteria	Exclusion Criteria	Inclusion Criteria	Exclusion Criteria
Population	• Adults (18+) • Cardiac surgery patients (CABG and/or valvular)	• History of atrial fibrillation or arrhythmia prior to surgery	• Adults (18+) • Cardiac surgery patients (CABG and/or valvular)	• History of atrial fibrillation or arrhythmia prior to surgery • Post-operative new-onset acute kidney injury without dialysis
Exposure	• CKD (GFR/CrCl <60 mL/min) or Dialysis		• POAF	
Comparator	• No CKD or Dialysis		• No POAF	
Outcomes & Timing	• POAF within 30 days of surgery		• Postoperative renal failure defined as the need for new-onset dialysis within 30 days of surgery	
Study	• Prospective, retrospective studies • Publication: 2010-2022 • Any country • English Text	• Grey literature, case reports, reviews, letters, comments and editorials, abstracts, systematic literature reviews, and meta-analysis were not included	• Prospective, retrospective studies • Publication: 2010-2022 • Any country • English text	• Grey literature, case reports, reviews, letters, comments and editorials, abstracts, systematic literature reviews, and meta-analysis were not included

RESULTS

Study and Patient Characteristic

- For Objective 1, 16 studies, spanning more than 13 countries and capturing 101,691 patients, were used to assess the association between preoperative renal failure and POAF (Supplementary Table 2)
- For Objective 2, 7 studies, spanning more than 6 countries and capturing 65,199 patients, were used to assess the association between POAF and postoperative renal failure (Supplementary Table 3)

Figure 1. Objective 1 PRISMA Flow Diagram

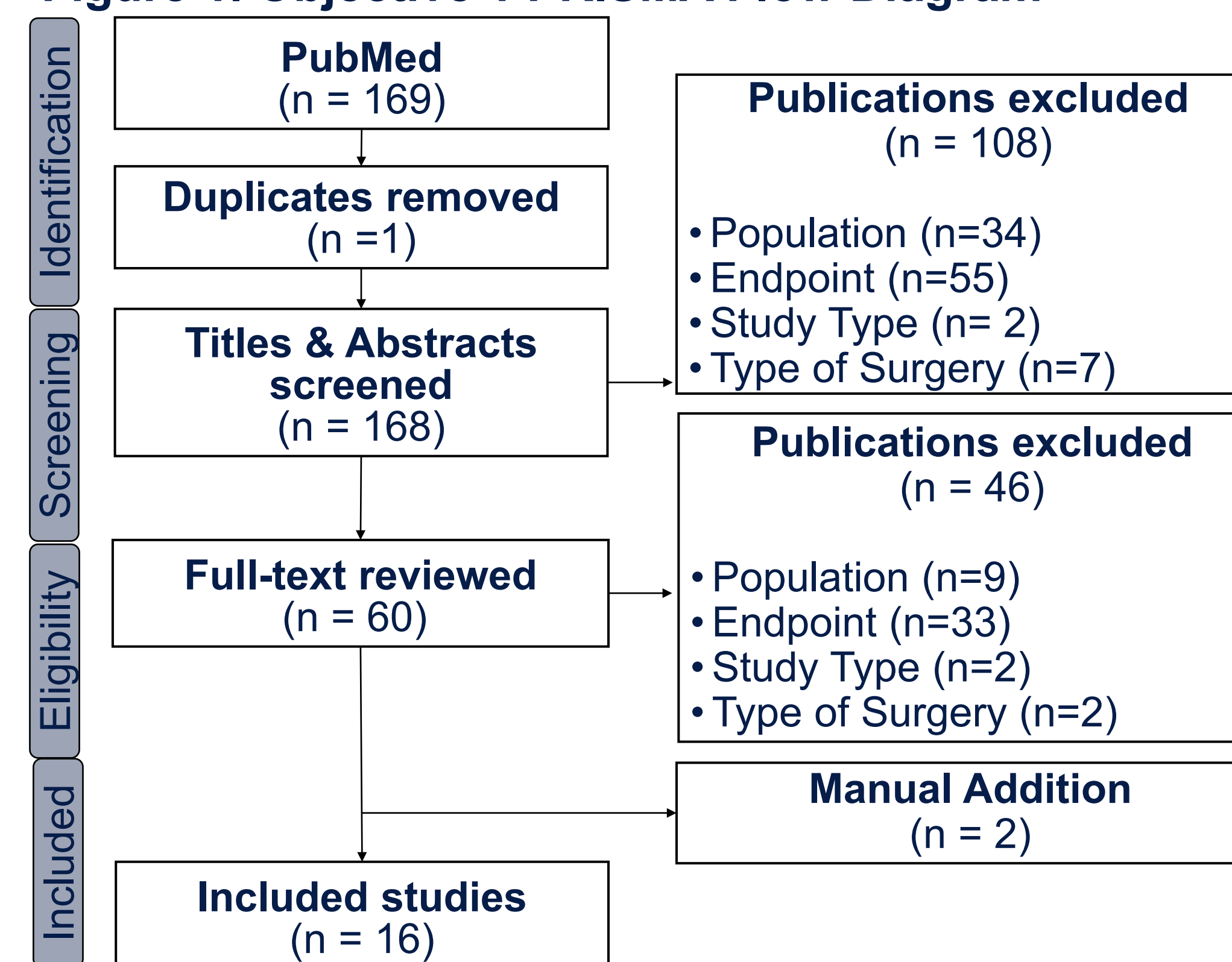
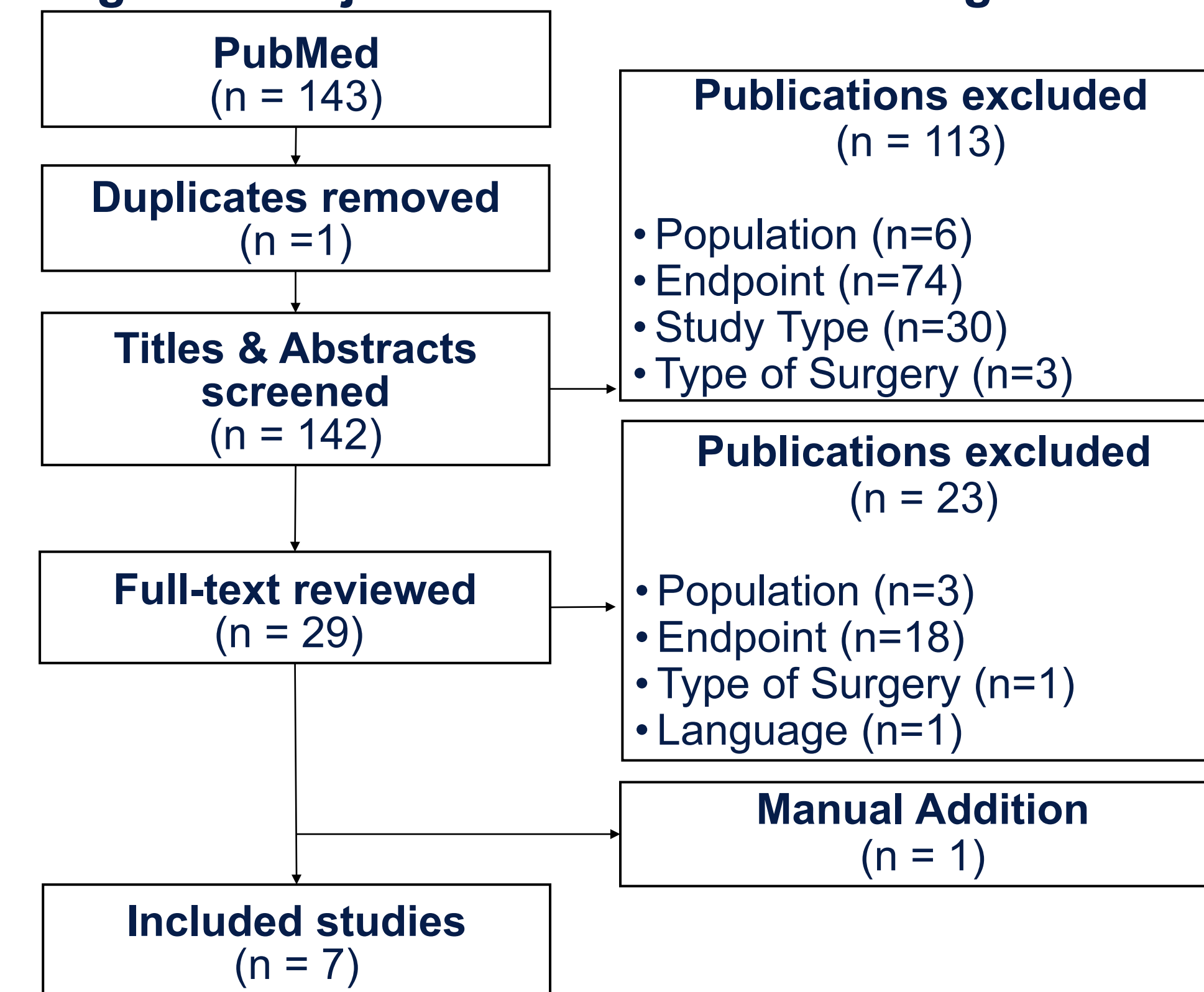


Figure 2. Objective 2 PRISMA Flow Diagram



Objective 1 Results - Preoperative Renal Failure to POAF

- 13 of the 16 studies showed an increase in risk (13–407%) or odds (34-135%) for POAF in those with preoperative renal failure compared to those without preoperative renal failure. The results were statistically significant (p-value<0.05) in 2 of these 13 studies. The remaining 11 studies did not assess statistical significance. (Table 2)
- 3 of the 16 studies showed a decrease in risk (6–15%) for POAF in those with preoperative renal failure compared to those without preoperative renal failure. The results were not statistically significant in all 3 of these studies. (Table 2)

Table 2. Objective 1 Results

Author	Year	Postoperative Atrial Fibrillation		Relative Risk for POAF (Renal Failure/No Renal Failure)
		No Renal Failure (%)	Renal Failure (%)	
Barbosa, RR ^a	2011	293 (8.3)	58 (16)*	1.93
Bianco, V ^b	2021	4204 (35.2)	96 (32.8) ^{NS}	0.93
Chua, S ^a	2013	76 (43.2)	44(49.4)*	1.14
Chua, S ^a	2015	44 (19.6)	59 (47.2) [∞]	2.41
El-Chami, MF ^b	2010	2919 (18.3)	66 (26.2) [∞]	1.43
Limite, LR ^a	2014	NR	NR	2.35 (1.25–4.48) ^Ω
Mariscalco, G ^b	2014	4529 (26.4)	32 (38.6) [∞]	1.46
Musa, AF ^b	2018	172 (27.7)	11 (64.7) [∞]	2.33
Perrier, S ^a	2017	257 (23.5)	54 (27) ^{NR}	1.34 (1.03-1.74) ^{NR}
Potdar, Sp ^a	2022	83 (7.6)	5 (38.5) [∞]	5.07
Saxena, A ^b	2011	5347 (28.3)	200 (32.1) [∞]	1.13
Saxena, A ^b	2013	716 (35.2)	9 (30) ^{NS}	0.85
Shinmony, A ^a	2014	180 (24.2)	17 (70.8) [∞]	2.93
Taha, A ^b	2021	7340 (30.1)	28 (28.2) ^{NS}	0.94
Todorov, H ^b	2017	178 (23.7)	16 (59.3) [∞]	2.50
Tsai, Y ^a	2015	74 (52.9)	52 (60.5) [∞]	1.14

Objective 2 Results - POAF to Postoperative Renal Failure

- All 7 studies showed an increase in risk (117–396%) or odds (132%) for postoperative renal failure in those with POAF compared to those without POAF. The results were statistically significant (p-value<0.05) in all 7 studies. (Table 3)

Table 3. Objective 2 Results

Author	Year	Postoperative Renal Failure		Relative Risk for Renal Failure (POAF / No POAF)
		No POAF (%)	POAF (%)	
Almassi, HG	2011	3 (0.4)	5 (2)*	4.90
Bianco, V	2021	89 (2.1)	211 (4.9)*	2.37
El-Chami, MF	2010	57 (0.4)	64 (2.1)*	4.96
Mariscalco, G	2014	102 (0.8)	119 (2.6)*	3.25
Musa, AF	2018	9 (2.0)	12 (6.6)*	3.31
Saxena, A	2011	376 (2.7)	391 (7.0)*	2.32 (1.98-2.72) ^Ω
Saxena, A	2013	63 (5.6)	108 (12.1)*	2.17

Abbreviations: POAF, Postoperative Atrial Fibrillation; *, Significant P-value < 0.05; ∞, P-value not reported between RF/No RF groups, but p-value <0.05 between POAF/No POAF groups for preoperative renal failure; Ω, Reported significant (p-value<0.05) adjusted odds ratio with 95% Confidence Interval; NR, Not Reported/Significance Not Reported; NS, Not Significant; a, Renal Failure defined as Globular Filtration Rate or Creatinine Clearance <60 mL/min; b, Renal Failure Defined as Dialysis or Renal Replacement Therapy; RF, Renal Failure; PECOTS, Population, Exposure, Comparator, Outcome, Timing, Study Design; HCRU, Healthcare Cost and Resource Utilization.

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- Remainder of references are in the Supplementary Appendix (Scan QR Code to access)

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