

PICO SEARCH ASSIGNMENT WORKSHEET

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Brief description of patient problem/setting (summarize the case very briefly)

64 yo Asian female presents to the ED w/ palpitations, mild SOB, and fatigue. EKG shows atrial fibrillation with rapid ventricular response. No prior history of AF. Hemodynamically stable. You are deciding between rate control vs rhythm control.

Search Question: In adults presenting to the ED with new-onset atrial fibrillation, does rhythm control compared to rate control improve clinical outcomes and symptom resolution?

Question Type: What kind of question is this? (boxes now checkable in Word)

☐ Prevalence

☐ Screening

☐ Diagnosis

☐ Prognosis

☒ **Treatment**

☐ Harms

Assuming that the highest level of evidence to answer your question will be meta-analysis or systematic review, what other types of study might you include if these are not available (or if there is a much more current study of another type)?

Please explain your choices

If meta-analysis or systematic review is not available, randomized controlled trials (RCTs) would be most useful because they directly compare rate control and rhythm control strategies while minimizing bias. RCTs allow for evaluation of outcomes such as symptom improvement, recurrence of atrial fibrillation, and hospitalization rates. In addition, cohort studies may be included since they reflect real-world ED and outpatient management and can provide insight into long-term outcomes, including stroke risk and mortality. Although cohort studies are more prone to bias, they are valuable when RCT data is limited or when evaluating long-term effects.

PICO search terms:

P	I	C	O
Adults	Rhythm control	Rate control	Symptom resolution
Atrial fibrillation	Cardioversion	Beta-blockers	Recurrence
New-onset atrial fibrillation	Antiarrhythmics	Calcium channel blockers	Hospitalization
ED patients			Clinical Outcomes

Search tools and strategy used:

Please indicate what databases/tools you used, provide a list of the terms you searched together in each tool, and how many articles were returned using those terms and filters.

Explain how you narrowed your choices to the few selected articles. For example, if your search returned 25 articles among the several databases used, what was the process used to determine which four articles to use?

Database	Search Term Used	# of Results	Filters/Limiters Applied	Notes/Observers
PubMed	(adult OR adults) AND ("atrial fibrillation") AND ("rate control" OR "rhythm control") AND ("emergency department" OR acute)	93 results	Last 5 years, Free full text, English, Human studies	
Cochrane Library	("atrial fibrillation" OR AF) AND ("rate control" OR "rhythm control" OR cardioversion OR antiarrhythmic) AND (treatment OR management OR outcomes)	8 results	2021, 2022, 2023, 2024, 2025, 2026, English, Research articles	Limited results were returned using detailed search terms, so broader keywords were used. One relevant systematic review focusing on cardioversion as a rhythm control strategy was selected. Other studies were excluded as they focused on anticoagulation or non-acute management.
Google scholar	(adult OR adults) AND ("atrial fibrillation" OR AF) AND ("rate control" OR "rhythm control" OR cardioversion OR antiarrhythmic therapy) AND (treatment OR management OR clinical outcomes OR symptom resolution OR hospitalization OR mortality)	2,450 results	Since 2022, review articles	A large number of results were identified, so articles were screened by title and abstract for relevance to rate versus rhythm control strategies. Priority was given to systematic reviews and randomized controlled trials, including a meta-analysis comparing rate and rhythm control. Studies focusing on single treatment approaches or non-acute settings were excluded.

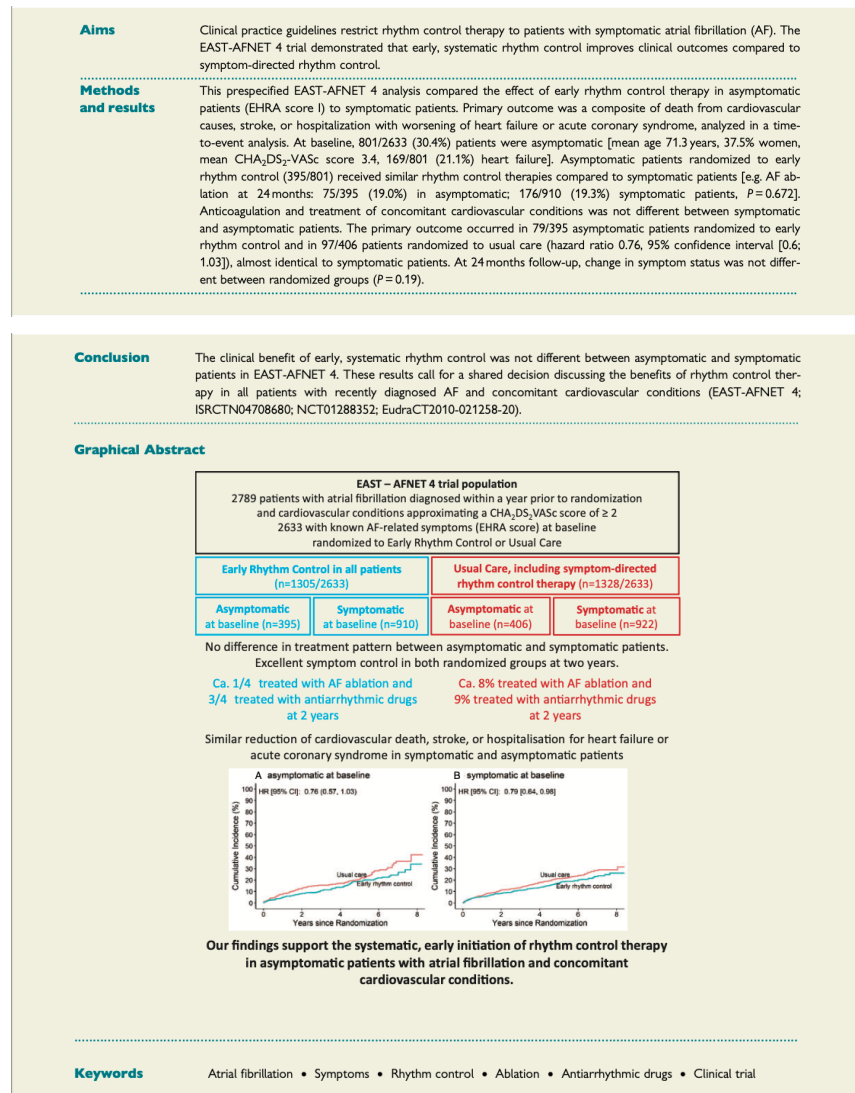
I used 3 databases – PubMed, Google Scholar, and Cochrane – which gave me 93, 2,450, and 8 results. I tried to keep everything recent, mostly within the last 5–10 years. There was some overlap between PubMed and Cochrane, especially with articles focused on rhythm control like cardioversion, which honestly made sense since there aren't that many strong studies directly comparing rate vs rhythm control. I still kept them because they were relevant to my PICO and had good evidence. Google Scholar gave the most results, but after going through them, a lot had to be excluded since they focused on chronic AF, post-ablation, or didn't actually compare rate vs rhythm control. I mainly focused on picking systematic reviews and RCTs that were more relevant to acute or ED settings.

Results found:

1. Systematic, early rhythm control strategy for atrial fibrillation in patients with or without symptoms: the EAST-AFNET 4 trial

Citation: Willems S, Borof K, Brandes A, Breithardt G, Camm AJ, Crijns HJGM, Eckardt L, Gessler N, Goette A, Haegeli LM, Heidbuchel H, Kautzner J, Ng GA, Schnabel RB, Suling A, Szumowski L, Themistoclakis S, Vardas P, van Gelder IC, Wegscheider K, Kirchhof P. Systematic, early rhythm control strategy for atrial fibrillation in patients with or without symptoms: the EAST-AFNET 4 trial. *Eur Heart J*. 2022 Mar 21;43(12):1219-1230. doi: 10.1093/eurheartj/ehab593. PMID: 34447995; PMCID: PMC8934687.

Article Type: Randomized controlled trial



Important Findings:

- Rhythm control was associated with decreased cardiovascular death and decreased stroke risk
- Decreased hospitalizations, especially related to heart failure
- No major difference in overall mortality between rate vs rhythm control

- Benefits were more noticeable with early rhythm control strategies
- Newer studies (with ablation/modern meds) show better outcomes compared to older trials

I chose this article because it directly compares rate and rhythm control strategies in patients with atrial fibrillation and looks at important clinical outcomes like cardiovascular death, stroke, and hospitalization. Since it's a meta-analysis of randomized controlled trials, it provides strong, high-level evidence that is very relevant to my PICO question. Even though it's not specific to the emergency department, the findings still apply because these are the same management decisions we make in the ED when patients present with new-onset atrial fibrillation. I also liked that it included more recent studies, which better reflect current practice.

2. External electrical and pharmacological cardioversion for atrial fibrillation, atrial flutter or atrial tachycardias: a network metaanalysis (Review)

Citation: Kukendrarajah K, Ahmad M, Carrington M, Ioannou A, Taylor J, Razvi Y, Papageorgiou N, Mead GE, Nevis IF, D'Ascenzo F, Wilton SB, Lambiase PD, Morillo CA, Kwong JSW, Providencia R. External electrical and pharmacological cardioversion for atrial fibrillation, atrial flutter or atrial tachycardias: a network meta-analysis. *Cochrane Database of Systematic Reviews* 2024, Issue 6. Art. No.: CD013255. DOI: 10.1002/14651858.CD013255.pub2. Accessed 29 March 2026.

Article Type: **Systematic review and network meta-analysis (Cochrane Review)**

ABSTRACT

Background

Atrial fibrillation (AF) is the most frequent sustained arrhythmia. Cardioversion is a rhythm control strategy to restore normal/sinus rhythm, and can be achieved through drugs (pharmacological) or a synchronised electric shock (electrical cardioversion).

Objectives

To assess the efficacy and safety of pharmacological and electrical cardioversion for atrial fibrillation (AF), atrial flutter and atrial tachycardias.

Search methods

We searched CENTRAL, MEDLINE, Embase, Conference Proceedings Citation Index-Science (CPCI-S) and three trials registers (ClinicalTrials.gov, WHO ICTRP and ISRCTN) on 14 February 2023.

Selection criteria

We included randomised controlled trials (RCTs) at the individual patient level. Patient populations were aged ≥ 18 years with AF of any type and duration, atrial flutter or other sustained related atrial arrhythmias, not occurring as a result of reversible causes.

Data collection and analysis

We used standard Cochrane methodology to collect data and performed a network meta-analysis using the standard frequentist graph-theoretical approach using the netmeta package in R. We used GRADE to assess the quality of the evidence which we presented in our

Main results

We included 112 RCTs (139 records), from which we pooled data from 15,968 patients. The average age ranged from 47 to 72 years and the proportion of male patients ranged from 38% to 92%.

Seventy-nine trials were considered to be at high risk of bias for at least one domain, 32 had no high risk of bias domains, but had at least one domain classified as uncertain risk, and one study was considered at low risk for all domains.

For paroxysmal AF (35 trials), when compared to placebo, anteroapical (AA)/anteroposterior (AP) biphasic truncated exponential waveform (BTE) cardioversion (RR: 2.42; 95% CI 1.65 to 3.56), quinidine (RR: 2.23; 95% CI 1.49 to 3.34), ibutilide (RR: 2.00; 95% CI 1.28 to 3.12), propafenone (RR: 1.98; 95% CI 1.67 to 2.34), amiodarone (RR: 1.69; 95% CI 1.42 to 2.02), sotalol (RR: 1.58; 95% CI 1.08 to 2.31) and procainamide (RR: 1.49; 95% CI 1.13 to 1.97) likely result in a large increase in maintenance of sinus rhythm until hospital discharge or end of study follow-up (certainty of evidence: moderate). The effect size was larger for AA/AP incremental and was progressively smaller for the subsequent interventions. Despite low certainty of evidence, antazoline may result in a large increase (RR: 28.60; 95% CI 1.77 to 461.30) in this outcome. Similarly, low-certainty evidence suggests a large increase in this outcome for flecainide (RR: 2.17; 95% CI 1.68 to 2.79), vernakalant (RR: 2.13; 95% CI 1.52 to 2.99), and magnesium (RR: 1.73; 95% CI 0.79 to 3.79).

For persistent AF (26 trials), one network was created for electrical cardioversion and showed that, when compared to AP BTE incremental energy with patches, AP BTE maximum energy with patches (RR 1.35, 95% CI 1.17 to 1.55) likely results in a large increase, and active compression AP BTE incremental energy with patches (RR: 1.14, 95% CI 1.00 to 1.131) likely results in an increase in maintenance of sinus rhythm at hospital discharge or end of study follow-up (certainty of evidence: high). Use of AP BTE incremental with paddles (RR: 1.03, 95% CI 0.98 to 1.09; certainty of evidence: low) may lead to a slight increase, and AP MDS Incremental paddles (RR: 0.95, 95% CI 0.86 to 1.05; certainty of evidence: low) may lead to a slight decrease in efficacy. On the other hand, AP MDS incremental energy using patches (RR: 0.78, 95% CI 0.70 to 0.87), AA RBW incremental energy with patches (RR: 0.76, 95% CI 0.66 to 0.88), AP RBW incremental energy with patches (RR: 0.76, 95% CI 0.68 to 0.86), AA MDS incremental energy with patches (RR: 0.76, 95% CI 0.67 to 0.86) and AA MDS incremental energy with paddles (RR: 0.68, 95% CI 0.53 to 0.83) probably result in a decrease in this outcome when compared to AP BTE incremental energy with patches (certainty of evidence: moderate). The network for pharmacological cardioversion showed that bepridil (RR: 2.29, 95% CI 1.26 to 4.17) and quinidine (RR: 1.53, (95% CI 1.01 to 2.32) probably result in a large increase in maintenance of sinus rhythm at hospital discharge or end of study follow-up when compared to amiodarone (certainty of evidence: moderate). Dofetilide (RR: 0.79, 95% CI 0.56 to 1.44), sotalol (RR: 0.89, 95% CI 0.67 to 1.18), propafenone (RR: 0.79, 95% CI 0.50 to 1.25) and pilsicainide (RR: 0.39, 95% CI 0.02 to 7.01) may result in a reduction in this outcome when compared to amiodarone, but the certainty of evidence is low.

For atrial flutter (14 trials), a network could be created only for antiarrhythmic drugs. Using placebo as the common comparator, ibutilide (RR: 21.45, 95% CI 4.41 to 104.37), propafenone (RR: 7.15, 95% CI 1.27 to 40.10), dofetilide (RR: 6.43, 95% CI 1.38 to 29.91), and sotalol (RR: 6.39, 95% CI 1.03 to 39.78) probably result in a large increase in the maintenance of sinus rhythm at hospital discharge or end of study follow-up (certainty of evidence: moderate), and procainamide (RR: 4.29, 95% CI 0.63 to 29.03), flecainide (RR 3.57, 95% CI 0.24 to 52.30) and vernakalant (RR: 1.18, 95% CI 0.05 to 27.37) may result in a large increase in maintenance of sinus rhythm at hospital discharge or end of study follow-up (certainty of evidence: low). All tested electrical cardioversion strategies for atrial flutter had very high efficacy (97.9% to 100%).

The rate of mortality (14 deaths) and stroke or systemic embolism (3 events) at 30 days was extremely low.

Data on quality of life were scarce and of uncertain clinical significance. No information was available regarding heart failure readmissions. Data on duration of hospitalisation was scarce, of low quality, and could not be pooled.

Authors' conclusions

Despite the low quality of evidence, this systematic review provides important information on electrical and pharmacological strategies to help patients and physicians deal with AF and atrial flutter.

In the assessment of the patient comorbidity profile, antiarrhythmic drug onset of action and side effect profile versus the need for a physician with experience in sedation, or anaesthetics support for electrical cardioversion are key aspects when choosing the cardioversion method.

PLAIN LANGUAGE SUMMARY

Electrical shocks (electrical cardioversion) and drugs (pharmacological cardioversion) for restoring normal rhythm in patients with atrial fibrillation or atrial flutter

Key Messages

Important Findings:

- Cardioversion (both electrical and pharmacologic) is effective for restoring sinus rhythm in atrial fibrillation
- Electrical cardioversion showed very high success rates, especially in acute settings
- Several antiarrhythmic drugs (amiodarone, flecainide, propafenone, vernakalant) were also effective, but efficacy varied
- Risk of mortality and stroke was very low with cardioversion
- Some medications carried risk of arrhythmias or side effects, requiring monitoring

- Limited data on hospital stay and quality of life outcomes

I chose this article because it is a Cochrane systematic review and network meta-analysis, which provides high-level evidence. It focuses on cardioversion as a rhythm control strategy, which is directly relevant to my PICO question comparing rate and rhythm control. Even though it does not directly compare rate versus rhythm control, it provides strong evidence supporting the effectiveness and safety of rhythm control interventions, especially in acute settings. This is important in the ED, where cardioversion is commonly used for patients presenting with atrial fibrillation.

3. Rhythm vs Rate Control Strategy for Atrial Fibrillation: A Meta-Analysis of Randomized Controlled Trials

Citation: Zafeiropoulos, S, Doundoulakis, I, Bekiaridou, A. et al. Rhythm vs Rate Control Strategy for Atrial Fibrillation: A Meta-Analysis of Randomized Controlled Trials. J Am Coll Cardiol EP. 2024 Jul, 10 (7_Part_1) 1395–1405. <https://doi.org/10.1016/j.jacep.2024.03.006>

Article Type: Systematic review and meta-analysis of randomized controlled trials

ABSTRACT

BACKGROUND Rhythm control, either with antiarrhythmic drugs or catheter ablation, and rate control strategies are the cornerstones of atrial fibrillation (AF) management. Despite the increasing role of rhythm control over the past few years, it remains inconclusive which strategy is superior in improving clinical outcomes.

OBJECTIVES This study summarizes the total and time-varying evidence regarding the efficacy of rhythm- vs rate-control strategies in the management of AF.

METHODS We systematically perused the MEDLINE, CENTRAL (Cochrane Central Register of Controlled Trials), and Web of Science databases for randomized controlled trials from inception to November 2023. We included studies that compared the efficacy of rhythm control (ie, antiarrhythmic drugs classes Ia, Ic, or III, AF catheter ablation, and electrical cardioversion) and rate control (ie, beta-blocker, digitalis, or calcium antagonist) strategies among patients with non-valvular AF. The primary outcome was cardiovascular (CV) death, whereas secondary outcomes included all-cause death, stroke, hospitalization for heart failure (HF), sinus rhythm at the end of the follow-up, and rhythm control-related adverse events. A cumulative meta-analysis to assess temporal trends and a meta-regression analysis using the percentage of ablation use was performed.

RESULTS We identified 18 studies with a total of 17,536 patients (mean age: 68.6 ± 9.7 years, 37.9% females) and a mean follow-up of 28.5 months. Of those, 31.9% had paroxysmal AF. A rhythm control strategy reduced CV death (HR: 0.78; 95% CI: 0.62-0.96), stroke (HR: 0.801; 95% CI: 0.643-0.998), and hospitalization for HF (HR: 0.80; 95% CI: 0.69-0.94) but not all-cause death (HR: 0.86; 95% CI: 0.73-1.02) compared with a rate control strategy. This benefit was driven by contemporary studies, whereas more ablation use within the rhythm control arm was associated with improved outcomes, except stroke.

CONCLUSIONS In patients with AF, a contemporary rhythm control strategy leads to reduced CV mortality, HF events, and stroke compared with a rate control strategy. (JACC Clin Electrophysiol 2024;10:1395-1405) © 2024 by the American College of Cardiology Foundation.

Important Findings:

- Rhythm control was associated with decreased cardiovascular death compared to rate control (HR 0.78)
- Decreased stroke risk and decreased heart failure hospitalizations
- No significant difference in all-cause mortality
- Rhythm control increased the likelihood of maintaining sinus rhythm
- Benefits were mainly seen in more recent studies, especially with early rhythm control and increased use of ablation
- Antiarrhythmic drugs were associated with more adverse events, and ablation had some procedural risks

I chose this article because it directly compares rate and rhythm control strategies in patients with atrial fibrillation and evaluates important clinical outcomes like cardiovascular death, stroke, and hospitalizations. Since it is a systematic review and meta-analysis of randomized controlled trials, it provides strong, high-level evidence that is highly relevant to my PICO question. Even though it is not specific to the emergency department, the findings still apply because these are the same management decisions made in the ED for patients presenting with new-onset atrial fibrillation. I also liked that it includes more recent studies, which better reflect current practice, especially with the increased use of ablation.

What is the clinical “bottom line” derived from these articles in answer to your question?

Overall, the evidence suggests that both rate control and rhythm control are appropriate strategies for managing atrial fibrillation, but they have different advantages depending on the clinical situation. Rate control remains a safe and commonly used initial approach, especially in stable patients, because it is easier to manage and has fewer immediate risks. However, more recent studies show that early rhythm control may improve important outcomes such as cardiovascular death, stroke, and heart failure hospitalizations. In the emergency department, this means that while rate control is often used first, rhythm control, including cardioversion, should be considered in appropriate patients, especially those with recent-onset atrial fibrillation or persistent symptoms. Overall, management should be individualized based on patient stability, symptom severity, and risk factors.