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REVIEW ARTICLE

Clinical service organisation for adults with atrial fibrillation: Cochrane systematic review and meta-analysis

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Aims This study aims to assess the effects of organized clinical service delivery models for atrial fibrillation (AF) on all-cause mortality and hospitalization, as well as cardiovascular outcomes, thromboembolic events, bleeding complications, quality of life, symptom burden, healthcare costs, and length of hospital stay.

Methods and results A systematic search was conducted across several databases, including Cochrane Central Register of Controlled Trials (CENTRAL), MEDLINE, Embase, and CINAHL, and clinical trial registries. Randomized controlled trials involving adults (≥18 years) with any type of AF were included. Primary outcomes were all-cause mortality and all-cause hospitalization. Secondary outcomes included cardiovascular mortality and hospitalization, AF-related emergency department visits, thromboembolic and bleeding events, quality of life, symptom burden, cost of intervention, and length of hospital stay. Eight studies (8205 participants) investigating collaborative, multidisciplinary, or virtual care models for AF were included. The mean age of participants ranged from 60 to 73 years. Organized AF clinical services likely resulted in a substantial reduction in all-cause mortality [risk ratio (RR) 0.64, 95% confidence interval (CI) 0.46–0.89; moderate certainty] and cardiovascular hospitalization (RR 0.83, 95% CI 0.71–0.96; high certainty) compared with usual care. However, these services probably made little to no difference to all-cause hospitalization (RR 0.94, 95% CI 0.88–1.02; moderate certainty) and may not reduce cardiovascular mortality (RR 0.64, 95% CI 0.35–1.19; low certainty). The effect on thromboembolic complications and major cerebrovascular events appeared minimal. Minor cerebrovascular events were not reported in any of the included studies.

Conclusion Moderate certainty evidence suggests that organized clinical services for AF likely lead to a large decrease in all-cause mortality but probably have minimal impact on all-cause hospitalization. Whilst cardiovascular hospitalizations were reduced, the effect on cardiovascular mortality remains uncertain. Further research is needed to compare different care organization models and to confirm findings for inconclusive outcomes, particularly regarding the role of mHealth in AF management. The findings highlight the importance of coordinated care through collaborative, multidisciplinary, and virtual approaches.

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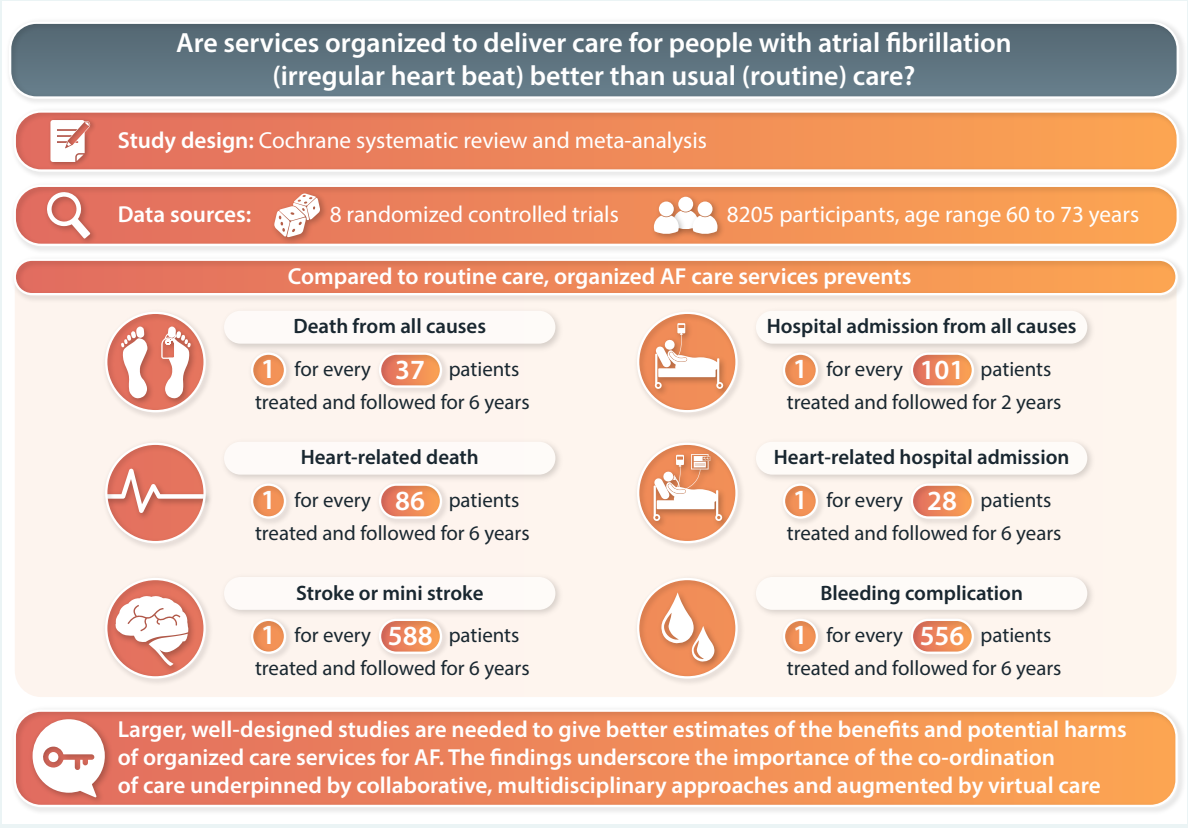
Graphical Abstract



Novelty

- This review provides moderate certainty evidence that organized clinical services for atrial fibrillation (AF) probably reduce all-cause mortality compared with usual care (RR 0.64, 95% CI 0.46–0.89; NNTB 37 over 6 years).
- Organized AF services are associated with a significant reduction in cardiovascular-related hospital admissions (RR 0.83, 95% CI 0.71–0.96; NNTB 28 over 6 years), indicating improved management of cardiovascular complications through organized care models.
- The review found that organized care services may make little difference in thromboembolic complications and major cerebrovascular bleeding events, such as stroke, highlighting the need for further research to assess these outcomes comprehensively.
- The findings highlight the importance of collaborative and multidisciplinary approaches and the integration of virtual care (eHealth/mHealth) in the organization of AF services, aligning with contemporary shifts towards patient-centred and technology-enabled healthcare delivery.

Introduction

Atrial fibrillation (AF) is the most commonly occurring heart rhythm condition. Globally, 43.6 million people were affected by AF in 2016, and the reported prevalence in the adult population ranges from 2 to 4%.[1] Atrial fibrillation is estimated to affect between 2.2 million people in the USA, with this number estimated to increase to 6–12 million in the USA by 2050 and 17.9 million people in Europe by 2060.[2] Atrial fibrillation is associated with an increased risk of thromboembolic complications such as stroke and other cardiovascular conditions such as heart failure, with risk increasing sharply with older age. Moreover, AF is associated with a two-fold increased risk of all-cause mortality in women and a 1.5-fold increase in men.[1] The socio-economic burden of AF is rapidly increasing, with most of the costs primarily related to the increasing rates of hospitalizations, interventional procedures including cardiac ablation and cardioversion, and device implantation.[3,4]

Atrial fibrillation is considered a chronic and complex condition. Guidelines recommend a comprehensive treatment approach, including screening and detection, treatment of AF (by applying a rate and/or rhythm control strategy), prevention of thromboembolic complications such as stroke by estimating the stroke risk in people with AF and prescribing appropriate oral anticoagulation, and the treatment of

underlying cardiovascular conditions, risk factors, and modification of lifestyle behaviour. This has also been described as the ABC approach.[5] The ABC approach has three key components: 'A', avoid stroke (with Anticoagulants); 'B', better symptom management, with shared decision-making on rate or rhythm control; and 'C', cardiovascular and comorbidity risk optimization. The complexity of AF management has called upon changes in how care is delivered: where traditionally patients with AF would be treated by a primary healthcare professional, the focus is now on novel models of care delivery where care and treatment are provided by a broader multidisciplinary team and can include virtual care.

The increase in the number of people seeking care for AF creates logistical, societal, and economic challenges for the health system, healthcare professionals, patients, and their informal caregivers. Current models of care, and how these are organized as clinical services, are diverse and not suitable for comprehensive care delivery by a multidisciplinary team, leading to fragmentation of care. However, the Atrial Fibrillation Network/European Heart Rhythm Association suggested careful examination of the optimal organization of clinical services and included models of care for AF management.[1] The association suggested that this examination should be data-driven and based on outcomes. There is strong evidence to support the use of integrated models of care for people with chronic heart failure and AF. Within integrated models of care, specialized clinics use a multidisciplinary team approach, comprehensive treatment, and patient-centred care, which have demonstrated improved patient outcomes. These approaches have been adopted in many countries and recommended within international guidelines.[1] Further, there is promising evidence related to collaborative multidisciplinary interventions, including nurse-led clinics and novel electronic health (eHealth)/mobile health (mHealth) interventions for AF.

Aim

The aim of the review was to assess the effects of clinical service organization for AF compared with usual care in adults diagnosed with all types of AF on all-cause mortality and hospitalization, cardiovascular-related mortality and hospitalization, thromboembolic complications, and major and minor cerebrovascular events.

Methods

The study protocol was registered in the Cochrane Database for Systematic Reviews.[6] The review was conducted in accordance with the Cochrane Collaboration guidelines and the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) statement guidelines.[7]

Inclusion and exclusion criteria

We included studies that met the following criteria:

(1) Individual parallel-arm, cluster, and cross-over randomized controlled trials (RCTs).
(2) Adults (18 years of age or older) with a diagnosis of AF of any type (defined as paroxysmal, persistent, or long-term persistent AF) or aetiology, consistent with international and national guidelines.[8]
(3) Clinical service interventions (inpatient, outpatient, or community-based) directed at people living with AF that are multicomponent and involved a multidisciplinary approach. These may include case management, collaborative multidisciplinary interventions such as disease management programmes, and integrated and co-ordinated models of care or eHealth models of care (including digital health approaches, telehealth, and structured telephone support).
(4) Usual care is defined as unrestricted routine care.

We excluded quasi-randomized trials and studies that were primarily educational, described cardiac rehabilitation programmes, focused only on lifestyle risk reduction, medication prescription, risk assessment, screening and detection of AF, and targeted general cardiac disorders rather than AF specifically. We placed no restrictions on language, sample size, publication status, and duration of follow-up.

Search strategy and screening

We identified trials through systematic searches of Cochrane Central Register of Controlled Trials, MEDLINE, Embase, and CINAHL from inception to 4 October 2022. Trial registries, ClinicalTrials.gov, and the World Health Organization International Clinical Trials Registry Platform (WHO ICTRP) were also searched for ongoing or unpublished trials on 7 April 2023. We also checked the reference lists of all included studies and any relevant systematic reviews identified for additional references to trials and examined any relevant retraction statements and errata for included studies. The detailed search strategy for all databases is provided in Supplementary material online, *S1*. Three review authors (A.D., F.S., and S.M.A.) independently screened the titles and abstracts of all studies identified by the search using Covidence,[9] coding them as 'retrieve' (eligible or potentially eligible/unclear) or 'do not retrieve'. In case of disagreement, a fourth review author (C.F.) was asked to arbitrate. We retrieved the full-text study reports/publication, and two review authors (F.S. and S.M.A.) independently screened the full texts and identified studies for inclusion and listed and recorded the reasons for exclusion of ineligible studies. We resolved any disagreements through discussion or by consulting a third review author (C.F.) if required. We identified and excluded duplicates and collated multiple reports of the same study so that each study, rather than each report, was the unit of interest in the review. We recorded the selection process in sufficient detail to complete a PRISMA flow diagram and Supplementary material online, *S3*.[7]

Data extraction and management

Data were extracted in Covidence. A customized data extraction form was piloted on at least one included study. Two review authors (F.S. and S.M.A.) independently extracted data on study design, setting, location, date, and duration of the study; participants randomized and lost to follow-up/withdrawn and analysed; age; sex; type of AF; history of heart failure; CHA_2DS_2-VASc score; inclusion criteria and exclusion criteria; intervention (type and components); primary and secondary outcomes; and funding sources and conflicts of interest. We resolved any disagreements by consensus or by involving a third review author (S.C.I.). One review author (F.S.) transferred the data into RevMan.[10] We double-checked that data had been entered correctly by comparing the data presented in the systematic review with those on the data extraction form. A second review author (C.F.) spot-checked study characteristics for accuracy against the study report.

Risk of bias and quality assessment

Two review authors (F.S. and S.M.A.) independently assessed risk of bias in the included studies using the Cochrane RoB 1 tool.[11] We resolved any disagreements by discussion or by involving another review author (S.C.I.). We graded each potential source of bias as low, high, or unclear and provided a quote from the study report, together with a justification for our judgement, in the risk of bias in included studies table. The Grading of Recommendations, Assessment, Development, and Evaluation (GRADE) was assessed by three review authors (C.F., F.S., and S.M.A.) independently to judge the certainty of the evidence based on five considerations study limitations, consistency of effect, imprecision, indirectness, and publication bias. The categorizations ranged from high to very low. Any disagreements were resolved by discussion or involving a fourth review author (S.C.I.). We justified, documented, and incorporated judgements of reporting of results for each outcome.

Statistical analyses

We undertook meta-analyses only where this was meaningful, that is, if the treatments, participants, and the underlying clinical question were similar enough for pooling. Random effects model (inverse variance method) was used as we expected some heterogeneity in the interventions. Dichotomous outcomes relating to all-cause mortality and hospitalization, cardiovascular-related mortality and hospitalization, thromboembolic

events, and major and minor cerebrovascular events were expressed as risk ratios (RRs) with 95% confidence intervals (CIs). When we were unable to combine the data in a meta-analysis, we provided a narrative description of the results as reported by the original study authors. We carried out sensitivity analyses to test whether key methodological factors or decisions affected the main results by only including studies with a low risk of bias. We excluded studies at high or unclear risk of bias for random sequence generation, allocation concealment, and incomplete data.

Results

We identified 8459 records in total, of which 8452 were identified from electronic bibliographic databases and 7 from clinical trial registries.

We excluded 1594 duplicate references. A total of 6865 titles and abstracts were screened and 6759 articles were excluded as irrelevant. After full-text review of 106 articles, we excluded 53 studies (57 reports) as they did not meet the review eligibility criteria. The primary reasons for exclusion are provided in Supplementary material online, *S3*, and *Figure 1*. We included a total of eight studies in the review. Five studies were individual parallel-arm RCTs,[12–16] and three studies were cluster-RCTs.[17–19] Three studies were conducted in the Netherlands,[12,15,19] three in China,[16–18] one in Hong Kong,[13] and one in Australia.[14] The sample size of the studies included in the review ranged from 40[13] to 3628,[18] giving a total of 8205 participants across all eight studies.

Detailed information regarding participants, interventions, outcomes, and other key information about the studies (e.g. sources of funding and conflicts of interest) is provided in the Supplementary material online, *S2*.

Interventions

Two studies delivered the intervention using mHealth (i.e. mobile AF application),[17,18] whilst two other studies used a decision support software such as CardioConsult AF, under the supervision of a cardiologist.[12,15] The remaining four studies used a case management approach.[12,13,16,19] All studies used a collaborative, multidisciplinary approach involving cardiologists, general practitioners, cardiac nurses, and allied health professionals. The majority of the studies were nurse-led.[12–16,19] The content of the intervention varied but included the following:

(1) Stroke and bleeding risk assessment: CHA_2DS_2-VASc, HAS-BLED scores, hypertension, abnormal renal/liver function, stroke, bleeding history, and overall medical history
(2) Self-care education programmes: provision of education materials or training around the pathophysiology of AF, its symptoms and possible complications, the results of the diagnostic tests and treatment options, and strategies with self-care protocols
(3) Anticoagulation case management: international normalized ratio measurements in those treated with a vitamin K antagonist (VKA), special attention to drug compliance, and monitoring of kidney function in participants using a non-VKA oral anticoagulant
(4) Structured post-discharge care and follow-up
(5) Psychosocial support

Risk of bias in included studies

The certainty of the evidence ranged from high (cardiovascular hospitalization) to low (thromboembolic complications and major cerebrovascular events). We downgraded the certainty of the evidence by one level for all-cause mortality, all-cause hospitalization, cardiovascular mortality, thromboembolic complications, and major cerebrovascular bleeding events due to study limitations (unclear or high risk of bias rating in some of the studies). We also downgraded by one level for cardiovascular mortality, thromboembolic complications, and major cerebrovascular bleeding events due to imprecision (wide CIs).

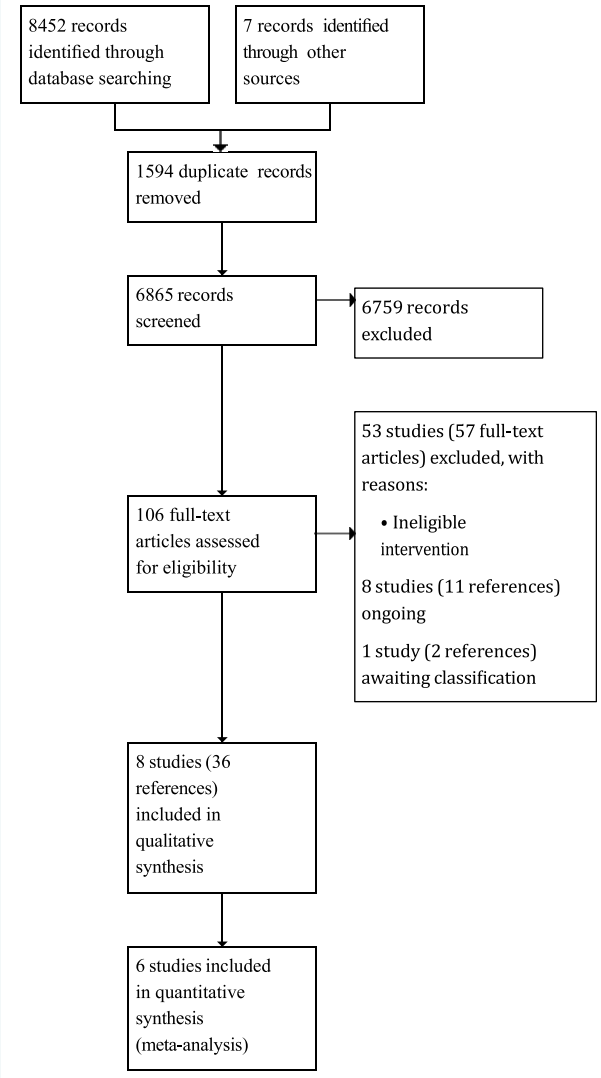


Figure 1 Preferred Reporting Items for Systematic Reviews and Meta-Analyses flow diagram.

Overall, we assessed the risk of bias as high, as all studies had at least one domain at unclear or high risk of bias. Risk of bias summaries are presented in the risk of bias tables in Supplementary material online, *S2*, and in *Figures 2* and *3*. For the studies that were assessed as unclear risk, there was inadequate describing of method of randomization, allocation concealment, blinding, and completeness of the data. The studies assessed as high risk was primarily due to a lack of blinding of participant and personnel.

Primary outcomes

All-cause mortality

Clinical service organization for AF likely resulted in a large reduction in all-cause mortality compared with usual care (RR 0.64, 95% CI 0.46–0.89; $P = 0.008$; $I^2 = 35\%$; 5 studies, 4664 participants; moderate certainty evidence). Therefore, the estimated 6-year number needed to treat for an additional beneficial outcome (NNTB) for all-cause mortality with organized AF clinical services is 37. We removed two studies in sensitivity analysis due to their unclear[18] or high[19] risk of selection bias.

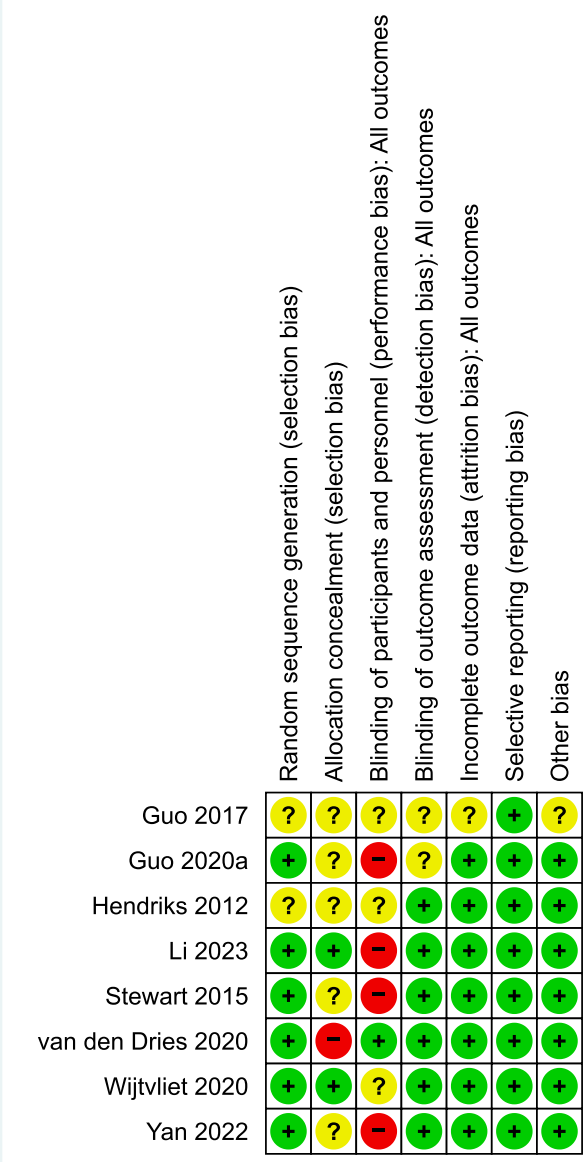


Figure 2 Risk of bias summary: review authors' judgements about each risk of bias item for each included study.

The point estimate was similar, but the CI widened, and the large relative risk reduction for all-cause mortality was no longer observed. Organized AF clinical service did not reduce all-cause mortality (RR 0.71, 95% CI 0.40–1.24; $P = 0.23$; $I^2 = 63\%$; 3 studies, 2401 participants; Analysis 1.2). Heterogeneity also increased to 63%.

All-cause hospitalization

Clinical service organization for AF likely resulted in little to no difference in all-cause hospitalization compared with usual care (RR 0.94, 95% CI 0.88–1.02; $P = 0.13$; $I^2 = 0\%$; 2 studies, 1340 participants; moderate certainty evidence). Therefore, the 2-year estimated NNTB for all-cause hospitalization is 101 compared with usual care. We removed the study by van den Dries *et al.*[19] from the analysis due to its high risk of selection bias. As only one study remained, this precluded us from conducting a sensitivity analysis for this outcome.

Secondary outcomes

Cardiovascular mortality

Clinical service organization for AF may not have reduced cardiovascular mortality compared with usual care (RR 0.64, 95% CI 0.35–1.19; $P = 0.20$; $I^2 = 33\%$; 5 studies, 4564 participants; low certainty evidence). Thus, the estimated 6-year NNTB for cardiovascular mortality is 86 compared with usual care. We removed two studies from the analysis.[18,19] The relative risk for cardiovascular mortality in the sensitivity analysis did not differ. Organized AF clinical services may not have reduced cardiovascular mortality (RR 0.82, 95% CI 0.18–3.88; $P = 0.06$; $I^2 = 65\%$; 3 studies, 2301 participants). However, heterogeneity was increased from 33 to 65%.

Cardiovascular hospitalization

Clinical service organization for AF reduced cardiovascular hospitalization compared with usual care (RR 0.83, 95% CI 0.71–0.96; $P = 0.17$; $I^2 = 38\%$; 3 studies, 3641 participants; high certainty evidence). Thus, the 6-year estimated NNTB for cardiovascular hospitalization is 28 compared with usual care. We removed the van den Dries *et al.*[19] study from the analysis. The effect remained unchanged. Organized AF clinical services reduced cardiovascular hospitalization compared with usual care (RR 0.79, 95% CI 0.67–0.94; $P = 0.17$; $I^2 = 40\%$; 4 studies, 2456 participants).

Thromboembolic complications including stroke and/or transient ischaemic attack

Data relating to the number of thromboembolic complications were available for all five studies that were included in the meta-analysis. Clinical service organization for AF may not reduce thromboembolic complications, including stroke and/or transient ischaemic attack (TIA), compared with usual care (RR 1.14, 95% CI 0.74–1.77; $P = 0.55$; $I^2 = 0\%$; 5 studies, 4653 participants; low certainty evidence; Analysis 1.11). The estimated 6-year NNTB for thromboembolic complications with organized AF clinical services is 588. We removed two studies from the analysis.[18,19] The effect remained unchanged. Organized AF clinical services did not reduce thromboembolic complications (RR 1.15, 95% CI 0.66–2.01; $P = 0.63$; $I^2 = 0\%$; 3 studies, 2401 participants; Analysis 1.12).

Minor cerebrovascular bleeding events

None of the studies reported data on the number of minor cerebrovascular bleeding events, thereby precluding meta-analysis for this outcome.

Major cerebrovascular bleeding events

Data on the number of major cerebrovascular bleeding events were available for three studies. Clinical service organization for AF may not reduce major cerebrovascular bleeding events compared with usual care (RR 1.25, 95% CI 0.79–1.97; $P = 0.34$; $I^2 = 0\%$; 3 studies, 2964 participants; low certainty evidence; Analysis 1.13). The 6-year estimated NNTB for major cerebrovascular bleeding events is 556 compared with usual care. We removed two studies from the analysis.[18,19] As only one study remained,[12] this precluded us from conducting a sensitivity analysis for this outcome (Analysis 1.14).

Other secondary outcomes

The results for all remaining secondary outcomes have been reported in detail elsewhere.

Discussion

Hospitalizations due to AF have increased exponentially in recent decades and are known to be the costliest component of AF care

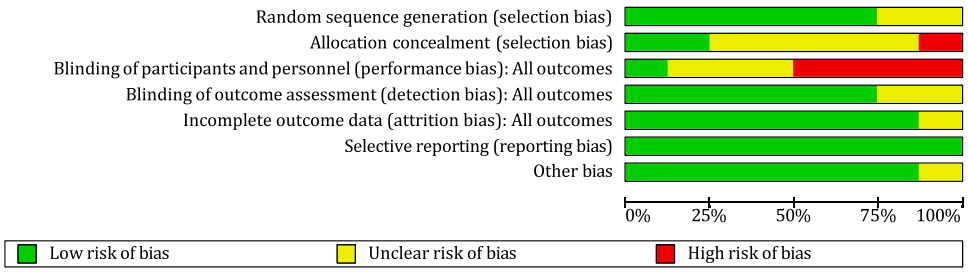


Figure 3 Risk of bias graph: review authors' judgements about each risk of bias item presented as percentages across all included studies.

Table 1 Summary of findings: clinical service organization compared with usual care for adults with atrial fibrillation

Patient or population: adults with atrial fibrillation
Setting: primary care practices and hospitals
Intervention: clinical service organization
Comparison: usual care

Outcomes	Anticipated absolute effects[a] (95% CI)		Relative effect (95% CI)	№ of participants (studies)	Certainty of the evidence (GRADE)	Comments
	Risk with usual care	Risk with clinical service organization				
All-cause mortality Follow-up: range 3 months to 5.8 years	67 per 1000	43 per 1000 (31–60)	RR 0.64 (0.46–0.89)	4664 (5 RCTs)	⊕⊕⊕⊖ Moderate[b]	
All-cause hospitalization Follow-up: range 12–24 months	493 per 1000	463 per 1000 (434–502)	RR 0.94 (0.88–1.02)	1340 (2 RCTs)	⊕⊕⊕⊖ Moderate[c]	
Cardiovascular mortality Follow-up: range 3 months to 5.8 years	26 per 1000	17 per 1000 (9–31)	RR 0.64 (0.35–1.19)	4564 (5 RCTs)	⊕⊕⊖⊖ Low[d,e]	
Cardiovascular hospitalization Follow-up: range 3 months to 5.8 years	234 per 1000	195 per 1000 (166–225)	RR 0.83 (0.71–0.96)	3641 (3 RCTs)	⊕⊕⊕⊕ High	
Thromboembolic complications Follow-up: range 3 months to 5.8 years	17 per 1000	19 per 1000 (12–29)	RR 1.14 (0.74–1.77)	4653 (5 RCTs)	⊕⊕⊖⊖ Low[b,e]	
Major cerebrovascular bleeding events Follow-up: range 3 months to 5.8 years	15 per 1000	19 per 1000 (12–30)	RR 1.25 (0.79–1.97)	2964 (3 RCTs)	⊕⊕⊖⊖ Low[d,e]	
Minor cerebrovascular events—not reported	—	—	—	—	—	

GRADE Working Group grades of evidence: *High certainty*: we are very confident that the true effect lies close to that of the estimate of the effect. *Moderate certainty*: we are moderately confident in the effect estimate that the true effect is likely to be close to the estimate of the effect, but there is a possibility that it is substantially different. *Low certainty*: our confidence in the effect estimate is limited that the true effect may be substantially different from the estimate of the effect. *Very low certainty*: we have very little confidence in the effect estimate that the true effect is likely to be substantially different from the estimate of effect. See interactive version of this table at https://gdt.gradepro.org/presentations/#/isof/isof_question_revman_web_429006128031995203.

CI: confidence interval; RR: risk ratio.

[a]*The risk in the intervention group* (and its 95% CI) is based on the assumed risk in the comparison group and the *relative effect* of the intervention (and its 95% CI).

[b]Downgraded one level due to study limitations: studies had either high or unclear risk of bias for selection, performance, and/or detection bias.

[c]Downgraded one level due to study limitations: studies had either high or unclear risk of bias for selection, performance, and/or detection bias.

[d]Downgraded one level due to study limitations: studies had either high or unclear risk of bias for selection, performance, and/or detection bias.

[e]Downgraded one level due to imprecision: 95% CI contains the possibility of benefit and harm.

delivery.[20–23] In Australia, AF is the most common cause of cardiovascular hospitalization, outnumbering both myocardial infarction and heart failure,[8] and is growing at a rate that is more than double that of these two conditions.[21] Urgent strategies are needed to stem this growing burden.

This review is the first to explore different models of care on outcomes in the AF population. We included 8 studies with a total of 8205 participants. Organization of care for AF likely results in a large reduction in all-cause mortality (estimated 6-year NNTB is 37), compared with usual care. However, this is based on moderate certainty evidence and must be considered in light of the methodological limitations of the included trials, which is validated by the results of the sensitivity analysis. When two studies were removed due to unclear or high risk of selection bias, the point estimate did not change much, but the level of heterogeneity increased and the CIs widened, touching the line of no effect.

Clinical service organization for AF probably makes little to no difference to all-cause hospitalization (estimated 2-year NNTB of 101) based on moderate certainty evidence. However, organized AF clinical services reduce cardiovascular hospitalization (estimated 6-year NNTB of 28) based on high certainty evidence and validated by sensitivity analysis. Atrial fibrillation clinical service organization may not reduce cardiovascular mortality (estimated 6-year NNTB of 86) based on low certainty evidence and may have little to no effect on AF-related emergency department visits. See summary of findings *Table 1*.

The certainty of the evidence ranged from high (cardiovascular hospitalization) to low (thromboembolic complications and major cerebrovascular events). We downgraded the certainty of the evidence by one level for all-cause mortality, all-cause hospitalization due to study limitations (unclear or high risk of bias rating in some of the studies).

The eight included studies were heterogeneous (i.e. integrated models of care vs. eHealth models of care) in terms of the nature of the clinical interventions delivered within them, as well as the personnel involved. One study assessed the impact of mHealth. Whilst the results of this study are encouraging, it was undertaken in one geographical location and was delivered by physicians alone, raising uncertainty about the widespread applicability of this model.

Three studies originated in the Netherlands,[12,15,19] three in China,[16–18] one in Hong Kong,[13] and one in Australia.[14] None of the studies were conducted in low-middle-income countries; therefore, it is unclear whether the results would be applicable in this setting. Further evaluation in other geographical locations is required to determine the applicability of such models of care. The evidence in this review is applicable to a predominantly male population aged between 60 and 73 years. All participants were diagnosed with AF either confirmed by an electrocardiogram or cardiologist, indicating an appropriate representation of population. All eight included studies reported at least one of the outcomes of interest.[12–19] However, none of the outcomes of interest were reported by all eight studies.

Limitations

The search strategy identified all relevant studies up until October 2022. Whilst this may be viewed as a limitation, we rechecked the studies listed as awaiting classification and ongoing at the time of publication, which resulted in two more studies being included for a total of eight included studies.

Although we searched numerous key databases, it is possible that we missed some relevant publications. We were unable to assess the possibility of publication bias as there were too few studies for funnel plot construction.

Conclusions and implications

Moderate certainty evidence shows that clinical service organization for AF probably results in a large reduction in all-cause mortality (one death prevented for every 37 patients treated and followed for six years) when compared with usual care. Organized AF clinical services probably make little to no difference to all-cause hospitalization [estimated two-year number needed to treat for an additional beneficial outcome (NNTB) of 101], based on moderate certainty evidence.

With AF as a leading cause of cardiovascular morbidity, mortality, and healthcare utilization globally, this review underscores the potential impact that co-ordination of care has on some outcomes for patients and the healthcare system. However, given the limited number of included studies and their methodological limitations as well as the heterogeneous nature of the interventions included in the analysis (i.e. integrated models of care vs. eHealth models of care), further research is needed to determine the utility of organized clinical services for AF.

Further research is needed in this area. Future trials should

(1) Compare different models of care organization: nurse-led vs. non-nurse-led multidisciplinary approach vs. utilization of mHealth
(2) Collect information about race/ethnicity of participants to determine whether this has any influence on attendance or adherence to the individual components within organized care services for AF, and therefore its effectiveness
(3) Include cost-effective analysis to assess the cost and the potential cost-benefit of the different models of care organization

Supplementary material

Supplementary material is available at *European Journal of Cardiovascular Nursing* online.

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Author contributions

C.F., J.H., C.G., B.V.B., and S.C.I.: conceptualization and design of protocol, coordinating and completing the protocol, and writing the protocol. C.F., S.M.A., A.D., and F.S.: screening for studies. S.C.I.: acted as adjudicator. C.F., S.M.A., A.D., and F.S.: data extraction. C.F., S.M.A., and F.S.: data analyses and interpretation. S.M.A. and F.S.: risk of bias assessment and GRADE assessment. S.M.A., C.F., F.S., and S.C.I.: contributed to writing of the manuscript.

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Data availability

All data are extracted from published original articles and in some cases through correspondence with the authors. Data are available upon request.

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