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Original Research Article

Atrial Fibrillation in Saudi Emergency and Cardiology Clinics: Anticoagulation Gaps, Stroke Risk, and Guideline-Based Care

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Abstract: Atrial fibrillation is a frequent presentation in emergency departments and cardiology clinics, yet the transition from acute recognition to durable stroke prevention remains uneven. In Saudi Arabia, the rising burden of cardiometabolic disease, ageing, renal impairment and fragmented follow-up creates a setting in which anticoagulation decisions are clinically important and operationally fragile. This review examines anticoagulation gaps, stroke-risk assessment and guideline-based care for adults with atrial fibrillation managed in Saudi emergency and cardiology settings. A structured narrative method was used to synthesise international guidelines, contemporary emergency-care evidence and Saudi literature published from 2020 to 2025. The review identifies recurring gaps: incomplete documentation of CHA2DS2-VASc or CHA2DS2-VA scores, uncertainty around direct oral anticoagulant dosing, persistent use of non-anticoagulant antiplatelet therapy for stroke prevention, delayed initiation after emergency discharge, limited renal-function reassessment, and variable cardiology follow-up. These gaps are not merely prescribing issues; they reflect competing priorities at presentation, inconsistent ownership between emergency physicians and cardiology teams, patient concerns about bleeding, and limited structured counselling. Guideline-based care should begin at first contact, with electrocardiographic confirmation, haemodynamic stabilisation, systematic stroke and bleeding risk assessment, renal and hepatic review, medication reconciliation, shared decision-making and a defined follow-up appointment before discharge. A Saudi model should combine emergency pathways, pharmacist-supported anticoagulant initiation, cardiology review for rhythm strategy, and quality indicators that track eligible anticoagulation, dose correctness and early review. Strengthening this pathway could reduce preventable stroke, avoid unnecessary admission and improve continuity for patients who currently move between episodic acute care and chronic cardiovascular management.

Keywords: Atrial Fibrillation, Saudi Arabia, Emergency Department, Cardiology Clinic, Anticoagulation, Stroke Prevention, Direct Oral Anticoagulants, Guideline-Based Care.

1. INTRODUCTION

Atrial fibrillation (AF) is the most common sustained cardiac arrhythmia encountered in adult practice and is strongly associated with ischaemic stroke, heart failure, repeated hospital contact and premature mortality [2-7]. For many patients, the emergency department is the first place where AF is detected, either because the arrhythmia causes palpitations, dyspnoea, syncope or chest discomfort, or because AF is incidentally identified during evaluation for infection, decompensated heart failure, acute coronary syndrome or metabolic disturbance [1-10]. The acute encounter therefore has consequences that extend beyond immediate rate control. It may determine whether the patient leaves with a clear diagnosis, an evidence-based anticoagulant plan, written safety-netting, and a time-bound route into specialist or primary care follow-up.

Saudi Arabia provides a distinctive context for this issue. The country has highly developed tertiary cardiac services, expanding digital health infrastructure and increasing use of direct oral anticoagulants (DOACs), but it also has a high prevalence of diabetes, hypertension, obesity and chronic kidney disease, all of which raise AF incidence and complicate anticoagulant selection [14-20]. Saudi patients frequently move between emergency departments, cardiology clinics, primary care and private-sector services. Where responsibility for stroke prevention is not explicitly assigned, treatment gaps may persist despite clear international recommendations [2-5]. Local studies report variable anticoagulant knowledge among patients, uneven familiarity with risk tools among clinicians and a continuing need for region-specific guidance on DOAC use in high-risk patients [15-18].

The problem is not simply that anticoagulants are underused. Overuse in patients with negligible stroke risk, inappropriate dose reduction, failure to account for renal function, unrecognised drug interactions and inadequate counselling can all undermine safety. Contemporary guidelines encourage risk-based anticoagulation rather than rhythm-status-based prescribing; a patient restored to sinus rhythm may still need long-term therapy when stroke risk is elevated [2, 3]. Bleeding scores should identify modifiable risk factors and trigger review, not be used mechanically to deny stroke prevention [2-12]. These principles are familiar to cardiologists but may be difficult to operationalise in crowded emergency settings, especially when AF duration is uncertain or follow-up is delayed.

The attached reference review on emergency AF management emphasises several transferable gaps: variability in rate versus rhythm control, uncertainty around ED anticoagulation initiation, inconsistent discharge protocols and limited multidisciplinary models [1]. This paper applies those themes to Saudi emergency and cardiology clinics, where guideline adherence requires both clinical precision and pathway design. The review argues that high-quality AF care should be evaluated by whether it reliably converts an acute presentation into a documented, safe and sustained stroke-prevention plan. The central question is how Saudi services can close the gap between evidence and real-world continuity without increasing avoidable admission or bleeding harm.

The distinction between emergency and cardiology clinic responsibilities is especially important because AF is both an event and a chronic diagnosis. Emergency clinicians are trained to identify instability, exclude immediately reversible causes and make safe disposition decisions. Cardiology teams are expected to assess atrial substrate, rhythm-control candidacy, long-term medication tolerance and comorbidity modification. Stroke prevention, however, belongs to both environments. When either setting assumes that the other will complete the anticoagulation decision, the patient is exposed to a preventable interval of risk. This interval may be brief, but it is meaningful because AF-related embolic events can be disabling, costly and life changing. A publishable review of Saudi AF care must therefore examine the handover itself: who calculates risk, who prescribes, who educates, who checks renal dosing, and who confirms that the patient receives and continues the medicine.

2. AIM AND OBJECTIVES

The aim of this review is to critically evaluate anticoagulation gaps, stroke-risk management and guideline-based care for adults with AF presenting to Saudi emergency departments and cardiology clinics.

The objectives are: first, to summarise contemporary evidence from 2020 to 2025 on AF stroke prevention, anticoagulant choice, emergency initiation and follow-up; second, to identify Saudi-specific barriers affecting anticoagulation decisions, including patient knowledge, clinician risk-tool use, renal-dose adjustment and clinic handover; third, to compare observed practice issues with major guideline principles; fourth, to propose a practical care model that links emergency stabilisation to cardiology-led continuity; and fifth, to define quality indicators and research priorities suitable for Saudi health systems.

3. METHODOLOGY

A structured narrative review was undertaken because the topic combines clinical evidence, guideline recommendations, service-delivery questions and Saudi contextual literature. The review question was framed as follows: among adults with AF managed in Saudi emergency or cardiology settings, what evidence from 2020 to 2025 informs anticoagulation gaps, stroke-risk assessment and guideline-based care? The method was designed to be transparent, reproducible enough for scholarly review, and suitable for integrating heterogeneous evidence without claiming statistical pooling.

Searches were conceptually organised across PubMed, guideline repositories and Saudi-focused literature sources using combinations of the following terms: atrial fibrillation, emergency department, cardiology clinic, Saudi Arabia, anticoagulation, direct oral anticoagulant, warfarin, stroke prevention, CHA2DS2-VASc, CHA2DS2-VA, HAS-BLED, renal impairment, discharge pathway, pharmacist, integrated care and follow-up. Eligible sources were published between January 2020 and October 2025, written in English, and directly relevant to AF diagnosis, acute management, anticoagulant initiation, risk stratification, patient knowledge, Saudi prescribing practice or integrated care. International guidelines were included because Saudi practice frequently benchmarks against them and because they provide the clearest standards for risk-based prescribing [2-5].

Sources were excluded when they focused solely on paediatric arrhythmias, postoperative AF without broader applicability, device-ablation technical outcomes without anticoagulation implications, or non-English reports for which reliable interpretation was unavailable. The synthesis proceeded in three stages. First, evidence was mapped to domains: emergency recognition, stroke-risk assessment, anticoagulant choice, special populations, discharge, cardiology follow-up and service governance. Second, Saudi studies and regional recommendations were examined for context-specific barriers. Third, findings were integrated into a pathway model and gap matrix. Methodological safeguards included privileging recent guidelines, peer-reviewed studies and Saudi data where available; distinguishing evidence-based recommendations from implementation proposals; and avoiding duplication of arguments across sections.

The extracted evidence was interpreted using a care-continuum lens. Rather than ranking papers only by design, each source was considered for what it contributed to a practical Saudi pathway: epidemiology and burden, prescriber behaviour, patient behaviour, drug safety, guideline thresholds or system redesign. This approach allowed high-quality international evidence to inform standards while preserving the importance of local studies that reveal implementation barriers. Because the review is intended for journal submission, statements are separated into three categories: established recommendations, observed gaps and proposed service improvements.

Table 1: Evidence-informed review method

Element	Specification used in this review
Review design	Structured narrative review with evidence mapping across acute care, cardiology follow-up, anticoagulant safety, Saudi context and service implementation.
Core sources	International AF guidelines and practical anticoagulant guidance [2-14]; Saudi studies on patient knowledge, clinician behaviour and DOAC use [15-20]; emergency discharge and follow-up evidence [21-23].
Search terms	Atrial fibrillation; Saudi Arabia; emergency department; cardiology clinic; anticoagulation; direct oral anticoagulant; warfarin; stroke prevention; CHA2DS2-VASc; CHA2DS2-VA; HAS-BLED; renal impairment; discharge; follow-up; pharmacist; integrated care.
Inclusion criteria	English-language sources from 2020-2025 addressing adult AF, stroke prevention, anticoagulant initiation or optimisation, acute care pathways, Saudi practice, integrated care or patient education.
Exclusion criteria	Paediatric arrhythmia studies, non-AF thrombosis papers, purely technical ablation studies without anticoagulation relevance, reports outside the publication window, and sources not applicable to emergency-cardiology continuity.
Synthesis approach	Findings were grouped into omission, delay, substitution, dose, discontinuity, complex prescribing, discharge design, multidisciplinary ownership and measurable quality indicators.
Quality safeguards	Priority was given to recent guidelines, peer-reviewed studies and Saudi data where available; recommendations were separated from implementation proposals and no statistical pooling was claimed.

4. Saudi Clinical Context and Burden

AF in Saudi Arabia sits at the intersection of demographic change and cardiometabolic risk. Although exact national prevalence varies by sampling frame, the risk profile is clear: hypertension, diabetes, obesity, sleep apnoea and coronary disease are common, and each contributes to atrial remodelling, thromboembolic risk or both [6-19]. The consequence is that many Saudi patients with AF are not low-risk young adults with isolated arrhythmia; they are older, multimorbid patients requiring integrated assessment rather than a narrow heart-rate decision.

Emergency departments carry much of this burden because they are accessible entry points for symptomatic episodes and for complications such as heart failure, transient ischaemic attack or stroke. The ED is also where diagnostic labels may be created. If an AF episode is treated as a transient accompaniment of infection or decompensation without clear reassessment, the patient may never receive appropriate long-term stroke prevention. Scientific statements on acute-hospital AF caution that AF detected during acute illness should not be dismissed as benign, because recurrence and thromboembolic risk may persist [10]. This is directly relevant to Saudi hospitals managing large volumes of diabetes, renal disease and acute medical admissions.

Cardiology clinics face a different but connected challenge. They must refine rhythm strategy, evaluate structural heart disease, consider ablation or antiarrhythmic therapy, and confirm whether anticoagulation is correctly selected and dosed. Early rhythm control can improve cardiovascular outcomes in selected patients, particularly when AF is diagnosed early and risk factors are managed [8, 9]. Yet rhythm decisions do not substitute for stroke prevention. A patient discharged after successful cardioversion remains at risk if CHA2DS2-VASc or CHA2DS2-VA criteria indicate anticoagulation [2, 3].

Saudi-specific literature highlights the implementation gap. A regional expert review noted increasing use of non-vitamin K antagonist oral anticoagulants and the need for practical advice in high-risk groups, including older patients and those with renal impairment [15]. A Saudi cross-sectional study found that patient knowledge about anticoagulation and AF-related stroke prevention was incomplete, supporting the need for structured counselling rather than simple prescription [16]. A survey of Saudi general practitioners reported variable self-reported use of thromboprophylaxis guidelines and risk-assessment tools, showing that continuity cannot rely on informal handover alone [17]. Recent Saudi hospital data also show active DOAC utilisation, making dose correctness, interaction review and monitoring infrastructure increasingly important [18-20].

A further contextual issue is the rapid evolution of Saudi healthcare delivery. Large referral hospitals may have electrophysiology units, anticoagulation services and electronic decision support, whereas smaller hospitals may rely on general emergency physicians and delayed outpatient referral. Private-sector pathways may differ again, particularly in medication access and follow-up scheduling. The result is a national landscape in which the same patient profile can receive different anticoagulation decisions depending on arrival site, time of day and documentation culture. Standardisation is therefore not a theoretical aspiration; it is a safety requirement for a condition where the evidence is strong but the operational chain is vulnerable.

Cultural and communication factors also require attention. Some patients may be reluctant to start an anticoagulant after a single emergency visit because they do not feel ill once palpitations settle. Others fear bleeding, have difficulty understanding indefinite therapy, or use over-the-counter analgesics that increase bleeding risk. Family involvement can be a strength in Saudi care when relatives help with transport and medicine collection, but counselling must be precise enough to prevent misinformation. Arabic-language materials should explain the difference between medicines that slow the heart, medicines that restore rhythm and medicines that prevent clots. Without that distinction, adherence may decline once symptoms improve.

5. Anticoagulation Gaps across Emergency and Cardiology Clinics

Anticoagulation gaps in AF can be grouped into omission, delay, inappropriate substitution, incorrect dose and discontinuity. Omission occurs when eligible patients leave acute care without oral anticoagulation or without a documented reason for deferral. Delay occurs when the ED recognises the indication but assumes the decision can wait for a clinic appointment that may not occur promptly. Inappropriate substitution occurs when aspirin or dual antiplatelet therapy is used for AF stroke prevention despite inferior protection and bleeding exposure. Incorrect dose occurs when DOACs are reduced because of age or perceived frailty without meeting approved dose-reduction criteria, or when renal dysfunction is not considered. Discontinuity occurs when the prescription is correct at discharge

but follow-up, adherence, monitoring or refill arrangements fail.

International emergency evidence confirms that these gaps are not unique to Saudi Arabia. Follow-up within seven days after ED discharge with new AF has been associated with better treatment and outcomes, whereas delayed or absent review leaves anticoagulation decisions unresolved [21]. Recent ED prescribing studies continue to show missed opportunities for stroke prophylaxis after AF discharge and demonstrate that pathway redesign can improve prescribing [22,23]. The lesson for Saudi services is that anticoagulation quality depends on a system, not only on clinician knowledge.

In emergency departments, the most common barrier is the tension between acute stabilisation and chronic prevention. Clinicians must assess haemodynamic instability, reversible triggers, chest pain, heart failure and AF duration while managing crowding and time pressure. Anticoagulation may be deferred because bleeding history is unclear, renal function is pending, the patient may need cardioversion, or outpatient follow-up is assumed. These concerns are legitimate, but they should lead to a documented plan, not silence. If anticoagulation is deferred, the record should state why, what information is missing, who will review it, and by when.

In cardiology clinics, the gap often shifts from initiation to optimisation. Patients may arrive on warfarin with poor international normalised ratio control, on an under-dosed DOAC, or on antiplatelet therapy initiated elsewhere. Some may stop anticoagulation after symptoms improve, misunderstanding that stroke risk is driven by clinical profile rather than perceived rhythm regularity. Others may have renal decline, weight change, new antiplatelet therapy after coronary intervention, or interacting medicines. The cardiology clinic should therefore function as an anticoagulation quality-control point, confirming indication, dose, adherence, bleeding risk, modifiable risk factors and patient understanding.

The Saudi pathway must also account for medication access and health literacy. DOACs reduce monitoring burden compared with warfarin and are recommended for most eligible patients without mechanical valves or moderate-to-severe rheumatic mitral stenosis [2-14]. However, their convenience can create false reassurance. The absence of routine international normalised ratio testing does not remove the need for renal-function review, adherence checks, bleeding education and interaction screening. Pharmacist-supported discharge can close this gap by verifying dose criteria, explaining missed-dose rules and ensuring that the first supply is available before the patient leaves.

Antiplatelet substitution deserves special emphasis. Patients with coronary artery disease may already be taking aspirin or a P2Y12 inhibitor, and clinicians may feel reassured that some antithrombotic therapy is present. Yet antiplatelets do not provide adequate AF stroke prevention for patients who meet oral anticoagulation criteria [2, 3]. The challenge becomes more complex after acute coronary syndrome or percutaneous coronary intervention, where combined antiplatelet and anticoagulant therapy may be needed for a defined period. In such cases, the correct response is specialist-guided minimisation of bleeding exposure, not abandonment of AF anticoagulation. Saudi cardiology clinics should treat every patient on both antiplatelet and anticoagulant therapy as requiring an explicit duration plan.

Inappropriate DOAC dose reduction is another hidden gap. It may appear safer, especially in older or frail patients, but off-label under-dosing can reduce stroke protection without reliably reducing major bleeding. Conversely, standard dosing in patients meeting reduction criteria may increase bleeding. Correct dosing requires more than selecting a drug name; it requires age, weight, renal function and interaction checks. Emergency departments should avoid starting a reduced dose solely because the patient is elderly unless the agent-specific criteria are met. Cardiology clinics should actively search for legacy prescriptions where the original renal function is unknown.

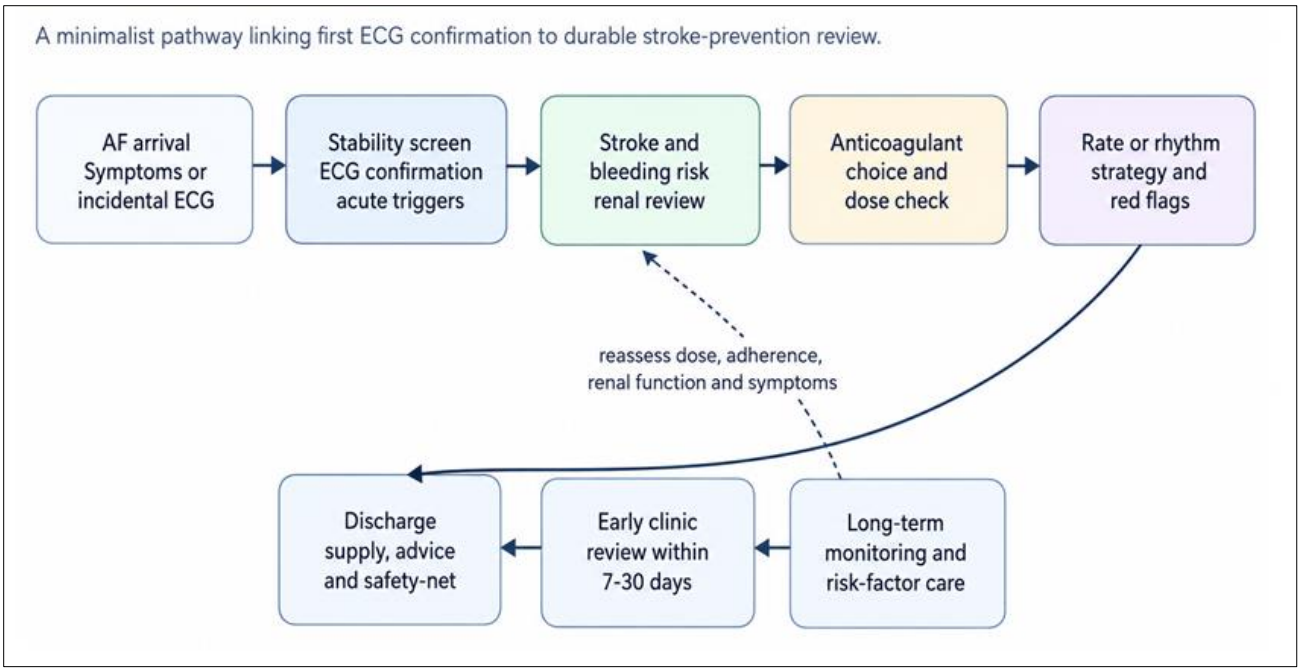

Figure 1: Saudi AF urgent-to-continuity care architecture. The pathway links first ECG confirmation to discharge supply, early review and longitudinal risk-factor control

6. Stroke Risk, Bleeding Risk and Complex Prescribing

Stroke-risk assessment should be explicit at every first AF encounter. The CHA2DS2-VASc score remains widely used, while the 2024 European guideline gives greater emphasis to CHA2DS2-VA by removing sex as a stand-alone risk component [2]. Regardless of the scoring variant, the clinical principle is stable: anticoagulation is indicated when estimated thromboembolic risk is sufficiently elevated, and the decision should not depend on whether rate or rhythm control is chosen [2, 3]. Evidence comparing stroke-risk scores shows that structured scoring is superior to unaided clinical judgement for consistent identification of candidates for therapy [24].

Bleeding risk should be handled differently. HAS-BLED and related tools are useful because they highlight uncontrolled blood pressure, renal or hepatic dysfunction, prior bleeding, alcohol exposure and concomitant antiplatelet or non-steroidal anti-inflammatory drug use [2-12]. A high bleeding score should prompt correction of reversible risk, closer review and careful drug selection. It should not automatically exclude anticoagulation, because patients at high bleeding risk often also have high stroke risk. This distinction is crucial in Saudi practice, where older patients with diabetes, kidney disease and vascular disease may look clinically fragile but face substantial stroke consequences if undertreated.

Renal impairment is a central prescribing issue. Several DOACs require dose adjustment according to creatinine clearance rather than creatinine concentration alone, and dose thresholds differ by agent [5-12]. Emergency and cardiology clinics should therefore avoid prescribing from memory when renal function is borderline. A pathway should require documentation of the most recent renal function, body weight when relevant, interacting medicines and the selected dose rationale. Reassessment intervals should be shorter for older patients, those with chronic kidney disease, and those with intercurrent illness that may alter renal function.

Frailty and falls require nuanced interpretation. Fear of falls is a frequent reason for withholding anticoagulation, yet the absolute stroke-prevention benefit often remains favourable when stroke risk is high [2, 3]. The safer response is not routine omission but fall-risk mitigation, medication review, blood-pressure control, and shared decision-making that explains both stroke and bleeding outcomes. Cancer-associated AF poses another challenge because malignancy and systemic therapy can increase both thrombosis and bleeding. Saudi tertiary centres with oncology and cardiology services should develop shared protocols for high-risk patients, including gastro-intestinal cancer, thrombocytopenia and procedures.

Cardioversion adds time-sensitive complexity. For unstable patients, immediate electrical cardioversion is a resuscitative

intervention. For stable recent-onset AF, rhythm control may be appropriate, but anticoagulation requirements depend on AF duration, stroke risk, prior anticoagulant adherence and imaging availability [2-5]. Emergency clinicians should not treat the cardioversion decision as separate from anticoagulation. Documentation should include AF onset certainty, anticoagulant history, stroke score, bleeding considerations and post-cardioversion plan.

Obesity also affects AF management in Saudi practice. Weight contributes to AF incidence, symptom burden, sleep apnoea and hypertension, and sustained weight reduction is associated with lower arrhythmia burden in long-term studies [2, 3]. For anticoagulation, extremes of body weight may influence drug exposure and clinician confidence. Contemporary practical guidance supports DOAC use in many patients with obesity while encouraging careful review when body weight is extreme or evidence is limited [5-12]. The key is to avoid using obesity as a vague reason for inaction; it should trigger drug-specific assessment and comorbidity treatment.

Women with AF require careful risk communication. Some older scoring systems assign a point for female sex, whereas newer approaches treat sex as a modifier rather than an independent reason for anticoagulation [2, 3]. The practical implication is that Saudi clinicians should not prescribe or withhold therapy based on sex alone. Instead, age, hypertension, diabetes, heart failure, vascular disease and prior thromboembolism should drive the decision. This is particularly relevant in older women who may have high stroke risk but may also be perceived as bleeding-prone or frail.

Medication reconciliation is essential because many Saudi patients have diabetes, hypertension, coronary disease, pain syndromes or renal disease requiring multiple medicines. Non-steroidal anti-inflammatory drugs, antiplatelets, certain antiarrhythmics, azole antifungals, antiepileptics and herbal preparations can alter bleeding risk or DOAC exposure. A pharmacist-led review at ED discharge and cardiology follow-up can identify these risks earlier than routine physician review alone.

7. Guideline-Based Care Model for Saudi Services

A practical Saudi model should start with the first confirmed ECG. Step one is classification: AF confirmed, haemodynamic status defined, reversible precipitants identified, and red flags such as acute coronary syndrome, heart failure, sepsis, pre-excitation or stroke symptoms addressed. Step two is risk scoring before disposition. The electronic record should prompt CHA2DS2-VASc or CHA2DS2-VA, bleeding-risk review, renal function, hepatic history and current antiplatelet or non-steroidal anti-inflammatory drug use. Step three is a treatment decision: anticoagulate now, defer with explicit reason and appointment, or document no indication.

Step four is drug selection. DOACs should be the default for eligible non-valvular AF patients because of efficacy, safety and ease of use compared with vitamin K antagonists [2-14]. Warfarin remains appropriate for mechanical heart valves, moderate-to-severe rheumatic mitral stenosis, selected severe renal impairment and some cost or access situations. The chosen agent should be linked to dose criteria and follow-up tests. Step five is rate or rhythm strategy. Rate control may be sufficient for stable older patients with persistent AF, while early rhythm control should be considered for recent diagnosis, troublesome symptoms, younger patients, tachycardia-mediated cardiomyopathy or heart failure where rhythm restoration may improve outcomes [2-9].

Step six is discharge engineering. No eligible patient should be discharged with an undocumented anticoagulation decision. The discharge bundle should include the diagnosis, stroke score, bleeding issues, anticoagulant name and dose, start date, missed-dose advice, bleeding warning signs, medicines to avoid, follow-up date, and contact route for deterioration. For high-risk patients, cardiology or anticoagulation-clinic review within seven days is a reasonable target where capacity allows, supported by evidence that early follow-up after ED discharge improves treatment continuity [21]. Lower-risk stable patients may be reviewed in primary care or general cardiology within thirty days, provided the anticoagulation plan is complete.

Step seven is multidisciplinary ownership. Emergency physicians should initiate the pathway; cardiologists should refine rhythm and structural assessment; pharmacists should verify dose, interactions and counselling; nurses should reinforce adherence and warning signs; and primary care should monitor blood pressure, diabetes, renal function, sleep apnoea, obesity and refill continuity. Integrated care reviews show that coordinated AF management can reduce mortality and cardiovascular hospitalisation compared with usual care [27, 28]. Digital health tools can support this model through prompts, remote follow-up and rhythm documentation, but technology should not replace accountable clinical review [29, 30].

The model should include a defined escalation track for uncertainty. If renal function is

unavailable, bleeding history is unclear, or AF duration cannot be established, the patient should not disappear into routine follow-up. Instead, the discharge plan should specify interim management, urgent testing and a named clinic destination. Patients with prior stroke, transient ischaemic attack, mechanical valves, rheumatic mitral stenosis, active bleeding, severe renal impairment, pregnancy, cancer-associated bleeding risk or combined antiplatelet therapy should be flagged for early senior review.

Quality indicators should be built into the pathway. Suggested indicators include the proportion of AF discharges with a documented stroke score, the proportion of eligible patients prescribed oral anticoagulation or given a justified deferral, the proportion of DOAC prescriptions with correct renal-adjusted dosing, the proportion receiving written counselling, and the proportion reviewed within seven or thirty days according to risk category. These metrics are feasible because they can be captured from electronic records and pharmacy data.

Figure 2: Anticoagulation implementation pressure points. The scores represent qualitative synthesis from reviewed guidance and implementation literature rather than patient-level Saudi outcome data

Table 2: Anticoagulation gap matrix for Saudi emergency and cardiology clinics

Gap	Likely setting	Clinical consequence	Recommended action	Quality metric
No recorded stroke score	ED triage, discharge or first clinic visit	Eligible patients may be discharged without oral anticoagulation.	Mandatory CHA2DS2-VASc or CHA2DS2-VA field before AF discharge.	Percentage of AF discharges with recorded score.
Delayed initiation despite eligibility	ED discharge when follow-up is uncertain	Preventable exposure to embolic stroke risk.	Start DOAC when eligible or document specific deferral and review date [21-23].	Eligible patients anticoagulated or justified.
Antiplatelet substitution	Coronary disease overlap	Inferior stroke prevention with avoidable bleeding exposure.	Define combined-therapy duration and return to anticoagulant-focused AF prevention.	Patients on antiplatelet plus anticoagulant with duration plan.
Incorrect DOAC dose	ED prescribing or chronic clinic renewal	Under-dosing may reduce protection; over-dosing may increase bleeding.	Record renal function, weight and dose criteria; audit stewardship [25, 26].	Correct dose among DOAC prescriptions.
Weak counselling	Discharge pharmacy and	Non-adherence, early discontinuation or	Arabic and English counselling, pharmacist	Documented counselling and first

Gap	Likely setting	Clinical consequence	Recommended action	Quality metric
and refill continuity	outpatient follow-up	unsafe co-medication use.	reconciliation and clear refill route [16-20].	supply before discharge.
No early review pathway	ED-to-cardiology transition	Missed renal review, rhythm strategy and persistence checks.	Risk-tiered cardiology or anticoagulation-clinic review within 7-30 days.	Reviewed within target interval by risk group.

8. Implementation Priorities and Research Agenda

Implementation should focus on measurable behaviours. First, every AF discharge should contain a documented stroke score and anticoagulation decision. Second, every DOAC prescription should show correct dose criteria. Third, every deferral should identify the responsible reviewer and date. Fourth, patient counselling should be standardised and available in Arabic and English, with attention to health literacy. Fifth, cardiology clinics should audit under-dosing, renal review, concomitant antiplatelet therapy and discontinuation without documented rationale.

Saudi research should move from describing knowledge gaps to testing pathway interventions. Priority studies include prospective audits of ED AF discharge, cluster evaluation of electronic risk-score prompts, pharmacist-led DOAC initiation models, patient-counselling interventions, and linkage studies measuring stroke, bleeding, readmission and adherence after emergency presentation. Registry-based research could compare public, private, urban and regional services to identify where follow-up breaks down. Qualitative work with patients and clinicians would clarify why anticoagulation is refused, delayed or stopped.

Cost-effectiveness also matters. Avoiding stroke has profound human and economic value, but clinics must allocate limited specialist appointments. A tiered approach may help: high-risk, newly diagnosed, renally impaired or recently cardioverted patients receive rapid cardiology or anticoagulation review; stable patients with complete discharge plans receive primary-care monitoring; complex patients receive multidisciplinary review. The test of success is not simply higher DOAC use, but the right anticoagulant, at the right dose, for the right patient, with visible continuity.

Implementation should also recognise that Saudi services may have different starting points. A tertiary cardiac centre might begin with electronic dashboards and pharmacist-led discharge. A regional hospital might begin with a one-page AF discharge checklist and a weekly virtual cardiology review. A busy private clinic might begin with dose-audit feedback and standardised patient leaflets. The pathway should therefore be modular: the minimum standard is documented risk assessment and anticoagulation decision-making; the advanced standard is integrated, audited, multidisciplinary care.

9. Limitations

This review is limited by the scarcity of Saudi emergency-department AF studies and by heterogeneity across available sources. Some Saudi evidence concerns patient knowledge, general-practitioner perceptions or hospital DOAC utilisation rather than ED-to-cardiology pathways specifically [16-20]. The proposed model is therefore evidence-informed rather than externally validated. It draws on international guidelines and emergency-care evidence, which may require adaptation to local staffing, formulary, insurance and referral structures. In addition, published studies may under-represent rural services, private clinics and patients who do not attend follow-up.

Another limitation is that the review emphasises anticoagulation and does not provide a full technical comparison of ablation, antiarrhythmic selection or left atrial appendage occlusion. Those interventions are important for selected patients, but they do not remove the need for systematic stroke-risk assessment at first contact. The review also does not claim that one international guideline should be transplanted unchanged into Saudi practice. Local adaptation should consider formulary rules, referral capacity and patient preferences while preserving the core principle that eligible patients require timely, safe and durable stroke prevention.

10. CONCLUSION

AF management in Saudi emergency and cardiology clinics should be judged by continuity of stroke prevention as much as by immediate symptom control. The evidence from 2020 to 2025 supports a clear message: anticoagulation decisions must be made early, documented explicitly, reviewed safely and carried across the emergency-cardiology boundary. The most important gaps are predictable and therefore preventable: absent risk scoring, delayed initiation, inappropriate antiplatelet substitution, incorrect DOAC dosing, weak counselling and missed follow-up. A Saudi pathway built around structured risk assessment, pharmacist-supported prescribing, rapid review for high-risk patients and measurable quality indicators can align

daily practice with contemporary guideline standards. Such a pathway would not eliminate clinical judgement; it would protect it by ensuring that urgent presentations do not lose sight of long-term stroke prevention across Saudi clinical care settings.

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