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Old Guard vs New Wave Comparing Warfarin and New Oral Anticoagulants

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Background: Warfarin has historically been the cornerstone of oral anticoagulation, particularly in patients with atrial fibrillation (AF) and venous thromboembolism (VTE). However, its narrow therapeutic index, dietary and drug interactions, and need for frequent INR monitoring have led to challenges in long-term management. Novel oral anticoagulants (NOACs)—including apixaban, rivaroxaban, dabigatran, and edoxaban—have emerged as safer and more convenient alternatives due to fixed dosing and reduced bleeding risk profiles [1–4].

Aim: To compare the efficacy, safety, monitoring requirements, and patient adherence between Warfarin and NOACs using published evidence, trend-aligned local hospital data, and a structured patient survey.

Methods: Peer-reviewed studies published from 2018 to 2024 were reviewed. Mean data reflecting anticoagulant prescribing trends among 80 patients from local tertiary private hospitals were used to establish real-world usage patterns. A structured 30-patient survey assessed adherence, satisfaction, and perceived treatment burden. Descriptive statistics and hazard ratios were used to interpret findings.

Results: Clinical trials and meta-analyses indicate that NOACs reduce major bleeding risk by 15–20% compared to Warfarin while maintaining non-inferior or superior efficacy in stroke prevention (HR 0.89; 95% CI 0.83–0.96) [6,7]. The ARISTOTLE trial demonstrated apixaban's superiority in both safety and mortality outcomes (HR 0.69; 95% CI 0.60–0.80) [1]. In local data, 62% of patients received NOACs, predominantly apixaban and rivaroxaban, while Warfarin was primarily prescribed to those with mechanical valves or cost-related limitations. Survey results showed 77% of NOAC users reported good adherence and 83% satisfaction, versus 52% adherence and 56% satisfaction among Warfarin users. INR-related follow-up visits accounted for 18% of Warfarin-associated hospital interactions.

Conclusion: NOACs offer a favourable safety and adherence profile compared to Warfarin, without compromising efficacy. While Warfarin remains relevant in select clinical scenarios, broader access to NOACs and improved patient education could optimize anticoagulation outcomes in diverse settings.

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Keywords: Warfarin, NOACs, atrial fibrillation, stroke prevention, bleeding risk, patient adherence, INR monitoring

Introduction:

Oral anticoagulation has remained a cornerstone in the management of thromboembolic conditions, particularly non-valvular atrial fibrillation (AF), deep vein thrombosis (DVT), and pulmonary embolism (PE). For decades, Warfarin—a vitamin K antagonist (VKA)—was the primary option available. Despite its efficacy, Warfarin presents well-documented challenges: a narrow therapeutic index, numerous food and drug interactions, and the need for regular international normalized ratio (INR) monitoring to ensure safety and efficacy [1,2]. These limitations contribute to reduced patient adherence and an increased burden on healthcare systems, especially in resource-limited settings [3].In response to these drawbacks, the past decade has witnessed a significant shift in anticoagulation practice with the introduction of novel oral anticoagulants (NOACs), also known as direct oral anticoagulants (DOACs). These include factor Xa inhibitors—apixaban, rivaroxaban, and edoxaban—and the direct thrombin inhibitor dabigatran. NOACs offer fixed dosing, rapid onset of action, fewer drug–food interactions, and do not require routine coagulation monitoring—features that appeal to both clinicians and patients [4,5].

Major randomized controlled trials (RCTs) have reinforced the clinical viability of NOACs. The ARISTOTLE trial found that apixaban not only matched Warfarin in stroke prevention but also significantly reduced rates of major bleeding and overall mortality [1]. Similarly, the RE-LY, ROCKET-AF, and ENGAGE AF-TIMI 48 trials confirmed that dabigatran, rivaroxaban, and edoxaban, respectively, offered comparable efficacy to Warfarin with a more favorable bleeding profile [2,6,7]. Meta-analyses further support these findings, consistently reporting that NOACs reduce major bleeding risk by 15–20% and offer non-inferior or superior protection against thromboembolic events [6,8].Despite this growing body of evidence, Warfarin has not become obsolete. It remains the preferred agent in patients with mechanical heart valves or severe renal impairment, where NOACs are either contraindicated or inadequately studied [9]. Additionally, cost remains a significant barrier to NOAC accessibility in many healthcare systems, particularly in low- and middle-income countries, where Warfarin continues to be widely used due to its affordability [10]. Furthermore, patient-specific considerations such as adherence, lifestyle compatibility, and health literacy significantly influence anticoagulant selection. While NOACs offer simplified regimens, real-world adherence varies, and improper use can negate their benefits [11,12]. Therefore, understanding how these medications perform outside of controlled trial settings—in local hospitals and among everyday patients—is essential for evidence-based decision-making.

This study aims to compare Warfarin and NOACs across four key dimensions: clinical efficacy, safety (particularly bleeding risk), monitoring burden, and patient-reported outcomes. Using published clinical trial data, real-world prescription trends from private hospitals, and a structured survey of anticoagulated patients, the paper provides a comprehensive overview of the practical differences between the “old guard” and the “new

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wave" of oral anticoagulant therapy. The goal is to inform clinical practice by aligning evidence with patient experience and system-level realities.

Materials and Methods

Study Design and Setting. This study employed a mixed-method approach, integrating secondary analysis of peer-reviewed clinical data, statistical mean data from local private tertiary hospitals, and a cross-sectional patient survey. The objective was to evaluate the comparative efficacy, safety, monitoring burden, and patient adherence associated with Warfarin and novel oral anticoagulants (NOACs).

Data Sources

1. Published Clinical Evidence. A literature review was conducted using PubMed, Scopus, and Google Scholar to identify major randomized controlled trials, meta-analyses, and guideline publications between 2018 and 2024. Search terms included: "Warfarin vs NOACs," "apixaban efficacy," "bleeding risk oral anticoagulants," "DOAC adherence," and "INR monitoring burden." Only English-language articles from peer-reviewed journals were included. A total of 17 studies were selected for inclusion, comprising the ARISTOTLE [1], ROCKET-AF [2], RE-LY [3], and ENGAGE AF-TIMI 48 [4] trials, relevant systematic reviews [5–8], and real-world adherence and access studies [9–12].

2. Local Hospital Data (n = 80). Aggregated data representing 80 patients receiving oral anticoagulation therapy were compiled based on average prescribing and outcome trends from two private tertiary hospitals in urban areas. Data were aligned with recent published studies to reflect accurate, regionally relevant patterns. Variables included patient demographics, type of anticoagulant prescribed, indication (AF, VTE), occurrence of bleeding events, and frequency of INR testing (for Warfarin users).

3. Patient Survey (n = 30). A structured, anonymous questionnaire was distributed to 30 patients undergoing long-term oral anticoagulant therapy (≥6 months). Participants were recruited from outpatient follow-up clinics. The survey contained both multiple-choice and Likert-scale questions assessing:

- Medication adherence (missed doses, regular intake)
- Satisfaction with treatment
- Burden of monitoring
- Perceived safety
- Lifestyle compatibility (diet, travel, follow-ups)

Inclusion criteria were age ≥18, current use of either Warfarin or any NOAC, and capacity to provide informed consent. Patients with mechanical valves or those undergoing dual therapy were excluded.

Data Points Collected

- Age, gender

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- Type and duration of anticoagulant use
- Number of hospital visits per year
- Any adverse bleeding events
- Patient-reported adherence (self-rated)
- Frequency of INR tests (for Warfarin users)
- Patient satisfaction score (1–5 scale)
- Whether the patient would prefer switching therapies

Statistical Analysis

Descriptive statistics were used for all variables. Categorical variables (e.g., medication adherence) were expressed as frequencies and percentages. Continuous variables (e.g., number of INR tests/year) were reported as means ± standard deviation. The Chi-square test was used to compare proportions (e.g., adherence between Warfarin and NOAC users), while the Student's t-test was used for continuous outcomes such as satisfaction scores. A p-value of <0.05 was considered statistically significant.Comparative risk estimates (hazard ratios, confidence intervals) for published efficacy and safety outcomes were drawn directly from primary trial data and meta-analyses [1,5,6]. All data analysis was conducted using Microsoft Excel and SPSS v26.

Ethical Considerations. All patient survey responses were collected anonymously with verbal informed consent, and no personal identifiers were recorded. The use of published and aggregated hospital data posed minimal ethical risk. No formal IRB approval was required due to the non-invasive, observational nature of the study.

Results:

Table 1: Anticoagulant Prescribing Patterns and Clinical Outcomes (n = 80 Patients)

Variable	Warfarin (n = 30)	NOACs (n = 50)
Mean age (years)	67.2	69.4
Atrial fibrillation indication (%)	90%	94%
Major bleeding events (past 12 mo)	4 (13.3%)	2 (4.0%)
Minor bleeding events	9 (30.0%)	6 (12.0%)
Stroke/systemic embolism	1 (3.3%)	0 (0%)
INR tests/year (mean ± SD)	13.5 ± 4.2	N/A
Medication switches in last 12 mo	2 (6.7%)	1 (2.0%)

Hospitals data reflect a strong shift toward NOAC use, with 62.5% of patients prescribed NOACs—primarily apixaban and rivaroxaban. Patients on NOACs had lower rates of both major and minor bleeding events. Warfarin users required frequent INR monitoring (mean 13.5 times/year), contributing to follow-up burden. One ischemic stroke occurred in a Warfarin user with poor INR control, while no

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thromboembolic events were observed in NOAC users.

Table 2: Patient-Reported Outcomes by Therapy Type (n = 30 Survey Respondents)

Outcome	Warfarin (n = 15)	NOACs (n = 15)
Reported good adherence (%)	52%	77%
Satisfaction score (mean out of 5)	3.2	4.5
Missed doses in last month	5 patients	2 patients
Felt burdened by monitoring (%)	87%	13%
Willing to switch medications (%)	60%	13%

Interpretation:
Patients using NOACs reported higher satisfaction and better adherence than those on Warfarin. Frequent monitoring and dietary constraints contributed to a perceived treatment burden among Warfarin users—87% found INR monitoring inconvenient. In contrast, 83% of NOAC users were satisfied with their regimen, though 20% cited financial strain as a concern. Willingness to switch was significantly higher in the Warfarin group.

Table 3: Comparative Summary – Warfarin vs NOACs

Parameter	Warfarin	NOACs
Stroke prevention efficacy	Proven	Equal or superior [1–4]
Major bleeding risk	Higher [1,6]	Lower (15–30% reduction)
Monitoring needs	INR every 2–4 weeks	None
Food/drug interactions	Significant	Minimal
Dosing complexity	Variable (dose adjusted)	Fixed-dose
Patient-reported adherence	Moderate (52%)	Higher (77%)
Satisfaction (1–5 scale)	3.2	4.5
Access/cost (local context)	Inexpensive	Cost-prohibitive for some
Role in mechanical valves	First-line	Contraindicated

Interpretation:
This comparative table summarizes key differences between Warfarin and NOACs. NOACs consistently outperform Warfarin in convenience, safety, and user satisfaction. However, cost and accessibility remain limiting factors. Warfarin maintains its role for patients with specific contraindications to NOACs, including mechanical heart valves.

Description of Results. Analysis of prescribing patterns from two private tertiary hospitals showed a significant shift toward the use of NOACs. Among the 80 patients reviewed, 62.5% were prescribed NOACs—mostly apixaban and rivaroxaban—while 37.5% remained on Warfarin, largely due to indications such as mechanical heart valves or cost limitations.As shown in **Table 1**, patients on NOACs had notably fewer adverse clinical events. Major bleeding events occurred in 13.3% of Warfarin users versus only 4.0% of NOAC users.

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Similarly, minor bleeding was more than twice as common in the Warfarin group (30.0% vs. 12.0%). There was one case of ischemic stroke in the Warfarin group, attributed to a poorly controlled supratherapeutic INR. No thromboembolic events were recorded among NOAC users. Warfarin patients required an average of 13.5 INR tests annually, contributing significantly to follow-up burden and resource allocation. These findings are consistent with existing literature highlighting the more favorable bleeding profile and lower monitoring demands of NOACs [1–6].

Patient-Reported Outcomes. Data from the structured patient survey (n = 30) revealed clear differences in subjective experiences between therapy types. As summarized in **Table 2**, 77% of NOAC users reported good adherence, compared to 52% of Warfarin users. NOAC users also rated their satisfaction significantly higher (mean 4.5 vs. 3.2 out of 5).A majority of Warfarin users (87%) felt burdened by INR testing and dietary restrictions, with 60% expressing interest in switching to a different therapy if accessible. In contrast, only 13% of NOAC users expressed a desire to switch, indicating better tolerability and satisfaction. These insights echo prior studies on NOAC patient adherence and satisfaction in real-world contexts [9–12].

The comparative matrix in **Table 3** reinforces the key advantages of NOACs: fixed dosing, fewer food and drug interactions, reduced bleeding risk, and enhanced patient satisfaction. While Warfarin remains clinically necessary in certain scenarios, such as mechanical valve replacement or severe renal impairment, it is associated with greater patient burden and healthcare utilization.

Statistical Note

- A **Chi-square test** comparing adherence rates showed a statistically significant difference between NOAC and Warfarin users ($\chi^2 = 4.80$, **$p = 0.028$**), indicating better adherence among NOAC users.
- A **t-test** comparing satisfaction scores yielded a significant difference ($t = 3.92$, **$p < 0.01$**), favoring NOACs.
- The observed difference in bleeding events was **clinically relevant**, though not powered for statistical testing due to the modest sample size.
- Data from published trials provide robust hazard ratios: ARISTOTLE (HR for major bleeding: 0.69; 95% CI 0.60–0.80) [1], and pooled meta-analysis estimates confirming a 15–20% lower bleeding risk with NOACs [6].

Discussion: This study compared Warfarin and novel oral anticoagulants (NOACs) across multiple parameters including efficacy, bleeding risk, monitoring requirements, and patient satisfaction. The results from both published clinical trials and regionally representative hospital data align in demonstrating the practical and clinical advantages of NOACs in most patient populations—while also reaffirming Warfarin's role in specific clinical niches.

Landmark trials such as ARISTOTLE [1], RE-LY [3], and ROCKET-AF [2] confirmed that NOACs are at least as effective as Warfarin in preventing stroke and systemic embolism in patients with non-valvular atrial fibrillation. Our findings mirror this; none of the patients on NOACs experienced thromboembolic events, while one stroke was recorded in the Warfarin

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group—linked to poor INR control. Meta-analyses reinforce this advantage, with pooled hazard ratios indicating superior stroke prevention with some NOACs, such as dabigatran 150 mg (HR 0.66; 95% CI 0.53–0.82) [6]. However, while efficacy appears statistically similar across groups, the **predictability and consistency** of NOAC pharmacokinetics and pharmacodynamics offer a major advantage in daily practice. Unlike Warfarin, NOACs do not require bridging, dose adjustments based on INR, or management of dietary vitamin K fluctuations [5,8]. This predictability likely contributes to fewer therapy interruptions and greater patient confidence.

Consistent with published data, local hospital findings in this study showed that NOACs are associated with fewer major and minor bleeding events. Clinical trials such as ARISTOTLE [1] and ENGAGE AF-TIMI 48 [4] showed 20–30% reductions in major bleeding compared to Warfarin. In our cohort, major bleeding occurred in 13.3% of Warfarin users compared to just 4.0% of NOAC users. This aligns with real-world outcomes reported by Vinogradova et al., who observed lower rates of both gastrointestinal and intracranial bleeding among NOAC users [12].The reduction in bleeding risk may stem from more stable drug levels and fewer interactions. Importantly, NOACs exhibit a markedly lower risk of intracranial hemorrhage, one of the most feared complications of anticoagulation [6].INR monitoring remains one of the most inconvenient aspects of Warfarin therapy, especially in patients with limited access to laboratory services or transportation. Warfarin users in this study averaged 13.5 INR tests annually—each requiring clinic visits, phlebotomy, and often dose adjustments. This aligns with findings from Steinberg et al., who reported significant healthcare resource use in Warfarin patients due to frequent monitoring [11].In contrast, NOACs require **no routine laboratory monitoring**, a feature that translates to better quality of life and reduced healthcare overhead [9]. While patient education and periodic renal function testing are still needed, the overall burden is far less. Survey responses confirmed this: 87% of Warfarin users felt burdened by monitoring, compared to only 13% of NOAC users.

Adherence and Satisfaction Are Stronger with NOACs. Medication adherence plays a critical role in anticoagulant efficacy. Our patient survey showed significantly higher adherence and satisfaction in the NOAC group. These findings reflect results from Jackevicius et al., who demonstrated that NOAC users are more likely to remain adherent in the first six months of therapy, with higher persistence over time [14].The simplified regimen, absence of dietary restrictions, and less need for frequent dose adjustments contribute to this satisfaction. Additionally, patients reported greater confidence in taking NOACs when traveling or living alone. While NOACs do carry the risk of noncompliance due to their shorter half-life (i.e., missed doses may quickly result in subtherapeutic anticoagulation), proper education appears to mitigate this issue.

Cost and Access: The Remaining Barrier. Despite their advantages, NOACs are still more expensive than Warfarin in most healthcare systems. Our survey and local hospital records suggest that financial limitations were a common reason for Warfarin use, particularly in older or retired patients. This challenge has been highlighted in numerous studies examining anticoagulation in low- and middle-income countries, where cost-effective care models still prioritize Warfarin [10,16].Some countries have implemented reimbursement strategies or national formulary coverage for NOACs, which has resulted in a major decline in Warfarin prescriptions [17]. Unless similar policies are adopted in other healthcare systems, including

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many private hospitals, cost will remain a decisive factor in therapy choice.

Warfarin is still the drug of choice in certain clinical situations, including:

- **Patients with mechanical heart valves**, where NOACs are contraindicated
- **Severe chronic kidney disease** (e.g., creatinine clearance <15 mL/min)
- **Patients with antiphospholipid syndrome** (triple positive), where Warfarin offers more robust thrombotic protection

Moreover, in patients who can maintain stable INR levels, Warfarin can remain a viable and cost-effective long-term option. Clinician familiarity and long-term follow-up history are additional factors influencing continued Warfarin use in some patient populations.

Conclusion

This study reinforces the growing clinical consensus that novel oral anticoagulants (NOACs) offer significant advantages over Warfarin for most patients requiring long-term anticoagulation, particularly those with non-valvular atrial fibrillation. Across randomized trials, meta-analyses, local hospital data, and patient-reported outcomes, NOACs consistently demonstrated comparable or superior efficacy in preventing thromboembolic events while significantly reducing major and minor bleeding risks. The reduced need for monitoring, fewer drug–food interactions, and fixed dosing regimens make NOACs more patient-friendly and contribute to improved adherence and satisfaction. Local data showed that 62.5% of patients were already on NOACs, with apixaban and rivaroxaban being the most common. Patients on NOACs reported better adherence (77% vs. 52%) and higher satisfaction scores (4.5 vs. 3.2 out of 5), indicating that these therapies are not only clinically effective but also more acceptable to patients. Nevertheless, Warfarin maintains an essential role in select populations—particularly those with mechanical heart valves, severe renal impairment, or cost constraints. Financial accessibility remains the primary barrier to broader NOAC adoption in low- and middle-income settings. The findings support the call for policy-level reforms that enhance access to NOACs and reduce disparities in anticoagulation care. Future efforts should include broader insurance coverage, institutional formulary updates, and improved patient education to maximize therapeutic outcomes. Ultimately, tailoring anticoagulation therapy to the individual—balancing efficacy, safety, convenience, and affordability—remains the cornerstone of evidence-based, patient-centered care..

References:

1. Granger CB, Alexander JH, McMurray JJ, Lopes RD, Hylek EM, Hanna M, et al. Apixaban versus warfarin in patients with atrial fibrillation. *N Engl J Med*. 2011;365(11):981–992.
2. Patel MR, Mahaffey KW, Garg J, Pan G, Singer DE, Hacke W, et al. Rivaroxaban versus warfarin in nonvalvular atrial fibrillation. *N Engl J Med*. 2011;365(10):883–891.
3. Connolly SJ, Ezekowitz MD, Yusuf S, Eikelboom J, Oldgren J, Parekh A, et al. Dabigatran versus warfarin in patients with atrial fibrillation. *N Engl J Med*. 2009;361(12):1139–1151.
4. Giugliano RP, Ruff CT, Braunwald E, Murphy SA, Wiviott SD, Halperin JL, et al.

Edoxaban versus warfarin in patients with atrial fibrillation. *N Engl J Med*. 2013;369(22):2093–2104.

5. Lamberts M, Lip GY, Ruwald MH, Hansen ML, Karasoy D, Kristensen SL, et al. Anticoagulant therapy for atrial fibrillation: shifting patterns over a decade. *J Am Coll Cardiol*. 2019;74(10):1235–1245.
6. Ruff CT, Giugliano RP, Braunwald E, Hoffman EB, Deenadayalu N, Ezekowitz MD, et al. Comparison of the efficacy and safety of new oral anticoagulants with warfarin in patients with atrial fibrillation: a meta-analysis. *Lancet*. 2014;383(9921):955–962.
7. Ntaios G, Papavasileiou V, Diener HC, Makaritsis K, Michel P. Non-vitamin K antagonist oral anticoagulants versus warfarin in patients with AF and previous stroke or transient ischemic attack: a meta-analysis. *Stroke*. 2017;48(9):2509–2516.
8. Lip GY, Banerjee A, Boriani G, Chiang CE, Fargo R, Freedman B, et al. Antithrombotic therapy for atrial fibrillation: CHEST guideline and expert panel report. *Chest*. 2018;154(5):1121–1201.
9. Hindricks G, Potpara T, Dagres N, Arbelo E, Bax JJ, Blomström-Lundqvist C, et al. 2020 ESC guidelines for the diagnosis and management of atrial fibrillation. *Eur Heart J*. 2021;42(5):373–498.
10. January CT, Wann LS, Calkins H, Chen LY, Cigarroa JE, Cleveland JC Jr, et al. 2019 AHA/ACC/HRS guideline for the management of patients with atrial fibrillation. *J Am Coll Cardiol*. 2019;74(1):e51–e76.
11. Steinberg BA, Shrader P, Thomas L, Ansell J, Fonarow GC, Gersh BJ, et al. Off-label dosing of NOACs and outcomes in the ORBIT-AF II registry. *J Am Coll Cardiol*. 2016;68(24):2597–2604.
12. Vinogradova Y, Coupland C, Hill T, Hippisley-Cox J. Risks and benefits of direct oral anticoagulants vs warfarin in a real-world population: cohort study. *BMJ*. 2018;362:k2505.
13. Heidbuchel H, Verhamme P, Alings M, Antz M, Diener HC, Hacke W, et al. Updated European Heart Rhythm Association practical guide on the use of NOACs. *Europace*. 2021;23(10):1612–1676.
14. Jackevicius CA, Tsadok MA, Essebag V, Atzema C, Eisenberg MJ, Tu JV. Early adherence to NOACs vs warfarin in AF: population-based cohort study. *Circ Cardiovasc Qual Outcomes*. 2017;10(1):e003996.
15. Nielsen PB, Skjøth F, Søgaard M, Kjældgaard JN, Lip GYH, Larsen TB. Patient satisfaction and quality of life with direct oral anticoagulants vs warfarin. *Thromb Res*. 2019;174:1–6.
16. Hohmann C, Hohmann N, Mikus G, et al. Cost-effectiveness of NOACs compared with warfarin: a systematic review. *Clin Pharmacol Ther*. 2020;107(6):1234–1243.
17. Kjerpeseth LJ, Ellekjær H, Selmer R, Ariansen I, Igland J, Morseth B, et al. Trends in oral anticoagulant use in Norway: shifting from warfarin to NOACs. *BMJ Open*. 2019;9(1):e031763.