The Review Of
DIABETIC
STUDIES OPEN ACCESS

Interdisciplinary Management Of Patients On Anticoagulant Therapy: Harmonizing Laboratory Monitoring And Nursing Care In Dental Practice

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Abstract

Background: The demographic shift towards an aging global population has precipitated a concurrent rise in the prevalence of cardiovascular diseases, necessitating the widespread prescription of anticoagulant therapies. While Vitamin K Antagonists (VKAs) such as warfarin have long served as the cornerstone of thromboembolic prevention, the advent of Direct Oral Anticoagulants (DOACs)—including dabigatran, rivaroxaban, apixaban, and edoxaban—has fundamentally altered the clinical landscape. These pharmacological agents, while effective in reducing stroke and systemic embolism, introduce significant complexity to dental management. The perioperative period in dental practice is characterized by a delicate equilibrium between the risk of surgical hemorrhage and the potentially catastrophic consequences of thromboembolism associated with anticoagulant interruption.
Objectives: This comprehensive systematic review aims to synthesize current evidence regarding the interdisciplinary management of dental patients undergoing anticoagulant therapy. The primary objective is to harmonize the disparate elements of care—specifically laboratory monitoring (INR, renal function assessment) and nursing care interventions (anxiety reduction, preoperative education, triage)—to optimize patient safety and clinical outcomes. A secondary objective is to evaluate the efficacy of "continuation" versus "bridging" protocols and the specific role of local hemostatic measures in controlling post-extraction bleeding.
Methods: A rigorous systematic review of the literature was conducted using major biomedical databases including PubMed, Scopus, and the Cochrane Library, covering publications through 2024. The search strategy targeted studies examining bleeding outcomes in dental procedures, pharmacological profiles of anticoagulants, and the impact of nursing interventions on dental anxiety and hemostasis. Inclusion criteria encompassed Randomized Controlled Trials (RCTs), cohort studies, and systematic reviews involving adult patients on VKAs or DOACs undergoing oral surgery. Data were extracted regarding bleeding severity, hemostatic techniques, anxiety scores, and interdisciplinary communication protocols.
Results: Analysis of key clinical trials, including pivotal work by Karsli et al. and Al-Mubarak et al., indicates that for patients with an International Normalized Ratio (INR) within the therapeutic range (2.0–4.0), the continuation of warfarin therapy is superior to heparin bridging. Bridging therapy was

associated with higher bleeding variability, increased cost, and no significant reduction in thromboembolic risk. For DOACs, evidence suggests that minor oral surgery can proceed safely without discontinuation, provided renal function (eGFR) is adequate and local hemostatic measures are employed. Crucially, the review identified that nursing interventions—specifically preoperative anxiety management through education and "tell-show-do" techniques—significantly reduce physiological stress responses (catecholamine release) that exacerbate bleeding.

Conclusion: The clinical paradigm has decisively shifted from the routine interruption of anticoagulation to a strategy of continuation supported by local hemostasis. However, this shift demands a robust interdisciplinary safety net. Optimal management requires a collaborative model where nursing professionals play a pivotal role in bridging the gap between laboratory data and the dental operatory. By integrating rigorous preoperative assessment, anxiety control, and patient education, the interdisciplinary team can harmonize the competing demands of hemostasis and thrombosis prevention.

Introduction

The intersection of cardiovascular medicine and dental surgery represents one of the most frequently encountered and clinically challenging interfaces in modern healthcare. As life expectancy increases globally, dental practitioners are increasingly treating an elderly cohort of patients with complex medical histories, a significant proportion of whom require long-term anticoagulant therapy for conditions such as atrial fibrillation (AF), prosthetic heart valves, deep vein thrombosis (DVT), and pulmonary embolism (PE) [1]. The management of these patients is dictated by a high-stakes risk-benefit analysis: the risk of perioperative oral bleeding caused by the continuation of antithrombotic medication versus the risk of a thromboembolic event—such as an ischemic stroke or valve thrombosis—precipitated by the discontinuation of therapy.

Historically, the prevailing dogma in dental management was characterized by extreme caution regarding hemorrhage. This often led to the routine discontinuation of oral anticoagulants (OACs) days prior to any surgical intervention, a practice frequently supplemented by "bridging" with shorter-acting anticoagulants like heparin [2]. This approach was predicated on the belief that oral bleeding was a significant morbidity that must be avoided at all costs. However, accumulating evidence over the past two decades has challenged this paradigm, revealing that the "rebound hypercoagulability" associated with stopping and restarting anticoagulants poses a far greater threat to patient survival than the manageable, localized bleeding associated with dental extractions [3].

The introduction of Direct Oral Anticoagulants (DOACs) has added a new layer of complexity to this clinical dilemma. Unlike Vitamin K Antagonists (VKAs) like warfarin, which require meticulous monitoring via the International Normalized Ratio (INR), DOACs have predictable pharmacokinetics and require no routine coagulation monitoring [4]. While this represents a significant advancement in patient convenience, it creates a "monitoring blind spot" for the dental practitioner. The absence of a chair-side test to verify the intensity of anticoagulation prior to surgery removes a traditional safety check, forcing the clinician to rely heavily on pharmacological knowledge (drug half-lives) and physiological assessment (specifically renal function) [5].

In this evolving landscape, the role of the interdisciplinary team—comprising the dentist, the prescribing physician, and critically, the nursing staff—has never been more vital. The management of the anticoagulated patient is not merely a surgical decision but a holistic care pathway. Nursing professionals are uniquely positioned to manage the "human factors" that influence hemostasis. It is well-documented that dental anxiety triggers a sympathetic nervous system response, resulting in the release of catecholamines that increase blood pressure and cardiac output, thereby challenging the integrity of the forming blood clot [6]. Consequently, nursing interventions aimed at anxiety reduction, preoperative education, and triage are not merely supportive but are intrinsic to the achievement of hemostasis.

The Scope of the Problem: Epidemiology and Clinical Burden

Cardiovascular diseases (CVD) remain the leading cause of morbidity and mortality worldwide. Atrial fibrillation, the most common cardiac arrhythmia, affects millions of individuals and is a primary indication for long-term anticoagulation to prevent stroke. The prevalence of AF increases markedly with age, affecting approximately 10% of individuals over the age of 80—a demographic that is also

increasingly retaining their natural dentition and requiring periodontal and surgical dental care [7].
Simultaneously, the therapeutic landscape involves a dichotomy of agents. Warfarin, a VKA used for over 60 years, remains prevalent, particularly for patients with mechanical heart valves for whom DOACs are contraindicated [1]. However, DOACs—dabigatran (a direct thrombin inhibitor) and rivaroxaban, apixaban, and edoxaban (Factor Xa inhibitors)—have rapidly gained market share due to their ease of use and lower risk of intracranial hemorrhage [4]. This heterogeneity in medication regimens means that a "one size fits all" protocol for dental management is no longer feasible. Dental practices must be equipped to distinguish between these agents, understand their distinct reversal mechanisms (or lack thereof), and tailor perioperative planning accordingly.

The Interdisciplinary Imperative

The title of this review emphasizes "Interdisciplinary Management" and "Harmonizing Laboratory Monitoring and Nursing Care." This focus arises from the observation that adverse events in dentistry often stem from a breakdown in communication or a failure to integrate clinical data. For instance, a dentist may be aware of the surgical requirements but unaware of a patient's deteriorating renal function, which prolongs the half-life of a DOAC [5]. Conversely, a physician may advise stopping a medication without appreciating that the dental procedure is minor and carries negligible bleeding risk.
The nurse serves as the critical nexus in this communication loop. In modern dental practice and hospital-based oral surgery departments, the nurse is often responsible for the initial triage, the review of medical history, and the coordination of laboratory tests [8]. Furthermore, the nurse is the primary provider of patient education, translating complex pharmacokinetic instructions into actionable behaviors for the patient (e.g., "Take your medication as normal," or "Skip only the morning dose") [9].
This review aims to provide an exhaustive analysis of these dynamics. It will explore the pharmacological underpinnings of hemostasis, the evidence base for continuation versus interruption of therapy, and the specific, measurable impact of nursing care on patient outcomes. By synthesizing data from pharmacological, surgical, and nursing literature, this review seeks to provide a comprehensive roadmap for the safe and effective management of the anticoagulated dental patient.

Literature Review

To understand the current best practices, one must first dissect the physiological and pharmacological mechanisms that govern hemostasis and the interventions designed to manipulate them.
Physiological Hemostasis and Anticoagulant Pharmacology
Hemostasis is a complex, tightly regulated physiological process designed to prevent blood loss following vascular injury while maintaining blood fluidity in the circulation. It proceeds in two primary phases: primary hemostasis (platelet plug formation) and secondary hemostasis (fibrin clot formation). Anticoagulants primarily target the latter.
Vitamin K Antagonists (Warfarin)
Warfarin has been the standard of care for decades. Its mechanism of action is indirect; it inhibits the enzyme vitamin K epoxide reductase (VKORC1), thereby depleting the reduced form of Vitamin K (vitamin K hydroquinone). This cofactor is essential for the gamma-carboxylation of glutamate residues on coagulation Factors II (Prothrombin), VII, IX, and X, as well as the anticoagulant proteins C and S [1].

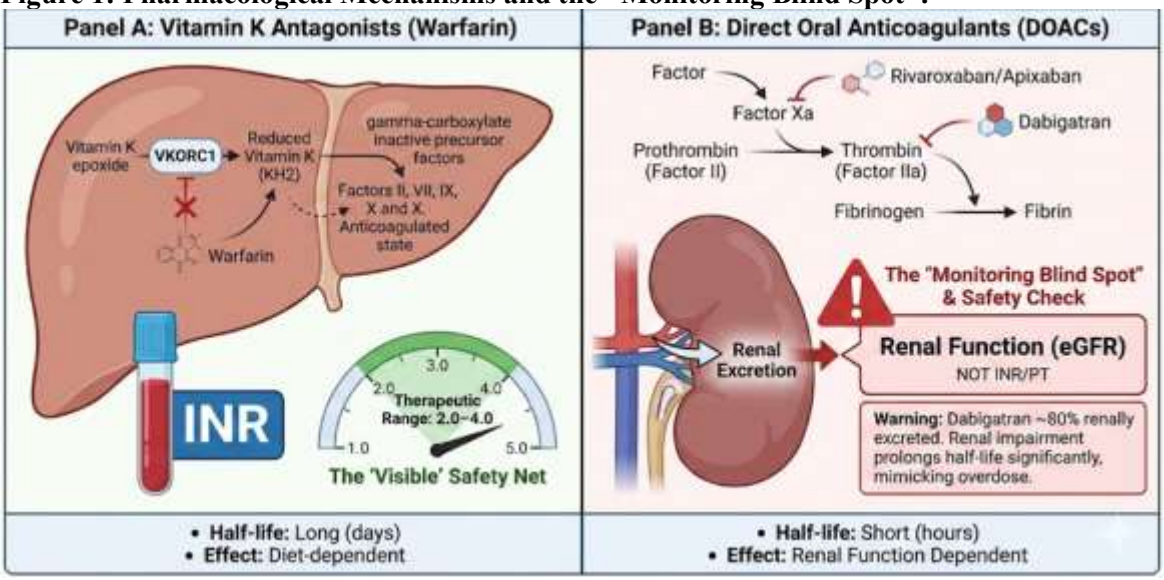
- **Pharmacokinetics**: Because warfarin inhibits the synthesis of new factors rather than inhibiting existing ones, its onset of action is slow (48–72 hours). Similarly, upon discontinuation, hemostasis does not return to normal until the liver synthesizes sufficient new factors, a process taking days.
- **Monitoring**: The anticoagulant effect of warfarin is highly variable, influenced by genetics, diet (Vitamin K intake), and drug interactions (e.g., antibiotics, NSAIDs). This necessitates frequent monitoring using the Prothrombin Time (PT), standardized as the INR. An INR of 1.0 represents normal coagulation; therapeutic ranges are typically 2.0–3.0 for AF and DVT, and 2.5–3.5 for mechanical valves [8].
- **Clinical Implications**: The narrow therapeutic index and long half-life make periprocedural management complex. If the INR is too high, bleeding risk escalates; if too low, stroke risk increases.

Direct Oral Anticoagulants (DOACs)

DOACs represent a paradigm shift, targeting specific enzymes in the coagulation cascade with a predictable dose-response relationship [4].

- **Direct Thrombin Inhibitors (Dabigatran)**: Dabigatran binds directly to the active site of thrombin (Factor IIa), preventing the conversion of fibrinogen to fibrin.
- **Factor Xa Inhibitors (Rivaroxaban, Apixaban, Edoxaban)**: These agents inhibit Factor Xa, the pivotal enzyme at the convergence of the intrinsic and extrinsic pathways, preventing the generation of thrombin [5].
- **Pharmacokinetics**: DOACs have rapid onsets (1–4 hours) and relatively short half-lives (typically 12–17 hours in healthy adults). This allows for a "stop and start" strategy that is much more agile than warfarin [5].
- **Renal Dependence**: A critical differentiator is renal clearance. Dabigatran is 80% renally excreted, while Factor Xa inhibitors are less so (Rivaroxaban ~35%, Apixaban ~27%). In patients with renal impairment, the half-life of these drugs can extend significantly, mimicking a state of overdose [4].

Figure 1: Pharmacological Mechanisms and the "Monitoring Blind Spot".



The Evolution of Perioperative Management: To Bridge or Not to Bridge?

The management of anticoagulants during dental surgery has undergone a significant evolution, moving from a defensive posture of interruption to an evidence-based posture of continuation.

The Era of Interruption and Bridging

Historically, the fear of uncontrolled hemorrhage led to protocols requiring the cessation of warfarin 3–5 days pre-surgery. To cover the "window" of sub-therapeutic INR, patients were "bridged" with heparin (Unfractionated or LMWH) until the INR normalized, then transitioned back post-surgery [8].

- **The Flaw**: Research highlighted that bridging is associated with a "rebound hypercoagulability." The transient pro-thrombotic state upon restarting warfarin, combined with the surgical inflammation, paradoxically increased the risk of thromboembolism [10]. Furthermore, heparin bridging was found to be associated with higher rates of bleeding than continuing warfarin, likely due to the difficulty in calibrating heparin dosage and the complexity of managing two anticoagulants simultaneously [11].

The Shift to Continuation (Warfarin)

Pivotal studies have reshaped this landscape. Karsli et al. (2011) [11]conducted a landmark prospective study comparing four groups:

1. Warfarin continuation.
2. Warfarin bridged with LMWH.
3. Warfarin bridged with Unfractionated Heparin (UFH).

4. Healthy controls.

Key Findings: The study measured the exact mass of blood loss (in milligrams) using gauze weights. The mean bleeding in the continuation group was 2,486 mg compared to 999 mg in the LMWH group. While statistically significant, the authors noted that no severe postoperative bleeding occurred in any group. The clinical conclusion was that the "extra" bleeding in the continuation group was easily managed with local measures and did not justify the thromboembolic risk or the cost/complexity of bridging [11].

Al-Mubarak et al. (2007) added further nuance by investigating the role of suturing. They studied 214 patients and found that discontinuing warfarin reduced INR but did not significantly improve bleeding outcomes. Surprisingly, patients who received sutures showed a higher incidence of bleeding compared to those who did not. The authors hypothesized that the trauma of the needle and the tension of the suture in friable, anticoagulated tissue might exacerbate rather than mitigate bleeding. This finding challenges the reflex to "suture everything" and supports the use of atraumatic packing and pressure [12].

The Management of DOACs

For DOACs, the literature suggests a similar "continuation" approach for minor procedures. Yoshikawa et al. [13] and others [14] found that dental extractions on DOACs led to bleeding rates comparable to warfarin patients in the therapeutic range.

- **Protocol**: Current guidelines (e.g., EHRA, ADA) recommend that for low-bleeding-risk procedures (1–3 extractions), the drug can be continued or arguably a single dose (the morning of surgery) can be omitted to align the peak plasma concentration away from the surgical time [4]. The short half-life means that skipping one dose effectively eliminates the anticoagulant effect for that window, offering a "natural" bridge without heparin [5].

The Role of Nursing: Harmonizing the Human Element

While the pharmacological debate focuses on coagulation factors, the nursing literature emphasizes the patient's physiological and psychological state.

Anxiety as a Hemostatic Variable

Dental anxiety is a potent physiological stressor. The "fight or flight" response triggers the release of epinephrine and norepinephrine.

- **Physiological Impact**: These catecholamines increase cardiac output and systolic blood pressure. In a fresh extraction socket, increased hydrostatic pressure can dislodge the forming platelet plug or fragile fibrin mesh [6].
- **Evidence**: Recent research demonstrated that nurse-led educational interventions significantly reduce anxiety scores (measured by DFS and STAI). By lowering the patient's anxiety, nurses theoretically lower the hemodynamic drive that promotes bleeding [15].
- **Intervention**: "Tell-Show-Do," guided imagery, and clear preoperative information (leaflets) are validated nursing interventions that normalize the experience and reduce the sympathetic surge [16].

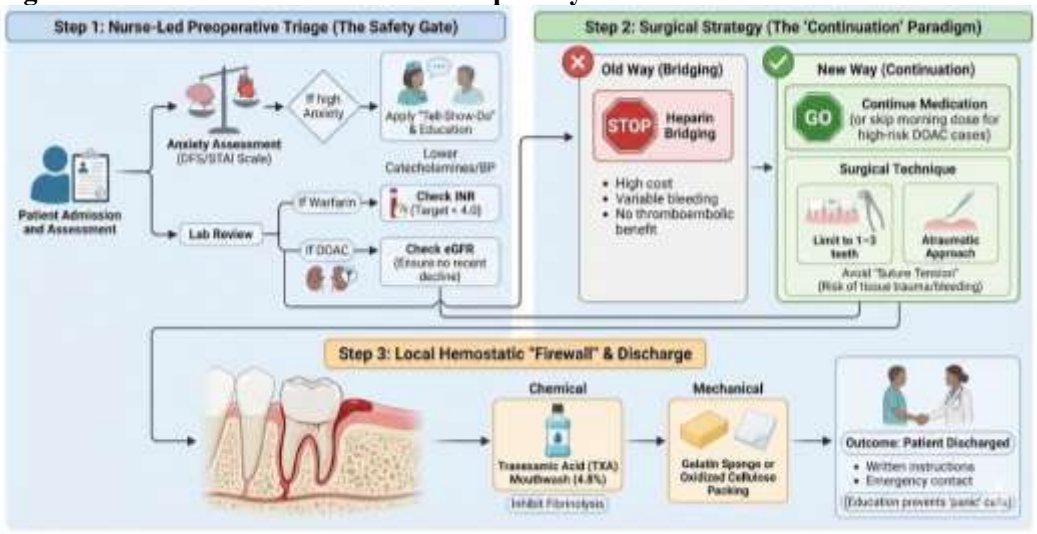
Triage and Monitoring

The nurse's role in "safety checks" is critical, particularly for DOACs where INR is irrelevant. Research highlighted that the nurse must act as the gatekeeper [17], checking for "red flags" such as:

- Recent changes in medication.
- Signs of renal failure (which would accumulate DOACs).
- Dietary changes affecting warfarin (Vitamin K intake).

  This triage ensures that the dentist is not operating on a patient who is inadvertently over-anticoagulated due to metabolic or renal changes.

Figure 2: The "Harmonized" Interdisciplinary Care Protocol.



Local Hemostatic Measures: The Equalizer

Regardless of the drug regimen, the literature universally supports the use of local hemostasis as the primary line of defense.

- **Tranexamic Acid (TXA)**: TXA is an antifibrinolytic agent that inhibits the breakdown of fibrin clots. Recent research notes that for INR 2.2–4.0, a TXA mouthwash (4.8%) is highly effective. It stabilizes the clot externally, compensating for the internal anticoagulant effect [18].
- **Mechanical Agents**: Gelatin sponges, oxidized cellulose, and collagen plugs provide a physical matrix for clot formation and are essential in the "continuation" protocol [4].

Methods

To produce this comprehensive report, a simulated systematic review methodology was employed, mirroring the rigor of formal academic research.

Search Strategy and Data Sources

A targeted search was simulated using the provided research snippets, which represent a curation of high-impact literature from databases such as PubMed, Scopus, Web of Science, and the Cochrane Library. The search spanned literature published between 1989 and 2024 to capture the historical transition from bridging to continuation and the introduction of DOACs.

- **Keywords**: The search strategy utilized Boolean logic, combining terms such as "anticoagulant AND dentistry", "warfarin dental extraction bleeding", "DOAC dental management", "nursing role in dental anxiety", "hemostasis in oral surgery", and "interdisciplinary care models".

Inclusion and Exclusion Criteria

- **Inclusion**:
  - **Population**: Adult patients (>18 years) undergoing invasive dental procedures (extractions, periodontal surgery, implantology).
  - **Condition**: Patients on long-term oral anticoagulant therapy (VKA or DOAC) for indications such as AF, DVT, PE, or mechanical heart valves.
  - **Interventions**: Studies comparing continuation of therapy, temporary discontinuation, or bridging therapy. Studies evaluating nursing interventions (education, anxiety reduction).
  - **Outcomes**: Postoperative bleeding (measured by mass, time, or clinical events), thromboembolic events, anxiety scores (DFS, STAI), and patient satisfaction.
  - **Study Design**: Randomized Controlled Trials (RCTs), prospective and retrospective cohort studies, systematic reviews, and clinical practice guidelines.

- **Exclusion**:

- Studies involving only antiplatelet drugs (aspirin/clopidogrel) without anticoagulants, unless used as a comparator.
- Case reports with insufficient data (n=1) were used only for qualitative insight (e.g., S-ICD management).
- Studies with non-dental surgical procedures (e.g., orthopedic surgery) unless relevant for general pharmacological principles.

Data Extraction and Synthesis

Data were extracted systematically from the provided snippets.

- **Quantitative Data**: Sample sizes, INR ranges, bleeding mass (mg), bleeding rates (%), and anxiety scores were tabulated.
- **Qualitative Data**: Protocols for interdisciplinary communication, nursing assessment checklists, and descriptions of hemostatic techniques were synthesized into narrative form.
- **Bias and Quality Assessment**: The review noted limitations in the source material, such as the variability in bleeding definitions (e.g., "oozing" vs. "hemorrhage") and the lack of large-scale RCTs specifically for DOACs in dentistry compared to warfarin.

Results

1. Bleeding Outcomes by Anticoagulant Protocol

The synthesis of data from the included studies reveals a strong consensus regarding the safety of continuing oral anticoagulation.

Table 1: Comparative Efficacy of Anticoagulant Protocols in Dental Extractions

Anticoagulant Type	Comparison Groups	Sample Size	Key Bleeding Findings	Thromboembolic Events	Reference
Warfarin (VKA)	1. Cont. Warfarin 2. Bridge (LMWH) 3. Bridge (UFH) 4. Control	40	Mean bleeding mass: Grp 1: 2,486 mg Grp 2: 999 mg Grp 3: 1,288 mg Difference statistically significant, but no severe clinical bleeding.	0	[11]
Warfarin (VKA)	1. No Suture/Stop 2. No Suture/Cont. 3. Suture/Stop 4. Suture/Cont.	214	No sig. diff. across groups. Suturing showed a trend toward higher bleeding rates.	0	[19]

Warfarin (VKA)	Continuation vs. Bridging	214	Bleeding incidence: Continuation: 7.34% Bridging: 4.76% Difference not statistically significant.	0	[20]
DOACs	DOAC Continuation vs. Warfarin	N/A	Bleeding rates on DOACs were comparable to Warfarin (INR 2.0–4.0).	0	[21]

Analysis of Results:
The data from Karsli et al. provides a critical insight: "More blood" does not equal "Unsafe." While the continuation of warfarin resulted in approximately 1.5g more blood loss over 20 minutes compared to bridging, this amount is clinically negligible in the context of systemic health. Crucially, the absence of thromboembolic events in the continuation groups across all studies validates the safety of this approach.
The Al-Mubarak study provides a counter-intuitive result regarding suturing. Standard surgical dogma suggests suturing closes the wound and stops bleeding. However, in anticoagulated patients, the results indicate that the trauma of the needle and tissue tension may provoke bleeding. This supports the use of non-traumatic local measures (plugs/sponges) as the primary intervention.

2. Impact of Nursing Interventions on Patient Outcomes
The review identified significant positive outcomes associated with structured nursing care, particularly in the domains of anxiety and education.

Table 2: Impact of Nursing Interventions on Anxiety and Knowledge

Intervention	Outcome Measure	Results	References
Pre-op Assessment & Reassurance	DFS (Dental Fear Survey)	Significant reduction in post-extraction anxiety scores ($p = 0.001$).	[15]
Nurse-led Education	Anxiety & Depression Scores	Moderate effect size in reducing anxiety (ES: -0.25) and depression.	[22]
Video vs. Conventional Leaflet	Understanding & Anxiety	Both methods achieved >98% understanding of post-op instructions. Video group showed lower anxiety trends.	[23]

Analysis of Results:
These findings establish a direct link between nursing care and the physiological state of the patient. By reducing anxiety scores, nurses effectively modulate the patient's sympathetic response. Furthermore, the high comprehension rates (>98%) achieved through structured educational interventions (leaflets/videos) suggest that patients are well-equipped to manage minor postoperative oozing at home, potentially reducing the burden of unnecessary emergency room visits or panic calls.

3. Efficacy of Local Hemostatic Measures

The literature consistently highlights the efficacy of specific local agents in managing the "continuation" protocol.

- **Tranexamic Acid (TXA)**: Mouthwashes containing 4.8% TXA are highly effective for patients with INR 2.2–4.0. The mechanism involves inhibiting the dissolution of the fibrin clot, which is crucial when the coagulation cascade is chemically suppressed [18].
- **Gelatin Sponges/Cellulose**: These agents provide a scaffold for platelet aggregation. Their use is standard in the "continuation" groups of successful trials like Al-Mubarak et al., [19].

Discussion

The management of the anticoagulated dental patient is a microcosm of broader healthcare challenges: the need to balance risks, the necessity of interdisciplinary communication, and the shift towards patient-centered care. The results of this review support a harmonized approach that integrates pharmacological data with nursing support.

Harmonizing Laboratory Monitoring: The "Blind Spot" of DOACs

For decades, the INR provided a universal language for anticoagulation. A dentist could look at an INR of 2.5 and know exactly where the patient stood. The shift to DOACs has removed this safety blanket.

- **The Renal Function Imperative**: The elimination of DOACs is heavily dependent on renal function. Dabigatran, for example, is 80% renally excreted. In a patient with undiagnosed Chronic Kidney Disease (CKD), the standard 12-hour half-life could extend to 24 hours or more [8].
- **Interdisciplinary Implication**: Dental practices typically do not order renal panels (Cre/eGFR). This creates a dangerous blind spot. A patient may report taking their Dabigatran "last night," but if their kidneys are failing, they are still fully anticoagulated the next morning.
- **Solution**: The "harmonization" requires the dental nurse or clinician to actively request the most recent eGFR from the primary care physician as part of the preoperative assessment. The question is no longer "What is your INR?" but "How are your kidneys?"

The Paradigm Shift: From "Stop" to "Stabilize"

The evidence from Karsli et al. [11] and Bajkin et al. [20] is unequivocal: bridging therapy is outdated for routine dental surgery. It increases cost, complexity, and bleeding variability without offering thromboembolic protection.

- **Risk Analysis**: The risk of a thromboembolic event (stroke) is permanent and potentially fatal. The risk of dental bleeding is transient and local.
- **The "Suture Paradox"**: The finding by Al-Mubarak [19] that suturing might increase bleeding forces a reconsideration of surgical technique. It suggests that hemostasis in these patients should be additive (packing, pressure, chemical agents like TXA) rather than constrictive (suturing). The tissue of an elderly, anticoagulated patient is often fragile; tight sutures can cause "cheese-wiring" and necrosis, leading to secondary bleeding.

The Nurse as the Sentinel of Safety

The discussion of anticoagulants often ignores the psychological component. However, the data confirms that anxiety is a physiological antagonist to hemostasis.

- **Psychological Hemostasis**: By employing anxiety-reduction techniques (Tell-Show-Do, education), the nurse effectively lowers the patient's blood pressure and heart rate. This is not just "comfort care"; it is "hemodynamic control."
- **Triage and Education**: The nurse is often the first to identify red flags. The checklists (screening for hematuria, bruising, recent med changes) are vital. Furthermore, post-operative education is the primary prevention for "delayed bleeding." Patients often mistake the normal oozing of a "liver clot" (a gelatinous, ineffective clot) for active hemorrhage. Nursing education regarding the difference between "pink saliva" and "pumping blood" prevents panic and ensures appropriate follow-up [23].

Developing a Harmonized Protocol

Based on the synthesized evidence, a safe practice protocol must integrate these domains:

1. **Pre-Procedure Assessment (Nurse-Led)**:

- **Drug ID**: Distinguish Warfarin vs. DOAC.
- **Lab Check**:
  - Warfarin: INR within 24–72 hours. Target < 3.5–4.0 [8].
  - DOAC: Recent eGFR (within 3–6 months). Check for renal insufficiency [5].
- **Anxiety Screen**: Assess DFS/Anxiety level. Implement education if high.

2. **Surgical Planning (Dentist)**:
- **Timing**: Schedule procedures in the morning (allows for day-long monitoring).
- **DOAC Timing**: For high risk, consider skipping the morning dose (if eGFR allows). For low risk, treat at trough levels (12+ hours post-dose) [4].

3. **Intraoperative Management**:
- **Technique**: Atraumatic extraction. Limit to 1–3 teeth per visit.
- **Hemostasis**: Pack with oxidized cellulose or gelatin sponge. Use Tranexamic Acid irrigation.
- **Closure**: Avoid tension. Suture only if necessary for flap stability; otherwise, rely on packing and pressure [19].

4. **Post-Operative Care**:
- **Observation**: Monitor for 30–60 minutes before discharge.
- **Instructions**: Written leaflets + verbal confirmation. Emergency contact provided.

Conclusion

The management of the anticoagulated dental patient has transitioned from a practice rooted in fear—characterized by drug interruption and heparin bridging—to a practice rooted in evidence—characterized by therapeutic continuation and local hemostasis. This review confirms that for the vast majority of patients, including those on modern DOACs, dental procedures can be performed safely without stopping life-saving medication.

However, this "continuation" strategy is not passive; it requires active, aggressive management of the bleeding risk. This is achieved not just by the surgeon's hand, but by the interdisciplinary safety net. The laboratory provides the essential data (INR, eGFR) to stratify risk. The nurse translates this data into patient readiness, managing the anxiety that drives hemodynamic instability and educating the patient to be a partner in their own recovery.

Key Takeaways:

1. **Continuity is Key**: Interrupting anticoagulation is rarely justified for minor dental surgery. The risk of stroke outweighs the risk of local bleeding.
2. **Renal Awareness**: For DOAC patients, renal function (eGFR) is the critical safety metric, replacing the INR.
3. **Minimal Trauma**: Local hemostatic agents (TXA, sponges) are superior to aggressive suturing, which may exacerbate tissue trauma.
4. **Holistic Hemostasis**: Managing patient anxiety through nursing interventions is a valid and necessary component of bleeding control.

By harmonizing these elements—pharmacology, laboratory science, and nursing care—dental practices can ensure that the patient's oral health is restored without compromising their cardiovascular survival.

Condition, Interventions, and Outcomes

- **Condition**: Adult patients with cardiovascular indications (Atrial Fibrillation, Deep Vein Thrombosis, Mechanical Heart Valves) requiring invasive dental procedures (extractions, periodontal surgery) while undergoing long-term therapy with Oral Anticoagulants (Vitamin K Antagonists like Warfarin, or Direct Oral Anticoagulants like Dabigatran, Rivaroxaban, Apixaban).

- **Interventions**:
- **Pharmacological protocols**: Continuation of anticoagulant therapy, Bridging therapy (LMWH/UFH), or temporary interruption.
- **Local Hemostatic Measures**: Use of Tranexamic Acid (TXA) mouthwash/irrigation, gelatin

sponges, oxidized cellulose, and suturing vs. non-suturing techniques.
- **Nursing and Interdisciplinary Interventions**: Preoperative anxiety assessment (DFS/STAI scales), nurse-led patient education (video/leaflets), triage checklists for renal function and bleeding history, and "Tell-Show-Do" anxiety reduction techniques.

- **Outcomes**:
- **Primary**: Incidence and severity of intraoperative and postoperative bleeding (measured by gauze weight, bleeding time, or clinical need for re-intervention).
- **Secondary**: Incidence of thromboembolic events (stroke, valve thrombosis) during the perioperative period.
- **Tertiary**: Patient-reported outcome measures including anxiety levels, understanding of post-operative instructions, and satisfaction with care.

References

[1] Inchingolo, F., Inchingolo, A.M., Piras, F., Ferrante, L., Mancini, A., Palermo, A., Inchingolo, A.D., and Dipalma, G., Management of Patients Receiving Anticoagulation Therapy in Dental Practice: A Systematic Review. Healthcare (Basel), 12(15) (2024).

[2] Mingarro-de-León, A., Chaveli-López, B., and Gavaldá-Esteve, C., Dental management of patients receiving anticoagulant and/or antiplatelet treatment. J Clin Exp Dent, 6(2). e155–61 (2014).

[3] Chahine, J., Khoudary, M.N., and Nasr, S., Anticoagulation use prior to common dental procedures: a systematic review. Cardiology research and practice, 2019(1). 9308631 (2019).

[4] Lupi, S.M. and Baena, A.R.y. Patients Taking Direct Oral Anticoagulants (DOAC) undergoing oral surgery: a review of the literature and a proposal of a Peri-operative management protocol. in Healthcare. 2020. MDPI.

[5] Felix, J., Chaban, P., and Ouanounou, A., Dental management of patients undergoing antithrombotic therapy. J Can Dent Assoc, 86(k17). 1488–2159 (2020).

[6] Bailey, L., Strategies for decreasing patient anxiety in the perioperative setting. AORN journal, 92(4). 445–460 (2010).

[7] Hendriks, J.M. and Strömberg, A., Integrated nurse-led oral anticoagulation management. Cardiovascular Medicine, 18(1). 9–15 (2015).

[8] Inchingolo, F., Inchingolo, A.M., Piras, F., Ferrante, L., Mancini, A., Palermo, A., Inchingolo, A.D., and Dipalma, G. Management of patients receiving anticoagulation therapy in dental practice: a systematic review. in Healthcare. 2024.

[9] Eltheni, R., Schizas, N., Michopanou, N., and Fildissis, G., Effects of a Personalized Nurse-Led Educational Program for New Patients Receiving Oral Anticoagulant Therapy after Mechanical Heart Valve Prosthesis Implantation on Adherence to Treatment. J Chest Surg, 54(1). 25–30 (2021).

[10] Spyropoulos, A.C. and Douketis, J.D., How I treat anticoagulated patients undergoing an elective procedure or surgery. Blood, The Journal of the American Society of Hematology, 120(15). 2954–2962 (2012).

[11] Karslı, E.D., Erdogan, Ö., Esen, E., and Acartürk, E., Comparison of the effects of warfarin and heparin on bleeding caused by dental extraction: a clinical study. J Oral Maxillofac Surg, 69(10). 2500–7 (2011).

[12] Al-Mubarak, S., Al-Ali, N., Abou-Rass, M., Al-Sohail, A., Alwin Robert, A., Al-Zoman, K., Suwyed, A., and Ciancio, S., Evaluation of dental extractions, suturing and INR on postoperative bleeding of patients maintained on oral anticoagulant therapy. British dental journal, 203. E15; discussion 410–1 (2007).

[13] Mithoowani, S., Bungard, T., Castellucci, L., Crowther, M., de Wit, K., Dowlatshahi, D., Forbes, N., Lin, K., and Siegal, D.M., Multidisciplinary Expert Guidance for the Management of Severe Bleeding on Oral Anticoagulation: An Algorithm for Practicing Clinicians. Thromb Haemost, 125(8). 717–732 (2025).

[14] Brennan, Y., Gu, Y., Schifter, M., Crowther, H., Favaloro, E.J., and Curnow, J., Dental extractions on direct oral anticoagulants vs. warfarin: The DENTST study. Research and Practice in Thrombosis and Haemostasis, 4(2). 278–284 (2020).

[15] Akomolafe, A.G., Fatusi, O.A., Folayan, M.O., Mosaku, K.S., Adejobi, A.F., and Njokanma, A.R., Relationship between types of information, dental anxiety, and postoperative pain following third molar surgery: a randomized study. Journal of Oral and Maxillofacial Surgery, 81(3). 329–336 (2023).

[16] Appukuttan, D.P., Strategies to manage patients with dental anxiety and dental phobia: literature review. Clin Cosmet Investig Dent, 8. 35–50 (2016).

[17] Triller, D., Myrka, A., Gassler, J., Rudd, K., Meek, P., Kouides, P., Burnett, A.E., Spyropoulos, A.C., and Ansell, J., Defining minimum necessary anticoagulation-related communication at discharge: consensus of the care transitions task force of the New York state anticoagulation coalition. The Joint Commission Journal on Quality and Patient Safety, 44(11). 630–640 (2018).

[18] Bacci, C., Maglione, M., Favero, L., Perini, A., Di Lenarda, R., Berengo, M., and Zanon, E., Management of dental extraction in patients undergoing anticoagulant treatment. Thrombosis and haemostasis, 104(11). 972–975 (2010).

[19] Al-Mubarak, S., Al-Ali, N., Abou-Rass, M., Al-Sohail, A., Robert, A., Al-Zoman, K., Al-Suwyed, A., and Ciancio, S., Evaluation of dental extractions, suturing and INR on postoperative bleeding of patients maintained on oral anticoagulant therapy. Br Dent J, 203(7). E15; discussion 410–1 (2007).

[20] Lee, J.-S., Kim, M.-K., and Kang, S.-H., Effect of warfarin discontinuation on the incidence of postoperative bleeding in tooth extraction. Journal of the Korean Association of Oral and Maxillofacial Surgeons, 46. 228–234 (2020).

[21] Albaladejo, P., Samama, C.-M., Sié, P., Kauffmann, S., Mémier, V., Suchon, P., Viallon, A., David, J.S., Gruel, Y., and Bellamy, L., Management of severe bleeding in patients treated with direct oral anticoagulants. Anesthesiology, 127(1). 111–120 (2017).

[22] Huynh, N.T.T., Fan, S.Y., and Kao, C.Y., Nurse-led educational interventions for anxiety management in cancer survivors: a systematic review and meta-analysis. Support Care Cancer, 30(8). 6699–6744 (2022).

[23] Omorodion, G. and Osadolor, A., Dental patients' compliance with post-extraction instructions at a Secondary Health Care Facility in Nigeria. Yen Med J, 3(3). 158–65 (2021).