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Abstracts from the Anticoagulation Forum 18th National Conference on Anticoagulation Therapy April 3-5, 2025 Washington, D.C.

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The Anticoagulation Forum's 18th National Conference on Anticoagulation Therapy took place April 3-5, 2025 in Washington, D.C. and was a platform for collaboration, learning, and professional growth. This three-day event brought together clinicians, researchers, and industry leaders to explore contemporary challenges and practical strategies in anticoagulation therapy, equipping attendees with the knowledge to improve care for patients with thrombotic disorders. The conference provided a unique opportunity for healthcare professionals to connect with colleagues from around the world with diverse research interests and expertise. Through special lectures on recent advances, case-based discussions, poster presentations of original research, and an exhibit hall featuring the latest innovations, participants gained valuable insights into the evolving landscape of anticoagulation management while fostering education, collaboration, and the translation of research into clinical practice.

The Anticoagulation Forum is the largest organization of anticoagulation management specialists. Over the past 35 years, our mission has been to improve the quality of care for patients taking antithrombotic medications by educating healthcare professionals and advocating for clinical best practices.

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ANTICOAGULATION CLINIC MODELS OF CARE

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Utilization of a Direct Oral Anticoagulant (DOAC) Population Management Tool (PMT): Standardizing Assessment of Liver Flags

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Introduction: Direct Oral Anticoagulants (DOACs) have become the most prescribed oral anticoagulants, requiring vigilant oversight due to their high-risk nature. The Veterans Health Administration (VHA) developed a DOAC Population Management Tool (PMT) to enhance safe prescribing practices by flagging potential clinical interventions. Liver monitoring is one subgroup. Liver flags alert prescribers to cirrhosis patients with one of the following: ascites, hepatic encephalopathy, T-bili >50 umol/L (>3 mg/dL), albumin <28g/L (<2.8g/dL), or T-bili 2-3 mg/dL and albumin 2.8-3.5g/dL.
Methods: The Minneapolis VA Health Care System Anticoagulation Clinic designed and implemented a Liver Dysfunction Algorithm to optimize patient safety by ensuring appropriate DOAC prescribing and ensuring patients receive specialty care when indicated. The algorithm's design addressed both safety and efficiency concerns. A retrospective review was conducted on the 65 flags occurring over the 18 month period post implementation.
Results: The algorithm led to clinical interventions in 23% of flagged cases. Specifically, 11% of interventions involved changing the DOAC agent, notably this was influenced by the high percentage (88%) of patients taking apixaban at baseline. Additionally, 11% resulted in GI specialty care referrals. The majority (77%) of flags required no intervention, potentially due to appropriate initial detailed DOAC assessment, history of a Xa level, established specialty care, or flags inaccurately triggered. Notably, 22% of cases did not use the standardized note template, indicating an opportunity for staff retraining.
Conclusion: The Liver Dysfunction Algorithm demonstrates potential for optimizing patient safety. Its local success suggests it could be adapted across various healthcare institutions to improve anticoagulation stewardship and patient care.

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Assessment of Patient's Knowledge and Its Impact on Achieving Therapeutic International Normalized Ratio Goal

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Introduction: Warfarin remains the sole oral anticoagulant authorized for use in heart valve replacement surgery, despite the emergence of novel anticoagulants in clinical practice. An increasing number of clinical pharmacists are now providing instruction to patients on warfarin therapy. However, to date, limited research has been conducted to explore the relationship between a patient's anticoagulation control and their level of warfarin knowledge.
Methods: The present study aimed to evaluate the knowledge of warfarin and its impact on the attainment of therapeutic level of international normalized ratio (INR). This cross-sectional study was conducted in patients attending the anticoagulation clinic from February 2022 to February 2024 who were enrolled into the study on a non-probability consecutive basis. A structured questionnaire was used to analyze the awareness and knowledge of anticoagulation, and its impact on the control of the INR. All the enrolled patients had an indication of using anticoagulation therapy on a long-term basis.
Results: A total of 323 patients were enrolled into the study. The present study reported a female dominant population i.e. 66.3% (n=214). The most frequent indication reported in the present study was mitral valve replacement (MVR) i.e. 39.6% (n=128). As per the opinions of the participants, broccoli was the most common food (n=268; 83.0%) that would affect the working of Warfarin. Almost 75% (n=243) participants were of the thought that consumption of wine can lead to an increase in the INR of the patient who is on Coumadin (Warfarin). More than 97% of the participants thought that usage of over-the-counter medications can significantly affect the working of Warfarin.
Conclusion: In conclusion, the extent of patient education regarding anticoagulant therapy has a significant impact on anticoagulation management. Improved management of the international normalized ratio (INR) can be achieved by educating patients, who are new to warfarin therapy by Pharmacists and by utilizing a standardized questionnaire to assess their knowledge.

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Automation, Expansion and Optimization of an Emergency Department Transition of Care Program for Outpatient Management of Acute Venous Thromboembolic Disease: Experience with our Facilitating Anticoagulation for Safer Transitions (FAST) Enterprise Health

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Introduction: Patients with acute VTE are at risk for medication errors, rehospitalization, adverse events and nonadherence when started on a chronic anticoagulation care plan in an Emergency Department setting.

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In 2014 we initiated a seamless transition care (TOC) program named FAST (Facilitating Anticoagulation for Safer Transitions) at our local academic medical center. This program was very successful in improving clinical outcomes, preventing hospitalization and reducing the cost of care with the treatment of acute DVT and uncomplicated PE events. With expansion of our health system, we proposed utilization of a reconfigured program with inclusion of three additional previously separate health care facilities without a need for additional manpower. We also addressed some of the previous challenges we had encountered with medication affordability / inaccessibility in order to assure medication adherence for a full three months of anticoagulation therapy.

Methods: Utilizing our current manpower at our Center City Vascular Center program, our multidisciplinary team worked with our EMR build team to develop an enhanced order panel for acute DVT / PE treatment with an automated patient referral system, standardized educational materials automatically loaded to the discharge instructions and dispensing of a 30 day supply of anticoagulation to appropriately screened patients prior to discharge. A hard stop guardrail was built into the system to prevent ED discharge if all necessary steps had not been successfully completed. We continued to utilize our post-discharge outreach call within 2 days and appointment within one week of discharge. Due to geographic challenges, telemedicine appointments were provided if patients were unable to come in person.

Results: Provision of a 30 day supply of medication with education, a 2 day outreach phone call and 1 week post-discharge appointment resulted in over 400 patients enrolled with <2% reutilization of ED facilities or hospitalization. Additional 30 day outcomes in terms of VTE-related adverse events, emergency medicine revisits, and adverse events (bleeding or re-thrombosis) were evaluated. The program did not require additional manpower or costs for expansion and assured medication accessibility at the time of discharge.

Conclusion: EMR system adaptation to automate processes and provide medication at the ED has resulted in assurance of medical accessibility for all patients with low VTE-related readmissions.

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Implementing & Integrating a Virtual Nurse-Led Anticoagulation Clinic Care Team

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Introduction: Eighteen registered nurse (RN) led anticoagulation clinics in rural and urban areas sought to standardize practices and implement innovative staffing models to ensure expert anticoagulation services continued.

Objective: To uphold anticoagulation stewardship throughout a model of care transition from in-person to virtual care as evidenced by nurse sensitive indicators.

Methods: Flexibility to meet varying patient needs is mixed with efficiencies as the right role supports care at the appropriate time. Patients complete INR testing at a lab followed by a virtual visit with an anticoagulation RN who consults with a pharmacist if nurse-initiated protocols don't suffice. Two Nurse Sensitive Indicators, Time in Therapeutic Range (TTR) [Rosendaal method], and patient engagement (defined by anticoagulation leadership as a patient having an INR result a minimum of every 8 weeks) were used to evaluate the model of care change impact.

Results: TTR averaged 73.8% over the past 2 years. The percentage of patients not maintaining engagement averaged 0.70% for the past year. Patient appointment availability is no longer limited by nurse staffing, compliance with venous confirmatory draws has increased, basic patient education was transformed into an interactive class, 23 clinic rooms were reallocated, and a virtual team of anticoagulation experts work to the top of their licensure with increased staff satisfaction.

Conclusion: This anticoagulation program demonstrated how nurses providing warfarin dosing and INR management per protocol in a virtual environment results in patients with high TTR and engagement. Efficiencies gained will provide sustainability of the anticoagulation program benefitting both staff and patients.

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Improving the Perioperative Process for Patients Managed by a Pharmacist-Run Anticoagulation Clinic

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Introduction: Perioperative management planning is a high-risk process; during this process several details must be collected and evaluated to create a safe and effective plan. A review of safety events and discussion with the anticoagulation team revealed opportunities for documentation alignment with internal perioperative guidance.

Objective: To increase documentation of identified crucial factors to ≥90% by the end of Q4 to ensure safety for anticoagulation patients undergoing perioperative management.

Methods: To gain an understanding of the current state, the pharmacist's note within the electronic health record (EHR) was queried for January 2024. Compliance to the documentation of these factors was retrospectively reviewed for 12 crucial factors identified. Countermeasures were implemented in July and August to target factors with the lowest compliance rates: patient bleed risk, history of heparin induced thrombocytopenia (HIT) and dialysis status if creatinine clearance was < 30ml/min. Compliance rates were recalculated for September 2024 to evaluate for improvements.

Results: In a review of August 2024 data an increase in compliance rate was noted for each targeted crucial factor: patient bleeding risk documentation increased from 44% to 95%, history of HIT documentation increased from 1% to 95%, and dialysis status documentation increased from 0% to 95%.

Conclusion: Our team increased standardization documentation, refreshed pharmacist clinical knowledge, and promoted more safety event reporting related to the perioperative process. Future direction will be focused on factors not yet >90% such as accuracy of patient's anticoagulation indication.

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Continued Assessment of a Direct Oral Anticoagulant (DOAC) Dashboard

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Introduction: As oral anticoagulation shifts from warfarin to direct oral anticoagulants (DOACs), a new management model is required to ensure safe, effective therapy. Michigan Medicine implemented a DOAC Dashboard within the electronic health record (EHR) to track patients needing DOAC dose or therapy adjustments based on renal function, age, weight, indication, and drug-drug interactions. The Dashboard currently manages 15,326 patients. This study aims to describe the use of the DOAC Dashboard and evaluate the effectiveness of pharmacist-led management in real-time.
Methods: A retrospective descriptive study was conducted on DOAC Dashboard alerts from January 4, 2022, to January 26, 2024.
Results: A total of 4,443 alerts were identified (3,228 noting missing clinical data and 1,215 noting known dosing issues). All missing clinical alerts were resolved by updating missing data. Of the 1,215 known dosing issues alerts, 487 (40.1%) required intervention. Patients requiring intervention were older and had higher serum creatinine and lower body weight. Overall, most interventions were performed among patients with AFib. Among the 487 interventions, 363 (74.5%) were accepted by providers and patients. High-dose alerts resulted in 248 (69.5%) interventions (87.9% acceptance) and low-dose alerts resulted in 225 (58.6%) interventions (59.6% acceptance). There was no difference in interventions between patients on apixaban vs. rivaroxaban. Approximately 15% of patients have repeated alerts over time, with an average of 3.3 repeated alerts per patient.
Conclusion: The DOAC Dashboard is an efficient and targeted approach to manage patients on DOAC in real-time. Majority (74.5%) of pharmacist interventions were implemented.

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Implementation of a Warfarin Patient Self-Management Program in Patients on Chronic Warfarin Therapy

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Introduction: Warfarin is a high-risk medication that requires frequent monitoring and evaluation of International Normalized Ratios (INRs) to ensure safety and efficacy. As such, managing warfarin therapy in the outpatient setting has historically placed a significant resource burden on healthcare systems. In contrast, warfarin patient self-management (PSM) allows patients to self-adjust their warfarin doses based on INR results using an algorithm or similar decision support tool. Studies show that warfarin PSM can reduce thromboembolic events and all-cause mortality, improve patient satisfaction, and reduce resource utilization for healthcare providers; however, despite its success in clinical trials and endorsement by evidence-based guidelines, the use of warfarin PSM in the United States (U.S.) remains low. We sought to develop and implement a warfarin PSM program for appropriate outpatients within a large, integrated, non-academic health system.
Methods: Program development and implementation included several phases: literature review; identification of potential barriers; protocol development; provider education and buy-in; nursing and pharmacist training; and patient selection, training, and enrollment. Patients considered for inclusion in the PSM program included those who were referred to our ambulatory anticoagulation management service (Sentara Anticoagulation Services) and had been on warfarin for at least six months, had been successfully performing patient self-testing (PST) for a minimum of three months, had INR goal ranges of either 2.0-3.0 or 2.5-3.5, and were willing to utilize the Epic MyChart system for communication. Patients were excluded if they had a diagnosis of antiphospholipid antibody syndrome (APS) or nonadherence to warfarin therapy or INR monitoring or if their referring provider did not agree to their participation in PSM.
Results: Sentara Anticoagulation Service's warfarin PSM program was approved and implemented after a development period of approximately two years, with patient enrollment beginning in December 2024.
Conclusion: We describe the process undertaken to successfully develop and implement an evidence-based warfarin PSM program within our large, integrated, non-academic health system in the U.S. Post-implementation quality improvement evaluation is planned at quarterly intervals over the first year of PSM enrollment.

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Implementation of a Centralized Direct Oral Anticoagulant Surveillance Program

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Introduction: Standards of care and best practices have been well established with warfarin management over time. With the shift to Direct Oral Anticoagulant (DOAC) prescribing as the preferred therapy for most anticoagulation indications, there remains significant variability in the prescribing, management and oversight of DOACs across the Veterans Affairs healthcare system. The Centralized Anticoagulation Services Hub (CASH) DOAC surveillance program was created to maximize the use of readily available tools through a centralized model. The goal was to achieve standardized practices to provide timely and consistent recommendations for DOAC prescribing.
Methods: Nine VA legacy facilities of varying population size and complexity are enrolled in the DOAC surveillance program. The CASH team uses the PBM DOAC Population Management Tool (PMT) to identify clinical concerns to evaluate and recommend interventions to the prescribing provider. Prescribing and management of DOACs is at the discretion of the Patient Aligned Care Team (PACT)/Specialty Care team. Business rules were established to outline the responsibilities of PACT/Specialty Care team and CASH team. Ongoing education is offered to facilities to increase confidence in DOAC prescribing and monitoring. Providers may submit Info-Sharing consults if additional support is needed for complex cases.
Results: Analysis of objective dosing recommendations indicate that enrolled facilities are able to meet or exceed national averages related to dosing analysis and adherence.
Conclusion: DOAC surveillance is an effective method to ensure appropriate DOAC usage and allows for large scale standardization in clinical recommendations provided across large cohort of patients.

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ANTICOAGULATION STEWARDSHIP

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The Impact of a VA DOAC Population Management Tool Flag for Concurrent Antiplatelets

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Introduction: Combination anticoagulation (AC) and antiplatelet therapy (APT) is known to increase the risk of bleeding. Pharmacists at the Madison VA AC clinic (with the support of multiple specialty services) have advanced practice to include more antiplatelet deprescribing in patients requiring long term anticoagulation therapy. In 2023, an APT flag in the VA DOAC Population Management Tool was activated for a more systematic approach to assessing the combination of DOAC and APT. The current objective is to describe pharmacist interventions and impact on prescribing trends since the activation of the APT flag via the DOAC dashboard.
Methods: APT flags were proactively reviewed in the dashboard. A chart note was written to describe patient history and assess criteria for possible deprescribing of APT therapy. Specialty providers were consulted to review potential candidates for APT deprescribing or another intervention. Patients were contacted to either stop APT (+/- PPI) or start PPI therapy if ongoing APT was recommended.
Results: After activation of the DOAC APT flag in July 2023, concomitant DOAC + APT prescribing decreased from 21.7% to 18.4%. DOAC and aspirin co-prescribing decreased from 17.6% to 13.5%. PPI co-prescribing increased from 54.6% to 64.7%. In addition to APT deprescribing, APT flags alerted pharmacy staff to other possible interventions related to inappropriate APT prescribing.
Conclusion: This pharmacist led initiative using a collaborative approach across multiple disciplines led to both antiplatelet and PPI deprescribing, and increased appropriate PPI prescribing for patients requiring combination therapy. In addition, pharmacists were able to address inappropriate APT prescribing practices and medication reconciliation.

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Safety Huddles in Anticoagulation Clinic Practice

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Introduction: The Veterans Health Administration (VHA) is on a high reliability organization (HRO) journey, pursuing a goal of "Zero Harm." Anticoagulants require vigilant oversight to ensure patient safety and optimize outcomes. In 2020, the Minneapolis VHA (MVAHCS) Anticoagulation clinic implemented Patient Safety Huddles to align with HRO practices and enhance anticoagulation stewardship. Patient Safety huddles are daily meetings to discuss patient care and identify concerns.
Objective: Describe the implementation and outcomes of Patient Safety Huddles at MVAHCS Anticoagulation Clinic since 2020.
Methods: Daily huddles are conducted at MVAHCS Anticoagulation Clinic, where staff discuss safety issues, patient cases, and staff recognition. Issues are categorized, discussed, and acted on with the goal of resolution. Huddles complement the Joint Patient Safety Reporting system to monitor trends and escalate as necessary. Outcomes were gathered including technology changes, quantity of issues discussed, and employee responses. Examples of technology changes and issues discussed are included.
Results: Since Patient Safety Huddles were implemented at MVAHCS Anticoagulation Clinic, 95 technology tickets have been submitted and 447 issues discussed. Employee survey questions indicate a strong safety culture, with positive results regarding workgroup safety, collaboration, and recognition.
Conclusion: Patient Safety Huddles at MVAHCS Anticoagulation clinic have led to hundreds of issues discussed and acted on. Huddles have enhanced team collaboration and provide a structured approach to identifying safety concerns, supporting VHA's HRO mission. Huddles foster proactive risk management and safety culture while providing a space for colleagues to collaborate on issues. Further studies are recommended to explore long-term impacts on patient safety and workload.

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Adherence to Direct Oral Anticoagulants among U.S. Veterans with Atrial Fibrillation in the Era of the Veteran Health Administration DOAC Population Management Tool

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Introduction: An estimated one-third of atrial fibrillation (AF) patients treated with a Direct Oral Anticoagulant (DOAC) are considered non-adherent, increasing the risk of stroke and systemic embolism (SSE). Minimal resources to automatically identify non-adherence or measure adherence over time exist. The DOAC Population Management Tool (PMT) alerts clinicians to non-adherence and supports program management by benchmarking facility and healthcare system adherence rates. The purpose of this evaluation is to describe DOAC adherence using the PMT within Veteran Heath Administration (VHA) where anticoagulation stewardship is commonplace, and an electronic population health tool is widely available.
Methods: The PMT was queried at quarterly intervals over a three-year period to evaluate DOAC adherence. For benchmarking, the PMT defines adherence (<35 days late for refill) and calculates individual site, regional, and national performance across VHA. This tool is available to clinicians and leadership to support patient and program management.
Results: From December 2021 through December 2024, the number of DOAC-treated veterans captured on the PMT increased from 341,430 to 417,221 (22.3%). On average 94.3% of DOAC-prescribed individuals were no more than 35 days late for refill (SD = 0.26).
Conclusion: Adherence to DOACs, as determined by the PMT, appears much higher than prior studies. This may be reflective of established anticoagulation stewardship activities within VHA and the availability of tools to support adherence. Further investigation is needed to reconcile adherence definitions and to directly assess the impact of anticoagulation service configuration and activities on adherence.

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Population Management Tools Facilitate Anticoagulation Stewardship within Veterans Health Administration

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Introduction: A tenant of anticoagulation stewardship is bleeding risk mitigation through appropriate antiplatelet therapy (APT) and non-steroidal anti-inflammatory drug (NSAID) deprescribing. The Veterans Health Administration's (VHA) Direct Oral Anticoagulant (DOAC) Population Management Tool (PMT) alerts users to DOAC-treated patients co-prescribed NSAIDs with some sites piloting novel APT alerts. We aimed to evaluate APT and NSAID use in DOAC-treated patients across VHA, correlating with DOAC PMT and APT alert engagement.
Methods: This retrospective, cross-sectional review used operational data from the PMT, grouping summary data from VA medical centers into three groups: 20 sites with the lowest and 20 sites with the highest PMT engagement without APT alert, and 17 sites using the APT alert (December 26, 2023 to December 25, 2024). Site-level APT and NSAID use rates and group means were calculated. Means were evaluated by t-test to assess whether high PMT engagement or the novel APT alert significantly affected APT and NSAID use rates compared to low PMT engagement.
Results: Mean site-level use rates were 24.2% (8.3 - 42.7%) for APT and 3.2% (0.6 - 11.5%) for NSAIDs among 417,869 DOAC-treated patients across 134 VA medical centers. APT use was similar between the top and bottom PMT use sites without APT alert (25.4% vs. 28.5%, p=0.18), while the APT alert sites had lower rates than the bottom PMT use sites (16.9% vs. 28.5%, $p < 0.001$). NSAID use was similar between the top and bottom PMT use sites (3.4% vs. 4.9%, p=0.07), while the APT alert sites had lower rates than the bottom PMT use sites (1.9% vs. 4.9%, $p < 0.001$).
Conclusion: Sites incorporating APT alerts resulted in significantly lower APT use. These sites also had lower NSAID use, suggesting users of APT alerts have developed enhanced stewardship practices aimed at bleed-risk mitigation. While PMT use has become the standard-of-care across VHA, even high PMT users did not show significant differences in APT & NSAID use, suggestive PMT should evolve to incorporate APT alerts to advance stewardship across VHA.

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Stroke Prevention in Atrial Fibrillation/Flutter Targeting the uNTreated (SPAFF-TNT) at the Orlando Veteran Affairs (VA) Healthcare System

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Introduction: Atrial fibrillation and atrial flutter are associated with an elevated risk of stroke and systemic embolism without anticoagulation therapy. The SPAFF-TNT project, initiated at the Salt Lake City VA and replicated at the Orlando VA Healthcare System, aimed to identify Veterans at risk who may benefit from anticoagulation therapy. This quality improvement project sought to determine reasons why Veterans with a non-sex CHA_2DS_2-VASc score ≥2 and an active diagnosis of atrial fibrillation/flutter were not receiving oral anticoagulation therapy.
Methods: A retrospective observational study was conducted at a single-center, academic, Veterans hospital in Orlando, FL. Of 2,393 identified patients, 205 were selected for detailed chart review, prioritizing those with the highest CHA_2DS_2-VASc scores (7-8, N=65) and a randomized selection from lower scores (2-6, N=140). Reasons for lack of therapy were documented, and recommendations for anticoagulation or non-pharmacological interventions were made where applicable.
Results: Among the reviewed population, common reasons for lack of anticoagulation included subclinical atrial fibrillation/flutter not requiring therapy (23.4%), unfavorable risk-benefit assessment (19.5%), and patient-informed decision to decline therapy (19.0%). Other reasons included inaccurate diagnoses (16.6%), alternative stroke prevention strategies in place (14.6%), and outdated medication records (12.2%). Less frequent reasons included patient preferences, referrals, or low-risk status.
Conclusion: The majority of cases reviewed revealed intentional, documented reasons for lack of anticoagulation therapy, suggesting that patient management was appropriate and not due to oversight in identifying eligible individuals.

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Risk Mitigation of Gastrointestinal Bleeding in Patients Co-Prescribed Antiplatelets with Oral Anticoagulants: VISN 8 Anticoagulation Stewardship Proton Pump Inhibitor Initiative

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Introduction: Concomitant antiplatelet (APT) therapy in patients receiving oral anticoagulation (OAC) is a common and modifiable risk factor for major bleeding. Within Veterans Health Administration (VHA) Veterans Integrated Service Network (VISN) 8 an ongoing anticoagulation stewardship initiative has focused on ensuring combination therapy is utilized only in appropriate settings. While combination therapy in VISN 8 has decreased by about 35% with this initiative nearly 1 out of 6 patients continue combined therapy. When patients receiving OAC incur a major bleed they face a greater risk of major adverse cardiovascular and cerebrovascular events making optimal risk mitigation in this vulnerable population paramount to patient safety. Professional guidelines recommend proton pump inhibitors (PPIs) in patients receiving OAC who are receiving concomitant APT to reduce the occurrence and severity of bleeding.

Studies have shown a relative risk reduction of up to 50% with PPI use in these patients. The purpose of this anticoagulation stewardship initiative was to increase PPI utilization in patients who were continuing combined therapy.
Methods: In February 2023, 41.3% of patients in VISN 8, as well as nationally, who were receiving combined OAC-APT were also receiving a PPI. VISN 8 facility anticoagulation program managers identified and shared potential strategies during monthly VISN 8 PBM Pharmacy Anticoagulation Workgroup Meetings. They were then tasked with socializing the initiative and implementing strategies to promote PPI utilization where appropriate. VISN 8 PBM data analytics provided reports of potential candidates with characteristics that allowed prioritization (e.g., age, hemoglobin, history of gastrointestinal bleed, etc.).
Results: As of December 2024, PPI utilization in patients receiving combined OAC-APT therapy in VISN 8 had a relative 38% increase from baseline (41.3% to 56.9%) versus a relative 5.8% increase nationally. Several VISN 8 facilities are approaching 70%.
Conclusion: Anticoagulation stewardship initiatives to increase PPI utilization in patients receiving combined OAC-APT therapy are feasible and should be considered. Within VISN 8, efforts continue to increase utilization, along with the development and implementation of additional resources to efficiently achieve this.

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Real World Experience with Use of Coagulation Factor VIIa (Recombinant)-jncw (SevenFact®) at an Academic Medical Center

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Introduction: Eptacog beta (SevenFact®) is a recombinant factor VIIa (rVIIa) analog newly approved by the Food and Drug Administration for the prevention and treatment of bleeding in those aged 12 years or older with hemophilia A or B with inhibitors. In July 2023, our institution converted from eptacog alfa (NovoSeven®) to eptacog beta for all indications except congenital factor VII deficiency, for which eptacog beta is not recommended. The objective was to evaluate rVIIa prescribing and clinical outcomes after a formulary interchange.
Methods: This retrospective analysis was completed at a tertiary academic medical center and deemed exempt by the Mass General Brigham Institutional Review Board. All rVIIa administrations from October 2023 through September 2024 were evaluated via electronic medical record review to assess product selection and the occurrence of thrombotic and new or worsening bleeding events that required an escalation in therapy.
Results: Administration of rVIIa occurred during 27 admissions (17 patients). Twelve patients were treated with eptacog beta for bleeding events associated with acquired/congenital hemophilia A, seven for procedural prophylaxis (six for acquired/congenital hemophilia and one for platelet pool disorder), three for anticoagulation-related life-threatening bleeding, and two for refractory bleeding during cardiac surgery. Eptacog alfa was administered per institutional guidelines in two patients with congenital factor VII deficiency and outside institutional guidelines in one patient for cardiac surgery. Three patients received both products during an encounter. There were no thrombotic events and new or worsening bleeding occurred during seven admissions (25.9%).
Conclusion: After formulary conversion to a new rVIIa product, providers appropriately substituted eptacog beta for eptacog alfa, and no unanticipated adverse clinical outcomes were reported.

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Anticoagulation Stewardship In Action: The Experience of a Latin American Center in Improving Adherence and Reducing Complications

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Introduction: Anticoagulation stewardship improves clinical outcomes in Warfarin users by reducing thromboembolic events and bleeding while increasing patient adherence. In patients on direct oral anticoagulants, data on the impact of multidisciplinary anticoagulation stewardship strategies on adherence are scarce.
Methods: This cohort study included patients who initiated direct oral anticoagulants during hospitalization at a referral institution in Colombia. Patients followed by an anticoagulation stewardship program were compared with those who were not, and adherence was measured at 30, 90, and 180 days. Factors associated with lower adherence were evaluated using univariate and multivariate logistic regression models.
Results: 250 patients were included in the study, with 81 patients in the anticoagulation stewardship program follow-up cohort. Adherence at 30 days was medium-high in more than 90% of participants. There were more patients with low adherence (9.4 vs. 2.4%, p=0.003) and bleeding complications (4.1% vs. 0 p=0.063) in the no follow-up by anticoagulation stewardship program group. Patients who were in the follow-up by an anticoagulation stewardship program group had a trend in favor of higher adherence (OR 3.51; 0.74-16.47; p=0.107). The factors associated with low adherence were a higher educational level (OR 0.20; 95% CI 0.05-0.75; p=0.018), belonging to the subsidized health system (OR 0.08; 95% CI 0.01-0.64; p=0.018) and deep vein thrombosis (DVT) as an indication for anticoagulation (OR 0.23;IC 95% 0.05-0.91; p=0.037).
Conclusion: In direct oral anticoagulants users, follow-up in an anticoagulation stewardship program may have a positive impact on greater adherence to anticoagulation therapy, with reduction in bleeding complications. Prospective studies are required to confirm these findings.

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Evaluation of Antithrombotic Use in Patients Presenting to the Emergency Department with a Gastrointestinal Bleed

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Introduction: As the number of patients on antithrombotic therapy (AT) continues to rise, so does the number of associated adverse events. While many of these events are iatrogenic, an estimated 10-30% are associated

with inappropriate prescribing, off label dosing, and failure to manage high-risk interactions. The purpose of this study is to identify opportunities for AT stewardship in patients presenting to the emergency department (ED) with gastrointestinal bleeding (GIB).

Methods: This single center, retrospective study included patients 18 years or older on AT presenting to the ED with a GIB at Lahey Hospital and Medical Center from January 2021 to September 2023. The primary outcome was opportunities for AT stewardship, including inappropriate dose or duration, no clear indication for AT, and identification of high bleed risk interactions. The secondary outcome focused on appropriate use of gastroprotection.

Results: 70 patients were included with a mean age of 78 years, 35% female, and 54 (77%) were on AT > 6 months prior to presentation. The most common indications for AT use were atrial fibrillation 44 (63%) and venous thromboembolism 15 (21%). AT use included apixaban 36 (51%), rivaroxaban 9 (13%), warfarin 13 (19%), clopidogrel 16 (23%) and aspirin 29 (41%), with some patients prescribed multiple agents. 47 (67%) patients had opportunities for AT stewardship prior to presentation. 17 (24%) had inappropriate doses, with 12/17 (71%) on a higher than recommended dose. Two patients had inappropriate duration of therapy, four had no clear indication for their AT, and ten (14%) were noted to have high bleed risk drug interactions. Additionally, when applying the TUNA 2 criteria (Thienopyridine use, Ulcer History, NSAID, Aspirin or Anticoagulant), we found that 31.4% of patients that qualified for gastroprotection were not prescribed a proton pump inhibitor or an H2 receoptor antagonist.

Conclusion: AT stewardship programs focused on evidence-based prescribing, monitoring and appropriate follow up may help decrease preventable AT related adverse drug events.

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Assessing the Impact of an Inpatient Anticoagulation Stewardship Program

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Introduction: The 2019 Joint Commission National Patient Safety Goal #3 emphasizes reducing harm associated with anticoagulant therapy. To address this, an inpatient anticoagulation stewardship program was implemented in January 2021. This study evaluates the program's impact on reducing medication errors, pharmacist interventions, and 30-day readmissions related to bleeding or clotting events. The primary objective was to assess the program's effect on medication error reduction. Secondary objectives included analysis of pharmacist interventions and 30-day readmission rates for bleeding or clotting.

Methods: A retrospective chart review was conducted for patients admitted during pre-implementation (March - May 2020) and post-implementation (March - May 2021) periods. Post-implementation included active pharmacist intervention. Patients prescribed apixaban, rivaroxaban, dabigatran, warfarin, fondaparinux, or therapeutic doses of enoxaparin were included. Exclusion criteria included maternity patients, patients under the age of 18, heparin infusions, and prophylactic unfractionated heparin or enoxaparin doses. Regimens were assessed for indication, dose, drug interactions, and absorption issues.

Results: There were a total of 250 patients in each group. When compared to pre-implementation, post-implementation medication errors decreased by 32% (25 to 17), and pharmacist interventions increased from 4 (50% acceptance) to 14 (85% acceptance). Contraindicated drug interactions occurred in five pre-implementation patients (three discharged with these regimens), while no such errors were observed post-implementation due to proactive provider education. Thirty-one pre-implementation patients were readmitted within 30 days (five bleeding events, no clotting events), compared to 13 post-implementation (one clotting event, no bleeding events).

Conclusion: An Inpatient Anticoagulation Stewardship Program significantly reduces medication errors associated with anticoagulant therapy and contraindicated regimens through proactive provider education. The impact on re-admissions requires further investigation.

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Implementation of a Clinical Surveillance Tool for Direct Oral Anticoagulation Monitoring in the Outpatient Setting

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Introduction: Despite the advantages of direct oral anticoagulants (DOACs) over warfarin such as reduced laboratory monitoring and fewer adverse events, variability in patient's responses can lead to unexpected bleeding or thrombotic complications. Anticoagulation stewardship aims to optimize therapy and provide safe management of anticoagulation through appropriate prescribing, monitoring, and patient education. This study evaluates the impact of a clinical surveillance tool (CST) for monitoring DOACs in an ambulatory care setting.

Methods: This single-center, retrospective study included CST-identified patients on chronic DOAC therapy who lacked a yearly basic metabolic panel (BMP) or bi-annual complete blood count (CBC) after therapy initiation and were seen in the internal medicine or pharmacist-led primary care clinics from September to December 2023. A comparator group from the same period in 2022 was used to assess monitoring practices before CST implementation. Primary outcomes included the percentage of patients appropriately monitored before and after CST implementation. Secondary outcomes assessed DOAC dose, duration, and education.

Results: Ninety-five patients were included. Baseline demographics were similar between both groups. The majority of the patients were treated with rivaroxaban for atrial fibrillation. In the pre-implementation group, 96% had a BMP within 12 months, and 74% had a CBC within 6 months, compared to 78% and 11%, respectively, in the post-implementation group. Of the 45 patients identified by the CST, pharmacist interventions resulted in 35 completing appropriate follow-up labs, 9 still had upcoming follow-up appointments scheduled, and 1 was lost to follow-up. More patients received DOAC education in the post-implementation group than in the pre-implementation group, 78% vs 48%, respectively.

Conclusion: Although appropriate monitoring strategies were present prior to implementation of the CST, it helped identify patients needing laboratory monitoring and follow-up, resulting in an additional 78% of those patients completing appropriate monitoring during the study period. This enhances safe management of DOACs through systematic surveillance.

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Evaluation of Heparin Nomogram Performance in Under- and Overweight Patients

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Introduction: The 2012 Antithrombotic Therapy and Prevention of Thrombosis guidelines recommend weight-based dosing for unfractionated heparin (UFH) as standard of care for achieving therapeutic aPTT as shown by Raschke et al. While there are currently no published studies evaluating therapeutic UFH dosing in underweight patients, retrospective studies have demonstrated that obese patients require lower doses due to differences in distribution. Prior data from The Johns Hopkins Hospital (JHH) corroborated this finding in an obese cohort which led to implementation of reduced weight-based dosing using actual body weight for obese patients. The impact of this dosing strategy has not yet been evaluated. Additionally, the impact of low body weight on heparin dosing and appropriateness of using standard dosing strategies has not been assessed.
Methods: This retrospective, observational cohort study included adult patients admitted to JHH or Johns Hopkins Bayview Medical Center between August 2021 - August 2023 and ordered a nurse-managed UFH infusion for at least 4 hours. Patients were grouped by weight. The primary endpoint was median UFH infusion dose to achieve first therapeutic aPTT. Percentage of therapeutic, sub-, and supratherapeutic aPTT at 6 hours was compared between those who did and did not receive an initial bolus.
Results: A total of 2,515 patients were included with 1,327 weighing 51-104 kg (index), 76 weighing /=155 kg. Overall median (IQR) UFH infusion dose to achieve therapeutic aPTT was 17 (3) units/kg/hour. Median UFH infusion dose to achieve first therapeutic aPTT will be compared between weight groups. Comparing those who did vs. did not receive an initial bolus, 25% vs. 26.1% were therapeutic (p=0.603), 36.9% vs. 49.1% subtherapeutic ($p < 0.0001$), and 38.1% vs. 24.8% supratherapeutic ($p < 0.0001$). This comparison will be stratified by initial UFH infusion dose.
Conclusion: This observational cohort study will provide valuable insight into UFH dosing required to achieve therapeutic aPTTs in under- and overweight patients.

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Pharmacy-driven Antithrombosis Stewardship Consultation to Promote Safe, Timely Discharge of Low-Risk Venous Thromboembolism from the Emergency Department (PASS ON ADMIT Study)

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Background: Our pharmacist-driven antithrombosis stewardship (ATS) service recently conducted a pilot initiative using real-time electronic alerts and expedited multidisciplinary evaluation of acute VTE patients within our emergency department (ED) and urgent care clinic (UCC) to promote outpatient treatment of low-risk events. Our aim was to evaluate the impact of upstream pharmacist-driven ATS consultation on healthcare resource utilization and patient outcomes in low-risk acute VTE.
Methods: Pre-post analysis included patients ≥18 years with acute VTE in ED or UCC during regular ATS service hours (7:00am-5:30pm) from 2/1/2022 to 4/30/2024. Exclusions: transfer from another hospital, admission, or pregnancy. Primary outcome was length of stay (LOS). Secondary outcomes: receipt of initial dose of anticoagulant prior to discharge, time to first anticoagulant, initial anticoagulant selection, and ED visits or readmissions related to bleeding or thrombotic complications at 30-days.
Results: 164 patients were included, 85 pre-intervention and 79 post-intervention. LOS in ED or UCC was significantly reduced after implementation (14.5 hours versus 10.4 hours, p = 0.002). The proportion of patients leaving the hospital without an initial dose of anticoagulant was reduced (42.4% vs. 27.8%, p=0.052). Time from diagnosis to first anticoagulant dose was the same between groups (4.3 vs. 4.3 hours). Only one patient in each group received intravenous heparin as initial anticoagulation. There were no 30-day major bleeding events in either group. 30-day non-major bleeding was significantly reduced in the intervention group (1/61 patients (1.6%) vs. 3/51 patients (5.9%) (p = 0.03). Two patients (2.4%) in the pre-intervention group had newly diagnosed VTE within 30-days compared to no patients in the post-intervention group (p = 0.17).
Conclusion: Pharmacy-driven ATS consultation using real-time electronic alerts and expedited multidisciplinary evaluation was associated with significantly reduced average ED/UCC LOS, shortened time to first anticoagulant dose and lower 30-day rates of bleeding and thrombotic events among patients with low-risk acute VTE. The positive results of this pilot project lend support for expansion of the initiative beyond current ATS service hours.

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Antithrombosis Stewardship as a Key Driver Within a VTE Center Of Excellence: The AMBITION Study

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Introduction: Our pharmacist-driven antithrombosis stewardship (ATS) service recently conducted a pilot initiative involving real-time electronic alerts and expedited multidisciplinary evaluation of patients with acute intermediate risk pulmonary embolism (PE) requiring admission to the hospital. Our aim was to evaluate the impact of antithrombosis stewardship on initial anticoagulant selection, completion of essential transitions of care components and clinical outcomes among patients with acute intermediate risk PE within a multidisciplinary Venous Thromboembolism Center of Excellence (VTE COE).
Methods: Our pre-post analysis compared management and outcomes of historical acute PE patients to those of a post-intervention cohort within our pilot multidisciplinary VTE Center of Excellence, which includes antithrombosis stewardship pharmacists, pulmonary embolism response team (PERT) providers, emergency medicine providers and radiologists. For the post-intervention cohort, only patients diagnosed during the limited pilot hours of 7:00am-5:30pm were included. The primary outcome was time to first dose of anticoagulant. Key secondary outcomes included preferential use of low molecular weight heparin (LMWH) as initial anticoagulation rather than intravenous unfractionated heparin (UFH) in accordance with guideline recommendations, completion of a 6-component transitions of care (ToC) bundle, and rates of 30 day ED visits or readmission for anticoagulation- or VTE-related issues.

Results: We included 188 patients; 125 in pre-COE and 63 in post-COE groups. Mean time to first anticoagulant dose decreased from 233 to 221 minutes following COE implementation (p = 0.44). Preferential use of LMWH over UFH increased from 37.6% to 68.3% (p <0.001). The average number of completed ToC bundle components significantly increased from 3.7 out of 6 to 4.6 out of 6 (p <0.001) and anticoagulant- or VTE-related ED visits or readmission at 30 days significantly decreased from 10.3% to 1.8% in the post-COE group (p = 0.04).
Conclusion: Upstream antithrombosis stewardship involvement in acute PE management is associated with improved patient management and outcomes. Broader implementation of the antithrombosis stewardship care delivery model has significant potential to optimize prescribing and use of high-alert, yet essential, antithrombotic therapies as well as improve healthcare resource utilization.

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The Current Landscape of Anticoagulation (AC) Stewardship Implementation Around the World: An International Survey

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Background: Little is known about the familiarity and implementation of AC stewardship on a global scale.
Objectives: To identify current AC stewardship patterns globally.
Methods: International survey electronically distributed to individuals involved with anticoagulation as a practitioner, researcher, or administrator.
Results: 985 responses (790 US/195 non-US) representing 65 countries/regions and 50 US states. Most respondents were physicians (51.9%) or pharmacists (24.2%). 93.7% felt anticoagulation safety was a serious concern in their country; 90.5% were at least moderately familiar with the term AC stewardship. Only 52.1% have an AC stewardship program for hospitalized (30.0%), ambulatory (14.8%), or both (54.0%) patients. Most (73.4%) felt their organization does a good job implementing clinical guidelines/protocols for AC stewardship, most commonly for DOACs (37.0%), LMWH (36.5%), IV UFH (35.9%), and warfarin (34.3%). Most commonly tracked quality measures were anticoagulation reversal (38.5%), rates of major bleeding (33.1%), number of INRs >5 (32.8%), and warfarin time in therapeutic range (31.4%). 90.7% have a structure for oversight/approval for AC use policies that includes multiple disciplines; 83.9% have a designated champion for AC stewardship efforts, and 62.5% indicated that champion is a physician. 82.2% felt their organization leadership supports AC stewardship with dedicated resources, including dedicated time to complete AC stewardship (51.1%), dedicated AC stewardship positions (56.5%), and financial support for training (36.3%). 17.4% indicated no/unsure if governmental or quality improvement standards for AC stewardship were present in their country/region.
Conclusion: Respondents were familiar with the term AC stewardship, and many organizations have a supportive leadership structure in place for AC stewardship activities, but only half of respondents felt they have an AC stewardship program in place. Many organizations do not have common clinical guidelines or track common quality measures. Opportunities exist for further development of AC stewardship services worldwide.

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Anticoagulation Stewardship Using a Direct Oral Anticoagulation Dashboard to Reduce Incorrect Prescribing

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Background: Direct oral anticoagulants (DOACs) are guideline preferred treatment in nonvalvular atrial fibrillation and venous thromboembolism, they have complex dosing regimens leading to frequent inaccurate dosing and increased risks of bleeding and thromboembolism. Population health dashboards are an effective tool for antithrombotic stewardship to identify and correct inaccurate DOAC dosing and reduce harms. While these dashboards have been shown to reduce inaccurate DOAC dosing and clinical harms in the Veterans Health Affairs (VHA) system, data is lacking in non-VHA health systems.
Objectives: Compared the effectiveness of a DOAC dashboard in reducing incorrect dosing, drug interactions and use of another anticoagulant between patients managed vs. not managed by the DOAC Dashboard within a large health system.
Methods: Henry Ford Health implemented an Epic-based DOAC Dashboard developed by the Michigan Anticoagulation Quality Improvement Initiative (MAQI2). The dashboard categorizes alerts into critical, possible critical and FYI. This analysis focused on "critical alerts" which include incorrect DOAC dosing, drug interactions and multiple prescribed anticoagulants. The anticoagulation stewardship service utilized the DOAC Dashboard to monitor and intervene on DOAC-treated patients in one large, unified medical group but not patients managed by clinicians outside that medical group but within the larger Henry Ford Health system. The proportion of patients with "critical alerts" was compared at the end of the analytic timeframe with chi square and Poisson tests.
Results: 468 of 6930 (6.8%) patients in the intervention group and 1063 of 14337 (7.4%) patients outside the intervention group had critical alerts at the start of the analysis. These rates remained steady for 4 months prior to dashboard implementation. Within 4 months following implementation, the rates of critical alerts dropped to 2% and 8%, respectfully, and remained consistent for 18 months. At the end, 222 of 9819 (2.3%) and 1887 of 21453 (8.8%) patients for the intervention and control populations, respectively, had critical alerts [p < 0.0001; ratio 0.26, 95% CI (0.22-0.30)].
Conclusion: Anticoagulation stewardship using a DOAC dashboard significantly reduced critical incorrect prescribing.

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Anticoagulation Stewardship Program Impact on Deprescribing Inappropriate Antiplatelet Therapy for Patients on Oral Anticoagulation Therapy in the Outpatient Setting

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Introduction: Patients receiving concurrent antiplatelet therapy while on oral anticoagulation therapy are at an increased risk of bleeding without clear reduction in thromboembolic events. The goal of this study is to

determine if pharmacist led deprescribing of inappropriate antiplatelet therapy reduces the risk of bleeding events without increasing the risk of thrombotic events.

Methods: This was a retrospective, observational, single-center cohort study that included patients newly started on oral anticoagulation, including warfarin and direct oral anticoagulants (DOACs), who were managed by Sanford Anticoagulation Management Services (AMS) Clinic from January 2020 to December 2023. Patients must have also been prescribed an antiplatelet at the start of anticoagulation or during the study period with concurrent anticoagulation therapy. A chart review was conducted to determine if a recommendation of antiplatelet discontinuation was completed by an AMS pharmacist based on professional judgement and guided by national guidelines. The primary outcome compared the number of combined thrombotic and major bleeding events (ISTH criteria) that occurred in a patient cohort continued on concurrent antiplatelet vs a patient cohort on oral anticoagulation alone after discontinuation of antiplatelet. Patients were followed for primary and secondary endpoints until the end of the study period or until unenrolled with AMS Clinic. Secondary endpoints included individual evaluation of thrombosis and bleeding events.

Results: A total of 201 patients met inclusion criteria with 94 patients newly initiated on warfarin and 107 patients on a DOAC. The primary outcome occurred in 36 patients (25%) in the antiplatelet with anticoagulation cohort and 5 patients (8.8%) in the anticoagulation-alone cohort. Thromboembolic events occurred in 10 patients (6.9%) in the antiplatelet with anticoagulation group and 2 patients (3.5%) in the anticoagulation alone group and major bleeding events occurred in 26 patients (18.1%) and 3 patients (5.3%), respectively. Results are pending statistical analysis.

Conclusion: In this study, anticoagulation stewardship led to discontinuation of inappropriate antiplatelets appearing to decrease the risk of experiencing a bleeding event with no clear increased risk of experiencing a thromboembolic event. Larger studies will be needed to attest to these results.

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Pharmacist Empowerment, Mandatory 4T Scoring and Real-time EHR Alerts to Optimize Antithrombosis Stewardship Around Diagnosis and Management of Heparin Induced Thrombocytopenia: The Persistent Study

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Introduction: Heparin-induced thrombocytopenia (HIT) is a rare but potentially life-threatening immune-mediated adverse reaction to unfractionated heparin (UFH) or low molecular weight heparin (LMWH). Platelet count fluctuations among hospitalized patients often lead to over-testing and inappropriate treatment. HIT represents a significant opportunity for quality improvement and antithrombosis stewardship. The University of New Mexico Hospital (UNMH) has implemented a system-level process designed to optimize diagnosis and management of HIT. This process requires providers to complete an electronic health record (EHR)-based 4T score, automatically triggering antithrombosis pharmacist review, 4T scoring, and ELISA PF4 antibody testing for scores ≥ 4. Discrepancies in 4T scores are resolved through multidisciplinary discussions to ensure appropriate testing decisions. This study evaluates the impact of an EHR-based antithrombosis stewardship initiative on HIT diagnosis and management at a large academic tertiary hospital.

Methods: This retrospective chart review includes adult patients with suspected or confirmed HIT one year pre- and post-implementation of the stewardship initiative. The primary outcome is compliance with a HIT management bundle, which includes provider documentation of 4T score, proper allergy documentation during workup and at discharge, and appropriate alternative anticoagulant use. Secondary outcomes include the individual components of the HIT stewardship bundle.

Results: A total of 108 patients with a HIT ELISA test ordered were included: 59 in the pre-intervention cohort and 49 in the post-intervention cohort (a 17% reduction). Testing was considered appropriate and completed in 32 patients in the pre-intervention and 46 in the post-intervention cohort ($p < 0.001$). Documented 4T scores by providers increased from 28.1% during pre-intervention to 84.8% during post-intervention ($p < 0.001$). Full compliance to the 5-component HIT bundle was 21.9% during pre-intervention and 41.3% in the post-intervention group (p=0.30).

Conclusion: Our EHR-based HIT stewardship initiative was associated with a reduction in overall HIT testing and an increase in requested tests considered appropriate. Also, it led to a numeric increase in overall HIT bundle compliance, highlighting its potential to improve HIT management in hospitalized patients.

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Stewardship Role in the Periprocedural Management of Patients with Hemophilia A Before and After Introduction of Emicizumab

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Introduction: Emicizumab, approved for bleed prevention in congenital hemophilia A, was added to formulary in 2019 with stewardship program oversight. The stewardship program evaluated the perioperative factor management of hemophilia A patients before and after emicizumab adoption.

Methods: This retrospective analysis included adult congenital hemophilia A patients undergoing scheduled and urgent inpatient procedures between July 2014 and September 2024, excluding events in 2019 during emicizumab adoption. All procedures for patients with inhibitors and a randomly selected sample for those without inhibitors were assessed pre- and post-2019. Procedures were classified as major or minor bleeding risk per defined criteria. The major outcome was perioperative clotting factor concentrate or bypassing agent usage pre- and post-2019, based on inhibitor status. Minor outcomes include regimen escalation for bleeding.

Results: Twenty-one patients (59 procedures) were analyzed. Among patients without inhibitors, 11 had 21 procedures pre-2019 (4 urgent, 13 minor, 8 major), while 4 patients had 10 procedures post-2019, all on emicizumab (4 urgent, 8 minor, 2 major). Pre-2019 regimens included recombinant factor VIII (rFVIII) 25 units/kg every 12 hours (n=8) and every 8 hours (n=6). Post-2019 regimens included rFVIII 25 units/kg every 12 hours (n=5) and 50 units/kg every 24 hours (n=3). Bleeding-related dose escalation occurred following 2 procedures pre-2019 and 1 post-2019. Among patients with inhibitors, 2 had 3 procedures pre-2019 (2 urgent, 2

minor, 1 major), while 4 patients had 25 procedures post-2019, 16 on emicizumab (9 urgent, 22 minor, 3 major). Pre-2019 regimens included recombinant activated factor VII (rFVIIa) 90 mcg/kg every 2 hours (n=1), activated prothrombin complex concentrate 50 units/kg every 12 hours (n=1), or both (n=1), with no bleeds. Post-2019 regimens included rFVIIa 90 mcg/kg every 2 hours (n=5), 75 mcg/kg every 4 hours (n=3), and rFVIII 50 units/kg every 12 hours (n=4). Bleeding-related dose escalation occurred following 1 procedure pre-2019 and 5 post-2019.
Conclusion: This study describes stewardship-guided perioperative management of congenital hemophilia A before and after emicizumab adoption, highlighting new stewardship optimization opportunities.

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The Impact of Prospective Review of Platelet Factor 4 Testing Practices for Suspected Heparin-Induced Thrombocytopenia: An Antithrombotic Stewardship Initiative

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Introduction: Heparin-induced thrombocytopenia (HIT) is a life-threatening form of immune-thrombocytopenia caused by antibodies against the heparin-platelet factor 4 (PF4) complex. The PF4 assay is the recommended first step for laboratory testing in patients at intermediate to high risk for HIT. The PF4 has excellent sensitivity but low specificity and a high rate of false positive results which can lead to initiation of unnecessary and costly treatments. Mitigation of inappropriate HIT testing in patients with low HIT probability is an important antithrombotic stewardship initiative to improve patient safety, reduce treatment costs, and reduce laboratory technician staff workload.
Methods: This was a retrospective, single center, observational cohort study. Patients who underwent PF4 testing from January 12, 2023 to June 11, 2023 (pre-stewardship intervention control group) and January 12, 2024 to June 11, 2024 (stewardship intervention cohort) were included. The primary outcome was to compare the appropriateness of PF4 testing before and after implementation of prospective antithrombotic stewardship pharmacist review of patients with orders for PF4 testing.
Results: A total of 316 PF4 assays were included in this study, 163 in the pre-stewardship intervention control group and 153 in the stewardship intervention cohort. Appropriate PF4 tests were ordered in 57 (35%) patients in the pre-intervention group compared to 88 (57.5%) patients in the stewardship intervention group ($p < 0.001$). The volume of PF4 tests reviewed by stewardship pharmacists during the intervention period averaged two per day. The primary team agreed to PF4 cancellation for 47 (72.3%) of the 65 inappropriate PF4s in the stewardship intervention cohort.
Conclusion: A pharmacist-led stewardship initiative to prospectively review PF4 testing appropriateness was associated with a significant reduction in inappropriate HIT testing. Additional endpoints to be subsequently assessed include HIT status for all included patients, and the estimated cost avoidance associated with reduced laboratory tests and intravenous direct thrombin inhibitor use in the stewardship intervention cohort.

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ARTERIAL THROMBOSIS/PAD/ANTIPLATELET THERAPY

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Antiplatelet and Anticoagulant Bleeding Risk Reduction: A Collaborative Approach

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Introduction: Dual antiplatelet/anticoagulant (APT/AC) therapy increases the risk of bleeding significantly. Evidence-based literature regarding the indication and length of therapy for APT has changed in recent years. Medical complexity of patients, self-referred care, and Care in the Community have made it more challenging for providers to consistently evaluate APT indications and overall risk/benefit of therapy. The objective was to create standardized workflow to assist Patient Aligned Care Team (PACT) in the review of appropriateness of long-term APT therapy. This will reduce unnecessary concomitant use of oral APT with direct oral anticoagulant (DOAC) therapy in an overall effort to reduce bleed risk and pill burden/poly-pharmacy.
Methods: The DOAC Population Management Tool (PMT) was used to identify patients on concomitant oral APT and DOAC therapy. Clinical Pharmacy Technicians (CPhT) called patients to assist with confirming non-VA APT use. Centralized Anticoagulation Services Hub (CASH) team created an internal guidance document to ensure consistent recommendations. Clinical Pharmacist Practitioner (CPP) recommended discontinuation of APT medication directly to patient if for primary prevention only. If APT indication was unclear, CPP communicated with primary care or specialty provider to recommend re-evaluation of APT indication and consideration of GI prophylaxis as appropriate.
Results: Implementation of the initiative resulted in an overall decline in concomitant APT and DOAC therapy by 40% in 11 months. Dual APT and DOAC therapy at the facility is now below the national average among VA medical centers.
Conclusion: Using a collaborative approach to reduce DOAC/APT therapy is an effective method.

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Aspirin Utilization in Patients with Nonvalvular Atrial Fibrillation on Oral Anticoagulants in a Large Academic Medical Center

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Introduction: Aspirin is frequently prescribed for thromboembolism risk reduction in patients with a history of ischemic stroke, heart attack, mechanical heart valve, peripheral arterial disease, left ventricular assist

device, and antiphospholipid syndrome. In the absence of these possible indications, aspirin plus direct-acting oral anticoagulants (DOACs) or warfarin is associated with an increased risk of bleeding and hospitalizations due to bleeding, with no observed differences in risk of thromboembolic events.

Objective: To determine the percentage of patients with nonvalvular atrial fibrillation (NVAF) on anticoagulants who may be on aspirin inappropriately.

Methods: 10,561 patient charts were reviewed for anticoagulation use, aspirin use, and possible indications for aspirin. Possible indications were identified using ICD-10 codes, including antiphospholipid antibody syndrome (D68.61), antiphospholipid antibody positive (R76.0), heart transplant (Z94.1), heart valve replacement (Z95.2, Z95.3, Z95.4), and left ventricular assist device (Z95.811).

Results: 2,200 NVAF patients were identified as being on concurrent anticoagulation with warfarin or a DOAC in addition to aspirin. Of these, 688 patients (31.3%) had no identifiable indication for aspirin. Of the 688 patients without an identifiable indication for aspirin, 147 (21.4%) were written by a provider in cardiology, and 90 (13.1%) in family medicine.

Conclusion: Approximately one-third of patients with NVAF taking both an oral anticoagulant and aspirin may be on aspirin inappropriately. This combination may increase the risk of bleeding and hospitalizations secondary to bleeding, without providing any benefit. Prescribers may benefit from pharmacy-led education sessions regarding the risks of prescribing aspirin in these patients in the absence of an indication.

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ATRIAL FIBRILLATION

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Comparative Effectiveness and Safety of Direct Oral Anticoagulants Compared with Warfarin in Patients with Low Bodyweight who have Atrial Fibrillation: A Systematic Review and Meta-analysis

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Introduction: Direct oral anticoagulants (DOACs) are becoming the anticoagulation strategy of choice for most clinical risks for which they are indicated. However, uncertainty persists regarding their efficacy and safety in preventing stroke among patients with low body weight (<60 kg or BMI <18 kg/m^2). To address this, a pooled systematic analysis of published studies was conducted to compare the efficacy and safety of DOACs versus warfarin for stroke prevention in this specific patient population.

Methods: A comprehensive search of electronic databases (PubMed, EMBASE, Cochrane Database of Systematic Reviews, Science Citation Index, and Database of Abstracts of Reviews of Effectiveness) was conducted from inception to June 2023. The study aimed to evaluate the efficacy and safety of direct oral anticoagulants (DOACs) compared to warfarin in patients with atrial fibrillation and low body weight. Using a random-effects model, pooled odds ratios (ORs) with corresponding confidence intervals (CIs) were calculated to assess mortality outcomes in these patient cohorts.

Results: A meta-analysis of nine studies (n = 159,514 patients) found that DOACs were associated with a lower risk of stroke recurrence compared to warfarin (OR 0.66, 95% CI 0.49-0.9) and a significant 30% reduction in major bleeding events (OR 0.70, 95% CI 0.62-0.80). However, there was no significant difference in the composite outcome (OR 0.81, 95% CI 0.59-1.09) or mortality (OR 0.82, 95% CI 0.48-1.41).

Conclusion: A pooled meta-analysis of real-world and randomized controlled data found that in patients with atrial fibrillation and low body weight (<60 kg or BMI <18 kg/m^2), DOACs significantly reduced the risks of stroke and major bleeding compared to warfarin. However, uncertainty remains regarding the composite outcome and mortality point estimates between the two anticoagulation strategies.

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Stroke Prevention in Atrial Fibrillation and Flutter - Targeting the Untreated Patients In Veterans Health Administration with a Pharmacists-Led, Multi-Center Electronic Health Record Intervention (SPAFF-TNT)

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Introduction: Claims-based data suggests up to half of at-risk atrial fibrillation (AF) populations do not receive oral anticoagulants (OAC). We sought to validate rates of OAC non-use estimates derived from automated data extraction and to optimize stroke risk reduction in AF using a population health tool, manual chart review, and targeted intervention by clinical pharmacists at 18 Veterans Health Administration (VHA) facilities.

Methods: Anticoagulation pharmacists manually reviewed 2,773 unique patient cases across 18 VHA sites where OAC underuse for stroke prevention in AF was identified via a population health tool. Data elements documenting the reasons for OAC nonuse and opportunities for intervention were collected and analyzed.

Results: Initial automated data identified 26.5% of patients across all VHA sites to have AF without OAC use despite a non-sex CHA_2DS_2-VASc $\geq$ 2 in July 2022. Of the cohort manually reviewed, OAC nonuse was adequately explained in 2,711/2,773 (98%). Only 11/2,773 (0.4%) patients had OAC initiated. Other interventions (e.g., referral to specialist or consideration of left atrial appendage occlusion, etc.) occurred in 51/2,773 (1.6%).

Conclusion: Across 18 diverse VHA medical centers, the actionable AF treatment gap is significantly smaller than published literature suggests. Although utilizing anticoagulation service providers to address an untreated AF population represents a novel approach to anticoagulation stewardship, interventions were rare in this largest-of-its-kind chart-reviewed cohort. While population health tools are effective in identifying untreated patients with AF, their ability to efficiently identify opportunities for intervention appears limited in the population studied.

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Antithrombotic Prescribing Practices in Patients with Atrial Fibrillation Presenting with Acute Ischemic Stroke while on Oral Anticoagulation

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Introduction: Therapeutic anticoagulation (AC) reduces the risk of acute ischemic stroke (AIS) in patients with atrial fibrillation, although events still occur. Management of antithrombotic therapy following a stroke varies greatly with limited evidence to guide treatment. We evaluated prescribing practice at our institution and the impact on recurrent ischemic events.
Methods: This retrospective study included patients >18 years old with a diagnosis of atrial fibrillation who presented to Lahey Hospital and Medical Center for radiographically confirmed AIS while on oral AC from January 2022 to October 2023. Following the ischemic stroke, patients were organized into groups based on their care plan. Groups included: no change, change in AC, and change in antiplatelet (AP). Fisher's exact test was used to compare the incidence of recurrent AIS in patients with or without a change in AC. Other analysis included use of AP therapy and major bleeding events.
Results: 73 patients were included with a mean age of 80 years, 49% female, mean CHA_2DS_2-VASc 4.8, and median duration of follow-up of 9.4 months (IQR 96-514). 58 (79%) had no change in AC and 31 (42.5%) received AC with AP. 9 (12.3%) experienced recurrent AIS. No significant difference was seen between change AC vs no change (OR 2.14 [0.3-11.89], p= 0.38) or AP with AC vs AC alone (OR 1.81 [0.35-10.05], p=0.48). 3 patients on AP with AC experienced major bleeding, but due to the small number, meaningful analysis was not possible.
Conclusion: In our patient population, changing AC or adding AP therapy did not decrease recurrent AIS.

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Impact of Amiodarone Exposure on Apixaban Pharmacokinetics in Hospitalized Patients

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Introduction: Current available data is unclear regarding the effects of concomitant amiodarone on apixaban pharmacokinetics (PK) despite their use in nonvalvular atrial fibrillation (NVAF). Amiodarone's long and variable half-life makes a traditional crossover drug study challenging. This ongoing retrospective study will define the mechanism of this potential drug interaction. The primary objective is to describe the impact of amidarone on pharmacokinetic exposure of apixaban in hospitalized patients with a history of NVAF who are on a stable dose of amiodarone 200 mg/day.
Methods: Eligible patients were 18 years or older admitted to Thomas Jefferson University Hospital for NVAF treated with apixaban 2.5 or 5 mg twice daily (Apix only) or amiodarone 200 mg/day and apixaban (Amio/Apix). Patients were identified by screening the hospitalized patients' census. Plasma apixaban was quantified using liquid chromatography-tandem mass spectrometry from salvaged blood samples previously collected for clinical care from eligible patients.
Results: Both groups were similar in demographics. The median concentration of apixaban for Apix only was 185 ng/mL (SD 167) and 227 ng/mL (SD 213.5) for Apix/Amio (p = 0.99). The mean minimum concentration <6 hours post-dose of apixaban was 198.4 ng/mL (SD 168) for Apix only and 272.2 ng/mL (SD 246) for Apix/Amio (p = 1).
Conclusion: Concomitant amiodarone does not appear to have a significant impact on median apixaban concentration, supporting the current labeled dosing when the drugs are administered together. Future directions include analysis using population PK methods.

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HEALTH DISPARITIES

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Impact of Food Insecurity on Anticoagulation Quality Among Patients Receiving Warfarin at a Safety Net Academic Center

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Introduction: Warfarin management remains essential for a variety of anticoagulated patients and is impacted by dietary vitamin K intake, potentially leading to variation in international normalized ratio (INR), and increased bleeding or thrombosis. Food insecurity (FI) may limit consistent access to vitamin K foods, and thus INR control. This cross-sectional cohort study aims to characterize the correlation of FI and time in therapeutic range (TTR).
Methods: This IRB approved retrospective cohort study reviewed patients who screened positive on a social determinant of health questionnaire and had warfarin dosing managed at the institution's anticoagulation clinic between September 2023 and 2024. Data was obtained from the electronic health record and analyzed using qualitative methods. Patients 18 years or older who had three or more INR results during the study period were included.
Results: Of 38 patients included, majority were African Americans. Anticoagulation indication included 18 valve, 12 venous thromboembolism, 4 atrial fibrillation, and 4 others. There were 27 patients with moderate FI and 11 with severe FI. TTR for patients with moderate FI was 56.31% and 43.09% for severe FI (p = 0.13). Last outpatient INR at goal range for patients with moderate FI was 48% and 18% for severe FI (p = 0.067).
Conclusion: Although it did not meet pre-defined statistical thresholds, worsening FI was associated with worsening INR control. Small sample size was a limitation. Screening for and addressing FI may impact quality of warfarin care.

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Social Determinants of Health Barriers within an Antithrombosis Clinic

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Introduction: Social determinants of health (SDOH) are the conditions in the environments where people are born, live, learn, work, play, worship, and age, which contribute to health, function, and quality of life risk factors and outcomes. Literature shows an association between SDOH and prescribing rates and adherence to anticoagulation therapy. This is a retrospective cohort study evaluating the association between patient-reported SDOH food-related and/or transportation-related barriers and their anticoagulation management within an antithrombosis clinic (ATC). The purpose of this study is to evaluate the prevalence of SDOH within our clinic and its association with anticoagulation metrics.
Methods: Adult patients who were asked SDOH questions between 7/1/2024 - 10/31/2024, with >1 visit and were managed with warfarin therapy by ATC via point of care international normalized ratio (INR) will be evaluated for inclusion. Outcomes include a comparison of warfarin time in therapeutic range (TTR) and appointment attendance among patients with vs without any SDOH barrier identified. TTR and appointment attendance rates are calculated based on the anticoagulation episode in the electronic medical record. The TTR calculation excludes the first 10 days of treatment, and inpatient and external INR measurements. Appointment attendance is presented as a rate of all appointments with the ATC. Statistical analyses will include Mann-Whitney U Test and stratification of patients by duration of their ATC treatment.
Results: Preliminary results are available for 131 patients, 43 of which reported one or both SDOH barriers of interest.
Conclusion: Rates of reported SDOH barriers, ATC appointment no show rates, and TTR will be presented.

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INPATIENT ANTICOAGULATION MANAGEMENT

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Attributable Risk of Bleeding in Pulmonary Embolism (PE): A Comparative Study of Contemporaneous Control, Symptomatic PE, and Asymptomatic PE

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Introduction: Traumatic brain injury (TBI) patients, particularly those with subdural hematomas (SDH), are at a high risk for bleeding complications when treated with anticoagulation for pulmonary embolism (PE). The objective of this study was to evaluate the attributable risk of bleeding in TBI patients diagnosed with incidental (asymptomatic) PE, symptomatic PE, and no PE, with a specific focus on hemorrhagic expansion and clinical outcomes.
Methods: A retrospective cohort study analyzed 243 TBI patients, including 46 with incidental PE, 107 with symptomatic PE, and 90 without PE (control). Statistical analysis used ANOVA and Kruskal-Wallis tests to compare bleeding complications, hemorrhagic expansion, and hospital length of stay (LOS).
Results: Patients with incidental PE had the highest bleeding complication rate (28%) compared to symptomatic PE (5%) and controls (6%) (p=0.001), resulting in an attributable bleeding risk of 23% compared to controls. Hemorrhagic expansion occurred in 15% of the incidental PE group, 5% of the symptomatic PE group, and none in the controls (p=0.001), while gastrointestinal bleeding was significantly more frequent in the incidental PE group (15%) compared to symptomatic PE (1%) and controls (6%) (p=0.001). Significant baseline differences included higher rates of mechanical ventilation in the symptomatic PE (72%) and incidental PE (63%) groups compared to controls (48%) (p=0.002). Imaging use was also notably higher in the incidental PE group, with 70% undergoing CT chest with contrast compared to 38% in controls and 22% in symptomatic PE (p=0.001), and 87% receiving CT abdomen/pelvis (A/P) compared to 31% in symptomatic PE and 68% in controls (p=0.001). Median hospital length of stay was longest in incidental PE patients (22 days) compared to symptomatic PE (19 days) and controls (15 days) (p=0.010), while mortality rates did not differ significantly across groups (p=0.110).
Conclusion: Treatment of incidental PE in TBI patients is associated with significantly higher risks of bleeding complications, including hemorrhagic expansion and prolonged hospital stays. These findings underscore the importance of identifying factors contributing to bleeding risks in this vulnerable population.

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Evaluation of a Protocol For Heparin Initiation in Patients Transitioning from Oral Factor Xa Inhibitors

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Introduction: Transitioning from oral factor Xa inhibitors (FXaI) to unfractionated heparin infusion (UFH) can be challenging when using anti-Xa levels for heparin monitoring. The presence of residual factor Xa inhibition can result in elevated heparin anti-Xa levels and subsequent heparin infusion interruptions and/or adjustments. Activated partial thromboplastin time (aPTT), which is minimally affected by residual FXaI, is an alternative heparin monitoring strategy, but disregards residual FXaI anticoagulant effects.We created a transition protocol which is individualized to the patient based on the indication for heparin and baseline anti-Xa level. The objective of this quality assurance evaluation was to assess adherence to the protocol and describe patient outcomes.
Methods: Retrospective chart review of patients admitted to the Madison VA Hospital with baseline anti-Xa UFH levels between 3/21/23-3/31/2024. Inclusions: use of apixaban or rivaroxaban within 72 hours prior to UFH infusion. Exclusions: prior use of a low molecular weight heparin, direct thrombin inhibitor, fondaparinux, or warfarin. Outcomes included percent of transitions with accurate protocol adherence and occurrence of new thromboembolic or bleeding events during hospitalization.
Results: Sixty-five patients with baseline anti-Xa UFH labs were identified. A total of 54 patients were included in analysis.Accurate protocol implementation occurred in 91% of patients. Incorrect heparin initiation timing (3) and/or initial lab monitoring modality (3) were reasons for protocol deviation. There were no new thromboembolic or bleeding events.

Conclusion: An individualized protocol for transitioning patients from oral FXaIs to heparin infusion was accurately implemented the majority of the time with no safety signals.

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The Effect of Individualized Intravenous Heparin Dosing on Activated Partial Thromboplastin Time Values in Neurocritical Care Patients

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Introduction: At the University of Illinois Hospital & Health Sciences System (UI Health), patients at high risk for bleeding, such as neurocritical care patients, may receive individualized IV heparin therapy. This non-standardized approach may cause aPTT value variability, resulting in serious adverse events (e.g., thrombosis and hemorrhage). This study aims to determine the effects of individualized IV heparin dosing on aPTT values.
Methods: This retrospective observational study, conducted at UI Health between 6/1/2021 and 12/31/2022, included patients receiving individualized IV heparin for over 24 hours with at least 4 consecutive aPTT values. Stable therapeutic anticoagulation was defined as two consecutive aPTT values within therapeutic range. The primary outcome was time to therapeutic anticoagulation. Secondary outcomes included therapeutic anticoagulation within 24 hours of initiation, time in sub-therapeutic, therapeutic, and supra-therapeutic ranges, new thrombotic events, and major bleeding.
Results: Thirty-three patients were analyzed. The average time to first therapeutic anticoagulation was 20 ± 18 hours, and the average time to stable therapeutic anticoagulation was 38 ± 33 hours. Within 24 hours of treatment, 58% of patients had an initial therapeutic aPTT, and 27% achieved stable therapeutic anticoagulation. Therapeutic anticoagulation was achieved in 47% and 41% using the Rosendaal and traditional method, respectively. Two major bleeding complications occurred. No new thrombosis was observed. Of 962 aPTTs values, 24% sub-therapeutic, 44% therapeutic, and 32% supra-therapeutic.
Conclusion: Most patients achieved therapeutic anticoagulation, but only a third remained in the therapeutic range within 24 hours of heparin initiation. aPTT values were highly variable, with no significant clinical outcomes.

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Derivation and Validation of a Pharmacogenetic-guided Warfarin Dosing Algorithm in an Arab Population Residing in Qatar

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Introduction: A number of studies have demonstrated the superiority of genotype guided warfarin dosing when compared to other methods. Internationally validated algorithms are also available and although studied in diverse populations they were not validated in the Arab population. This research aims to derive and validate a genotype-guided warfarin dosing algorithm in an Arab population and compare its results to an internationally validated genotype-guided warfarin dosing algorithm (Gage et al. algorithm available at www.warfarindosing.org) in terms of accuracy measures.
Methods: Arab patients newly starting on warfarin provided saliva for genotyping of VKORC1 (−1639G>A), CYP2C9*2, CYP2C9*3 and CYP4F2*3. The primary outcome was the calculated warfarin maintenance dose. Patients were randomly assigned to a derivation or a validation cohorts. Multiple linear regression was used to derive a warfarin dosing model. The model was validated in an independent cohort. Algorithm correlation with warfarin dose was assessed using Spearman correlation coefficient. The median absolute error (MAE) was calculated for our algorithm and compared to the MAE of Gage et al. algorithm.
Results: Multiple linear regression analysis in the derivation cohort (n=164) showed that VKORC1 (−1639G>A), CYP2C9*2 & CYP2C9*3 genotypes, age, BSA and the use of prosthetic valve were significant predictors of warfarin dose in our population. The model could explain 40% of warfarin dose variability in our population ($p < 0.001$). In the validation cohort, (n = 92), our model correlated well with warfarin dose (Spearman's rho correlation coefficient = 0.66, $p < 0.001$). The derived warfarin dosing model showed higher accuracy evident from a significantly lower MAE compared to Gage et al. (9.1 mg/week vs 10.8 mg/week, p=0.02).
Conclusion: The derived model achieved the following factors: Age, BSA, Prosthetic valve indication, CYP2C9 and VKORC1 as significant predictors of warfarin dose. The model showed good association with warfarin dose and higher accuracy compared to Gage et al algorithm. Genetic and clinical factors explain around 40% of warfarin dose variability and therefore future studies should focus on identifying additional factors that affect warfarin dose.

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Argatroban Use in Therapeutic Plasma Exchange (TPE): A Case of Dynamic Anticoagulation Response

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Background: Therapeutic Plasma Exchange (TPE) removes circulating autoantibodies, immune complexes, and other pathogenic substances. TPE also removes circulating coagulation factors including thrombin. Warfarin can be used during TPE, but the anticoagulant effect may be increased. There is little evidence surrounding other anticoagulants. This is the first documented case reviewing the impact of TPE on concomitant argatroban, a direct thrombin inhibitor.
Objectives: To describe a unique case of anticoagulation therapy with argatroban complicated by the dynamic changes in pharmacokinetics and pharmacodynamics in patients undergoing Therapeutic Plasma Exchange (TPE) with albumin and NS replacement.
Case Report: We describe a 50-year-old female with a history of APS, multiple CVAs, and intracardiac thrombus previously on warfarin and aspirin who developed a CNS-autoimmune condition refractory to high-dose steroids. This patient underwent centrifugal TPE for multiple sessions; each removing 3.5L of plasma and replacing with albumin and NS. Prior to TPE, the patient was on warfarin but experienced INR lability after the first TPE. Argatroban was started before the second TPE due to concerns for HIT. The patient was stabilized on a consistent dose of

argatroban with an aPTT of 76s. After the second session of TPE, the patients APTT was elevated at >200s for greater than 6 hours despite holding argatroban.
Conclusion: This case demonstrated a dynamic response to argatroban during TPE. Further research is needed to understand how rapid depletion of coagulation factors or changes in albumin impact effects of Argatroban and to optimize anticoagulant safety and efficacy around TPE.

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LABORATORY MONITORING

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Warfarin and GLP-1 Receptor Agonist Interaction Effects on Time in Therapeutic Range

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Introduction: Warfarin is a commonly prescribed anticoagulant monitored using INR. Maximizing time in therapeutic range (TTR) is crucial for preventing stroke and major hemorrhage. GLP-1 receptor agonists manage diabetes and promote weight loss. While no known interactions exist between warfarin and GLP1-RA, secondary interactions due to gastrointestinal side effects cannot be ruled out. This study aimed to determine the impact of GLP-1 therapy initiation on INR control in patients receiving warfarin.
Methods: This retrospective cohort study reviewed patients concurrently prescribed warfarin and GLP1-RA from 1/1/2008 to 12/1/2023. Patients were excluded if they discontinued either medication within 90 days post-initiation or had fewer than four INR measurements within 90 days before and after GLP-1 agonist initiation. The primary outcome was TTR values pre- and post-GLP1-RA initiation. Secondary outcomes included the percentage of INR in range and time above and below range. Statistical analysis was performed using two-tailed t-tests comparing pre- and post-GLP-1 initiation periods.
Results: Of 81 patients screened, 28 patients met the above criteria to be included in the analysis. Thirteen patients (46%) were male. The average age of participants was 59.4 (minimum 38, maximum 80). Most (9, 32%) of the patients were on warfarin for mechanical valve, followed by afib/aflutter (7, 25%), venous thromboembolism (7, 25%), and other (5, 18%). At baseline, 22 (79%) of patients had a diagnosis of diabetes. Semaglutide was the most prescribed GLP1-RA (10, 36%), followed by exenatide (8, 28.5%), dulaglutide (5, 17.5%), liraglutide (4, 14%), and tirzepatide (1, 3.5%). Average TTR was 59% and 60% for the 90 days before and after GLP1-RA initiation, respectively (p=0.97). The percentage of in-range INRs were 56.6% and 51.9% for the pre-and post-initiation groups, respectively (p=0.51). No patients had bleeding post initiation of GLP1-RA. Among the sub-group of patients with baseline TTR greater or equal to 80%, post-GLP1-RA TTR decreased to 70%.
Conclusion: GLP1-RA therapy initiation in patients on warfarin did not significantly impact TTR. Some well-controlled patients experienced significant INR changes post-GLP1-RA initiation without bleeding events.

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Making It Count: Evaluating an Intervention to Increase Usability of Factor Xa Inhibitor Anti-Xa Levels

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Introduction: Apixaban and rivaroxaban are commonly ordered oral anticoagulants, which inhibit clotting factor X (factor Xa inhibitors, FXai). There are no Federal Drug Administration (FDA) approved laboratory assessments available to measure the anticoagulant effects of FXais. Furthermore, obtaining these levels is not recommended due to lack of information regarding their utility, and significant variability in levels depending on the timing of lab in relation to patient's last dose. Sanford USD Medical Center has lab capabilities to analyze and report FXai levels. Pharmacists noted that FXai results were often uninterpretable, as the last dose of medication prior to lab was not available. In those situations, patients had wasteful labs obtained.
Methods: Objective: Assess the impact of adding default text to the FXai levels, on documentation of the last dose of medication and usability of levels, by comparing 3 month of levels prior to the change and 3 months after the change, with a period omitted in between.
Results: Pre-intervention 43.1% of Fxai labs did not have last dose of medication documented, compared to 31.2% post-intervention. There was an increase in exact last time documentation from 35.3% to 50% pre- and post-intervention. No differences were found in the ordering prescribers, the timing of lab orders, or the utility of the lab result. Utility of the levels in decision making remained relatively similar, so there were still wasteful labs collected. A separate project identified FXai levels were pre-checked on an order panel, removal of this will help decrease ordering of unnecessary levels. Pharmacist and prescriber communication of the lab change provided education regarding the issue and may have impacted short term improvement in documentation of last dose.
Conclusion: Addition of default text to FXai lab orders had a mild impact on documentation of last drug doses, but no impact on utility of results.

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Assessing Anticoagulation Status of a Patient with APS Using Chromogenic Factor X Testing

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Introduction: Antiphospholipid syndrome (APS) is a systemic autoimmune disease characterized by thrombosis and/or pregnancy morbidity in association with persistently positive antiphospholipid antibodies (aPL). The standard treatment for thrombotic APS is life-long warfarin therapy, which requires regular monitoring via the International Normalized Ratio (INR). The presence of Lupus Anticoagulant (LA) can affect the phospholipid component of the INR test, making it challenging to monitor warfarin in APS patients. Chromogenic Factor X (CFX) is a laboratory test that provides an LA-independent measure of anticoagulation intensity. Studies have shown that CFX can be used to correlate INR values to determine whether the INR is an accurate representation of anticoagulation status.

Case Report: A 44-year-old man with triple-positive APS and history of mechanical aortic valve thrombosis who required warfarin doses of ~120 mg per day to achieve an INR within his goal range of 2.5-3.5. Our clinic explored utilization of CFX testing to correlate with his INR value to ensure the INR was an appropriate and accurate monitoring parameter.
Results: CFX is a phospholipid independent test which can give accurate anticoagulation status and assess reliability of INR results in APS patients taking warfarin. There appears to be an inverse correlation a CFX of 20-40% roughly inversely correlates to an INR goal of 2.0-3.0. We sent our patient to obtain CFX testing on the same day that his INR resulted at 2.8. His CFX resulted at 27%, which correlated appropriately with his INR value, confirming that the INR was a reliable method to monitor his anticoagulation therapy.
Conclusion: Although there are not established guidelines on utilization of CFX, this assay could assist in monitoring APS patients who experience recurrent VTE and/or who require higher-than-average doses of warfarin to obtain therapeutic INR. Our obtained reassurance via the correlated CFX level that this patient's INR results were representative of his true anticoagulation status on warfarin, and we were able to continue monitoring him with an INR goal 2.5-3.5.

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Evaluation of Heparin-Induced Thrombocytopenia Testing to Improve Anticoagulation Stewardship in an Acute Care Setting

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Introduction: Current guidelines recommend initiating a non-heparin anticoagulant and ordering heparin-induced thrombocytopenia (HIT) laboratory testing only in patients with an intermediate or high risk 4T score. However, our institution has seen an influx in the ordering of HIT labs without documentation of 4T score. The primary objective was to evaluate the impact of the 4T score on the incidence of inappropriate HIT testing.
Methods: In this retrospective study, patients for whom a PF4 immunoassay was ordered between January 1st and June 30th, 2024, were identified via an Epic-generated report and enrolled based on inclusion criteria. The proportion of PF4 antibody labs ordered inappropriately based on the patient's 4T score served as the primary endpoint of the study. Secondary outcomes included the proportions of positive PF4, SRA and patients appropriately transitioned to non-heparin anticoagulants when suspecting HIT.
Results: A total of 89/118 (75%) of HIT labs were ordered inappropriately. The proportion of positive heparin PF4 labs was 8/118 (7%) and positive SRA was 2/118 (2%). Of the patients who remained on anticoagulation at the time of testing, 72/86 (84%) were not transitioned to non-heparin anticoagulants. Argatroban was initiated upon suspicion of HIT in the 2 patients who had positive SRA and was appropriately continued afterwards.
Conclusion: 4T score implementation and pharmacist intervention could improve anticoagulation stewardship of HIT testing at our institution.

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Evaluation of Hemoglobin Monitoring Frequency in Patients on Anticoagulation Therapy

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Introduction: Major bleeding is the most notable risk associated with anticoagulation. Routine hemoglobin screening has been valuable in detecting occult bleeds but there is no clear designation on how often patients on anticoagulation therapy should be monitored and if this affects bleeding risk. The objective of this study was to compare outpatient hemoglobin monitoring intervals of less than and more than annually in patients on anticoagulation therapy.
Methods: This IRB exempt single-center retrospective chart review included patients over 18 years of age receiving anticoagulation therapy for at least one year from our institution's outpatient pharmacy between January 2017 - March 2023 with consecutive hemoglobin results with a greater than or equal to 2 g/dL decrease.
Results: Of 7254 hemoglobin values, 196 were included with an average patient age of 61 years old and the majority African American. One hundred and sixty (82%) had hemoglobin monitored annually or more with a mean hemoglobin difference of -3.17 g/dL, 49 reported bleeding (31%), 20 blood transfusions (13%), and 15 hemoglobin less than 7 g/dL (9%). Thirty-six (18%) had hemoglobin monitored less than annually with a mean hemoglobin difference of -2.78 g/dL, 13 reported bleeding (36%), three blood transfusions (8%), and zero with hemoglobin less than 7 g/dL.
Conclusion: Patients with a hemoglobin decrease of greater than or equal to 2 g/dL were monitored more frequently than annually and this was associated with a greater likelihood of occult anemia.

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Real-World Implementation of Latex Immunoturbidimetric Platelet Factor 4 Assay for Heparin-Induced Thrombocytopenia Diagnosis at a Large Academic Medical Center

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Introduction: Heparin-induced thrombocytopenia (HIT) is a rare complication of heparin use, characterized by increased thrombotic risk. Diagnosis includes calculating the pre-test probability of HIT using the 4T score, running a platelet factor 4 (PF4) assay to screen for anti-heparin/PF4 antibodies, and confirming results with a serotonin release assay (SRA) to assess for platelet activation. Our institution switched from an enzyme-linked immunosorbent PF4 assay batched once daily to a latex immunoturbidimetric assay (LIA) run on-demand. The objective

of this study is to describe real-world implementation of the LIA PF4 assay.
Methods: This retrospective analysis was performed at a tertiary academic medical center and approved by the Mass General Brigham Institutional Review Board (protocol#2021P001515). The electronic medical record was used to identify all PF4 tests ordered between October 2022 and October 2023. Endpoints included probability of positive SRA based on the magnitude of LIA result as well as the initial calculated 4T score.
Results: A total of 333 PF4s were ordered, of which 31 (9.3%) resulted positive. An SRA was ordered in 30 of the 31 patients; 13 (43.3%) resulted positive. The probability of positive SRA was 26.3% with weak-positive LIA (1.0-4.9 U/mL), 62.5% with moderate-positive LIA (5.0-15.9 U/mL), and 100% with strong-positive LIA (≥16.0 U/mL). An SRA was ordered in 15/302 negative PF4s, all of which resulted negative. The SRA resulted positive in 0%, 41.6%, and 50% of patients with low, intermediate, and high 4T scores, respectively.
Conclusion: The implementation of an on-demand LIA PF4 assay in routine clinical practice at our institution demonstrated consistent and reliable performance.

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Clinical Performance of a Novel Point-of-Care Coagulometer, the Perosphere ClotChek™, for the DOACS

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Introduction: While use of the direct oral anticoagulants (DOACs) does not require routine coagulation monitoring, measurement can be highly desirable in certain scenarios. The current study characterizes the response of a novel point-of-care (PoC) coagulometer, the Perosphere ClotChek (ClotChek) to DOAC-induced anticoagulation in DOAC and normal patients.
Methods: Rivaroxaban and apixaban patients (ages of 18-80 years old) were measured at T_{trough}, i.e. before their morning dose, and at T_{peak}, i.e. 2.75 hours later. For comparison, normal subjects (verified by laboratory screening), were measured at a single time point. For these patients, up to four operators at each of three sites performed triplicate clotting time measurements in whole blood at each measurement time point, alongside aPTT, PT/INR, and a calibrated, chromogenic anti-FXa assay.
Results: Across DOAC concentrations, the sensitivity of the ClotChek was significantly higher than comparator measures, with trough and peak ClotChek values being distinguishable and separable from each other, and from normal, with high statistical significance (mean of normal: 244 seconds; mean of trough: 273 and 294 seconds, and mean of peak: 369 and 324 seconds, respectively, for rivaroxaban and apixaban). A strong linear correlation was observed for clotting time versus drug concentration, measured by anti-FXa assay, with R2 values of 0.99 and 0.98 for rivaroxaban and apixaban, respectively.
Conclusion: These results provide evidence that the ClotChek may serve as an ideal measurement of the pharmacodynamic effects of the DOACs, rivaroxaban and apixaban, providing results in 3-8 minutes, with lab-like precision, in emergency and other scenarios.

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PATIENT SELF-TESTING

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Comparison of Warfarin Time in Therapeutic Range Before and After Home Meter Enrollment

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Introduction: Warfarin time in therapeutic range (TTR) assesses coagulation with a TTR of 58-65% implying a stable coagulation state. Cardiology clinic patients who are enrolled in the home monitoring program report their INR every 2 weeks and receiving dosing instructions from a pharmacist. This study's purpose was a comparison of warfarin TTR before and after enrollment in home monitoring.
Methods: This retrospective chart review included patients who are enrolled in home monitoring between January 1, 2020 and December 31, 2023 with available INR values 6 months before and after enrollment. Patients were excluded if they were non-compliant or had a home meter when establishing care. The primary outcome was the comparison of Rosendaal TTR before and after enrollment. Secondary outcomes assessed the frequency of extreme INR values (≥ 5 or ≤ 1.5), testing per month, and hospitalizations or emergency department visits for bleeding, thromboembolism, or stroke.
Results: Sixty-two patients met inclusion criteria for analysis. The average TTR before enrollment was 59.2% vs. 61.4% afterwards (p = 0.592). Thirty patients (48%) had an improved TTR, and 31 patients (50%) had a decreased TTR. The number of extreme INR values was similar (0.97 vs. 1.0). The frequency of INR testing per month increased after enrollment (1.8 vs. 2.5).
Conclusion: Warfarin TTR remained relatively stable after enrollment in home monitoring, suggesting a similar level of anticoagulation control is possible with clinic and home INR monitoring programs. Although there were marginally more patients with a decreased TTR, this may be explained by increased monitoring.

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Impact of Home Testing on INR Control and Adverse Events in Black Patients on Warfarin for Atrial Fibrillation or Venous Thromboembolsim

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Introduction: Black patients on warfarin have higher rates of stroke, major bleeding, and death compared to White patients. Suboptimal warfarin control, reflected by lower time in therapeutic range (TTR), may contribute

to these disparities. Home INR testing has shown mixed results in improving TTR and reducing adverse events (AEs), with limited evidence on its impact in Black patients. Our objective was to compare INR control and AEs between Black home-testers and non-home testers on warfarin for atrial fibrillation (AF) or venous thromboembolism (VTE).
Methods: From the Michigan Anticoagulation Quality Improvement Initiative (MAQI2) registry, Black patients on warfarin for AF or VTE between April 2012 and July 2024 were identified. Patients without at least 3 months of follow-up were excluded. Patients without documented home-testing were classified as non-home-testers while patients with ≥3 months of consecutive home testing were classified as home-testers. Home-tester outcome rates were calculated for the home-testing period only. Outcome rates were adjusted by inverse probability weighting, and comparisons were made using negative-binomial model. Major bleeding was based on International Society on Thrombosis and Haemostasis criteria.
Results: 122 home-testers and 1086 non-home-testers were compared. Home-testers had a higher TTR (58.8% vs 55.4%, $p < 0.01$) and fewer non-major bleeds (23.1 vs. 33.1 per 100 pt-yr, p=0.024). Major bleeding and thrombotic event rates were similar between the groups.
Conclusion: Home INR testing was associated with better INR control and less non-major bleeding in Black patients. Enhanced support for Black patients may further improve outcomes and bridge the gap in anticoagulation care quality.

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Point-of-Care INR Monitoring for Patients with Antiphospholipid Syndrome

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Background: Warfarin is the preferred anticoagulant in patients with antiphospholipid syndrome (APS). Patients with APS have lupus anticoagulant antibodies, known to slow blood clotting in vitro and falsely elevate international normalized ratio (INR) values. This reaction occurs more often with reagents used in point-of-care (POC) INR meters compared to the lab. Discrepancies between POC and lab INRs in patients with APS have been identified clinically, particularly when the POC INR result is >4. Objective: Determine the difference between INR values obtained via POC versus lab in patients with APS.
Methods: Retrospective chart reviews were conducted on adult patients with APS identified by ICD-10 codes who were taking warfarin and had POC and lab INRs from same calendar day between January 2020 and December 2023. POC readings above 8 were excluded. Using SPSS Statistics, bivariate correlation was conducted to determine Pearson correlation coefficient between POC and lab INRs.
Results: 59 same-day INRs were identified. The overall correlation coefficient between POC and lab INRs was 0.910 ($p < 0.001$). When POC INR was >4, the correlation coefficient was 0.489 ($p < 0.01$). Overall, 37% of POC INRs were within 0.5 of lab value; when compared, the POC INR >4 group was within range 4% versus 68% for POC INRs <4.
Conclusion: Although POC and lab INR tests show strong overall correlation, this weakens as the POC INR increases. Only 4% of POC INRs are within the acceptable error when >4; therefore, patients with APS may benefit from lab INRs at that threshold.

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Enhancing Warfarin Therapy Compliance and Adherence in LMICs Through POCT INR Self-Testing: A Patient-Centered Approach

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Introduction: Warfarin is widely used for preventing thromboembolic events, but its narrow therapeutic index requires frequent INR monitoring. In Low- and Middle-Income Countries (LMICs), limited access to laboratory services and patient education often lead to poor adherence and increased complications. Point-of-Care Testing (POCT) INR self-monitoring offers a convenient and effective alternative to improve compliance and outcomes. This study evaluates the impact of POCT INR self-testing with pharmacist counseling on adherence and safety in LMIC settings.
Methods: This 6-month prospective study included 83 patients discharged on lifelong warfarin therapy. Patients received POCT INR self-monitoring devices with pharmacist-led training on usage, dose adjustments, and dietary compliance. Follow-ups assessed adherence, INR control, and adverse events. Inclusion Criteria: Adults (≥18 years) requiring lifelong warfarin therapy. Exclusion Criteria: Those under corporate insurance plans that did not cover device costs.
Results: Of 83 patients, 97% adhered to self-monitoring. The primary reasons for non-adherence (3%) were loss to follow-up and dietary non-compliance. 85% of patients maintained their INR within the therapeutic range (TTR), and no major bleeding or thromboembolic events were observed. Minor bleeding occurred in 2.4%, managed through dose adjustments. 92% reported increased confidence, and 95% preferred self-testing over laboratory visits, reducing hospital visits by 68%.
Conclusion: POCT INR self-monitoring, combined with pharmacist counseling, is a feasible and effective strategy for improving adherence and outcomes in LMICs. High compliance rates and reduced adverse events highlight its potential to address accessibility and educational barriers, providing a cost-effective and scalable solution for anticoagulation management in resource-limited settings.

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PEDIATRICS

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Differences in Types of Thromboses and Risk Factors in Males versus Females in Adolescent Thromboembolism in the Throm-PED Registry

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Introduction: Adolescents are at heightened risk for thromboembolism (TE), likely due to diagnostic/therapeutic advances, and unique health challenges. Varying risk factors in females compared to males (e.g., estrogen, autoimmune disorders/antiphospholipid syndrome) may result in differences in prevalence, and TE types, which in turn can lead to differences in treatment choices, outcome and complications. Few studies have evaluated sex-based differences in TE and no study has addressed the impact of sex in adolescent TE.
Methods: The Throm-PED registry is an international, multicenter, prospective registry of the International Pediatric Thrombosis Network

(IPTN). Following data prospectively collected in Throm-PED registry (overall-since 2019; specific adolescent TE protocol-since 2021) were reviewed: age at diagnosis, gender, TE type, location, risk factors, treatment, outcome, complications.

Results: Data were analyzed for 776 adolescents with TE, M-360 (46%), F-416 (54%), median age of 15 years (range-10-21 years) in both sexes. There was statistically significant greater prevalence of arterial thromboses overall, and intracranial venous, intracardiac, and aortic thromboses in males and venous TE overall, and pulmonary embolism in females respectively. For risk factors, congenital heart disease, surgery, and previous thrombotic event in males and oral contraceptives, obesity, antiphospholipid syndrome, and autoimmune disorders in females, were more prevalent which were statistically significant. Therapeutic modalities were similar in both.

Conclusion: Sex-based differences appear to impact adolescent TE characteristics with higher female prevalence as noted in our study. Increased prevalence of congenital heart disease may explain the increased prevalence of intracardiac/aortic thromboses in males. Risk factors with higher prevalence in females including estrogen therapy, autoimmune disorders, antiphospholipid syndrome and obesity might have contributed to increased prevalence of pulmonary embolism when compared to males. Future analysis with continued follow-up we hope will shed light on the sex-based differences in TE outcome and complications.

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Increased Neonatal Mortality and Increasing Rate of Cerebral Venous Sinus Thrombosis in Hospitalized Children: A Pediatric Health Information System Database Study

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Introduction: Pediatric Cerebral Venous Sinus Thrombosis (CVST) poses risks of neurological sequelae and mortality, necessitating timely diagnosis and appropriate antithrombotic therapy. Limited sample sizes in previous studies have led to inconsistent treatment recommendations. To better understand pediatric CVST, we used the Pediatric Health Information System (PHIS) database to compare clinical features, treatment practices, and outcomes in neonates versus older children, to analyze the influence of various parameters on healthcare outcomes.

Methods: Deidentified, retrospective data of pediatric CVST was extracted from the large multicenter PHIS administrative database from January 1, 2011 to October 1, 2022. Diagnostic, imaging, procedure, and pharmaceutical billing codes were used to identify demographic information, clinical characteristics, management, and outcome. Multivariance analysis was performed on study parameters in neonates vs. older children.

Results: 6,080 hospitalizations with CVST diagnosis (0.1% of all hospitalizations) were identified. Overall mortality of all children was 4.2%. Neonates constituted 17.3% of the hospitalizations (N=1054). Neonates had a longer hospital stay (median 24, vs. 8 days; $p < 0.001$), but lower ICU admission (33.4% vs. 55.6%; $p < 0.001$) and readmission rate (0% vs. 1.0%; p=0.002) when compared to older children. Enoxaparin and unfractionated heparin (UFH) remained the primary treatments for CVST, with UFH utilized more often in neonates (71.6% vs. 59.2%; $p < 0.001$). Neonates had increased mortality rate compared to older children (9.7% vs. 3.1%; $p < 0.001$).

Conclusion: Pediatric CVST is a serious disorder, with an overall mortality rate of 4.2% in our study. Neonates had distinct clinical features, associated diagnoses, and complications compared to older children. Neonates experienced longer hospital stay, and statistically significant higher mortality rate when compared to older children, consistent with prior studies. Future multi-center, prospective studies are needed to better address the increased neonatal mortality and improve overall care of pediatric CVST which is increasingly prevalent as seen in our study.

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PERIOPERATIVE MANAGEMENT

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Parenteral Bridging Practices and Outcomes in Patients on Warfarin for Mechanical Heart Valves and Venous Thromboembolism

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Introduction: Bridging with heparin or low-molecular-weight heparin (LMWH) during warfarin interruption is common. Guidelines against bridging in atrial fibrillation have recently been strengthened, while the evidence against bridging in mechanical heart valves (MHV) and venous thromboembolism (VTE) is less robust. Our objective was to describe the prevalence of bridging in patients on warfarin for MHV or VTE and study post-procedure outcomes.

Methods: Patients within the Michigan Anticoagulation Quality Improvement Initiative ($MAQI^2$) registry who were prescribed warfarin solely for MHV or VTE between January 1st, 2020 and July 16th, 2024 with at least one interruption for a surgery or invasive procedure and having at least thirty days of post-procedure follow-up were identified. Interruptions were categorized as bridged or non-bridged. Thirty-day post-procedure bleeding and thrombotic event rates were compared using propensity score matching and then adjusted for unbalanced variables. Patient-level clustering was addressed with a generalized estimating equation approach. Major bleeding defined by International Society on Thrombosis and Haemostasis criteria.

Results: 530 patients experienced 775 interruptions, and 427 (55.1%) interruptions were bridged. In 293 matched interruptions, thirty-day post-procedure thrombotic events were comparable between bridged and non-bridged interruptions (1.3 vs 2.7 per 100 interruptions, p=0.40) while major bleeding was also similar (2.7 vs 1.3 per 100 interruptions, p=0.23). Total bleeds of any severity and bleeds requiring ED evaluation/treatment were more common after bridged interruptions (12.8 vs 6.1 per 100 interruptions, p=0.015 and 5.1 vs 1.7 per 100 interruptions, p=0.019, respectively).

Conclusion: Bridging was associated with a significant increase in bleeding, without a reduction in thrombotic events during the 30-day post-procedure period.

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Evaluation of a Pharmacist-led Perioperative Antithrombotic Management Service

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Introduction: Perioperative management is an important component of antithrombotic stewardship. An appropriate perioperative plan minimizes risk of thrombosis and bleeding around time of procedure. The perioperative service was initiated in 2013. Expansion in 2015 included all anticoagulated patients undergoing cardiac catheterization, and 2018 to include patients undergoing GI procedures.
Methods: This is a retrospective review of all perioperative cases referred to a pharmacist-led perioperative management service between 2013-2024.
Results: This study included 28,470 cases. Referral grew significantly from 51 cases in 2013 to 4,453 cases in 2024. Procedure types include GI (51.2%), cardiac catheterizations (29.5%), and other general surgeries (9.6%). Referrals came from cardiology (45.8%), GI (31.1%), and general medicine (16.1%). Direct oral anticoagulants accounted for 48.8% of cases, followed by warfarin (39.0%), and P2Y12 inhibitors (9.8%). AFib was the most common antithrombotic indication (46%), follow by VTE (33.1%) and CAD (6.6%). Patients included those with low (45.8%), moderate (43.8%) and high thrombotic risk (10.4%). Perioperative bridging occurred in 19.3% of cases, with majority of bridging done in the outpatient setting (97.2%). Rate of bridging decreased significantly over time, with 88% in 2013 to 12.8% in 2024. At the time of pharmacist review, a provider had already proposed a perioperative plan in 4723 cases. Of these, 25% of plans had to be modified by pharmacists.
Conclusion: Need for perioperative management has grown significantly. Pharmacists can effectively assist with this process, especially in the minimization of unnecessary perioperative bridging. Requirement for bridging has decreased significantly over time.

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Optimizing Perioperative Anticoagulation Management: Impact of a Clinical Pharmacist Practitioner Managed Clinic on Patient Safety and Care Quality

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Introduction: The VA North Texas Health Care System (VANTXHCS) serves over 8,000 patients on oral anticoagulants. Approximately 15% to 20% of patients who are receiving anticoagulant therapy will require a procedure annually. The lack of utilization of standardized perioperative guidelines and processes by medical staff has led to inconsistent recommendations, poor follow-up, and potential patient harm. To address these challenges, a Clinical Pharmacist Practitioner (CPP) managed Perioperative Anticoagulation Clinic was established to streamline the process, ensure consistent recommendations, and enhance patient safety. Our objective is to evaluate the impact of a CPP managed Perioperative Anticoagulation Clinic on patient safety, focusing on consistent guideline implementation, and reduction of adverse events, such as bleeding and thrombosis.
Methods: The CPP managed clinic offers face-to-face, telephone, and VA Video Connect appointments. A comprehensive perioperative guideline was developed to provide standardized recommendations for pre- and post-procedural anticoagulation management. Additionally, a structured consult and follow-up process was created to ensure consistent care and minimize the risk of patients being lost to follow-up. Patients referred to the clinic were assessed for procedure-specific bleeding and thrombotic risks, with individualized plans created to manage anticoagulation therapy. Quality data were collected over two years, including patient consults, anticoagulant usage patterns, and pharmacist interventions addressing adverse events.
Results: The clinic demonstrated improved adherence to standardized guidelines and significant growth, with a 56% increase in utilization within the first year. Postoperative bleeding and thrombosis incidents were systematically documented and addressed, with CPP managed interventions preventing inappropriate anticoagulation resumption in several cases. Additionally, the clinic's follow-up processes reduced patients being lost to follow-up post procedures.
Conclusion: The CPP managed perioperative anticoagulation clinic successfully streamlined anticoagulation management, ensuring consistent and evidence-based recommendations. CPP managed interventions reduced adverse events, including inappropriate anticoagulation resumption, while enhanced follow-up processes minimized the risk of patients being lost to care. These outcomes demonstrate the clinic's success in improving patient safety and continuity of care.

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Peri-Procedural Warfarin Bridging Evaluation for Patients with Atrial Fibrillation Enrolled in an Anticoagulation Management Service

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Introduction: The 2023 AHA/ACC/HRS guideline recommends against peri-procedural bridging of warfarin in patients with atrial fibrillation (AF) based on CHA_2DS_2-VASc scores alone without prior thromboembolic (TE) events or additional risk factors. At our institution, the decision to bridge in patients with AF with moderate-to-high TE risk is driven by clinical judgment and patient-specific factors such as history of mechanical heart valve, lupus anticoagulant, or recurrent thromboembolism. Objective: To evaluate our current institutional peri-procedural practices and its impact on TE and bleeding events.
Methods: This observational, retrospective, single-center analysis included patients enrolled in our outpatient anticoagulation service on warfarin for AF with moderate-to-high TE risk based on CHADS2-VASc score ≥5 or with other TE risk factors who underwent a moderate-to-high bleed risk

procedure. Procedures completed from 08/2023 to 08/2024 were identified using reports from the electronic health record. Major endpoints included the percentage of patients receiving therapeutic bridging therapy, a composite of TE events (deep vein thrombosis, pulmonary embolism, cerebrovascular accidents, or transient ischemic attack), and a composite of major and clinically relevant non-major bleeding (CRNMB) events as defined by International Society on Thrombosis and Haemostasis. Minor outcomes included the incidence of the individual components of the composite endpoints within 30 days post-procedure.
Results: Of the 145 patients included, 87 patients (60%) received bridging therapy during warfarin interruption. There were no thromboembolic events following warfarin interruption. There were 21 bleeding events; 1 major and 20 CRNMB events. There were 15 (17.4%) CRNMB events in the bridging group and 5 (8.6%) in the non-bridging group. The sole major bleeding event was determined to be procedure-related for a patient receiving bridging therapy (transcatheter mitral valve replacement and developed a right groin access site hematoma on post-operative day one).
Conclusion: This analysis shows a trend towards less bleeding events without increasing TE risk when bridging was omitted in AF patients with moderate-to-high TE risk who required warfarin interruption for moderate-to-high bleeding risk procedures.

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POPULATION HEALTH

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Developing an Innovative Clinical Decision Support App for Enhanced Peripheral Artery Disease Management

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Introduction: Peripheral artery disease (PAD) contributes to significant morbidity and mortality, including limb amputation, myocardial infarction, stroke, and death. Effective management to prevent these complications is often underused or inconsistent with evidence-based guidance. Ensuring consistent, evidence-based care is challenging, especially in rural and underserved areas. This project aims to develop and implement a decision support app to enhance PAD management. The app will provide healthcare providers with real-time, evidence-based recommendations and support tools to improve patient outcomes.
Methods: The development of the decision support app will follow a multiphase approach: App Development: Create an intuitive, user-friendly app that integrates the latest clinical guidelines and decision algorithms using an established no-code app builder software platform. Pilot Testing: Implement the app in selected healthcare settings to evaluate its usability, effectiveness, and impact on clinical decision-making. Evaluation and Refinement: Collect feedback from users and analyze clinical outcomes to refine the app and ensure it meets the needs of healthcare providers and patients. Dissemination: Offer the healthcare community open access to the PAD app.
Results: Anticipated outcomes include improved adherence to clinical guidelines, enhanced decision-making capabilities for healthcare providers, and better patient management and outcomes. The app is expected to be particularly beneficial in underserved areas with limited access to specialist care and resources.
Conclusion: The decision support app for PAD management represents a significant advancement in using technology to improve healthcare delivery. By providing real-time, evidence-based support, the app has the potential to enhance care quality, reduce complications, and improve overall health outcomes.

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The Changing Landscape of Stroke Prevention in Subclinical Atrial Fibrillation and a Potential Path Forward in the Veteran Population: A Population Health Anticoagulation Stewardship Initiative

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Introduction: Use of oral anticoagulants (OAC) in subclinical atrial fibrillation (AF) represents an ongoing clinical question. Recent publications continue to inform but how best to apply remains unclear. We sought to develop a process by which patients with history of subclinical AF could be recalled for future intervention.
Methods: A systematic approach for review of non-anticoagulated AF patients was disseminated across 18 Veterans Health Administration (VHA) sites. Part of this approach included a note template which could generate data elements (health factors [HF]) that captured results of the review. These included HF for historic, transient, or subclinical AF for which anticoagulation had been deemed unnecessary. A population health tool was developed to extract and display these HFs allowing for rapid identification of this patient cohort.
Results: Of 2,773 non-anticoagulated patients, 694 had HF documenting historic, transient, or subclinical AF as the reason. These HF will allow for identification of these patients which can be operationalized to ensure close monitoring and application of new care standards as they are developed. Although, the HF lacked the granularity to identify patients with continuous rhythm monitoring or to separate out subclinical, low-burden AF from those with historic or transient AF all are at an increased risk of AF recurrence/progression and would benefit from identification for enhanced monitoring.
Conclusion: Documenting reasons for OAC non-use in a manner that is easily and rapidly retrievable is feasible and has the potential to improve efficiency of care and reduce the time it takes to deliver changing medical standards to individual patients.

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Availability, Pricing, and Affordability of Antithrombotic Medicines in Addis Ababa, Ethiopia: Implications for Health Policy

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Introduction: Antithrombotic medications are essential for the management of abnormal clot formation. However, their availability, pricing, and affordability in Ethiopia, particularly in Addis Ababa, have not been comprehensively studied.

Methods: A cross-sectional study was conducted in Addis Ababa, Ethiopia to assess essential antithrombotic medicines' availability, pricing, and affordability. This study utilized the World Health Organization (WHO) and International Health Action Organization methodology. Five public hospital outpatient pharmacies, four private hospitals, ten private pharmacies, four Kenema Pharmacies, and two Red Cross pharmacies in Addis Ababa, Ethiopia, were included in the study. All essential antithrombotic medicines in the sixth edition of Ethiopia's Essential Medicines List were included in this study. Data were collected for originator brands and the generic lowest-priced drugs available at each medicine outlet.
Results: The availability of low-priced generic (LPG) antithrombotic medicines was 31%, with private hospitals having the highest availability (52%). Original-brand antithrombotic medicines were rarely available, averaging only 3%, with private pharmacies showing a slightly higher availability (10%). The median prices of LPG antithrombotic medicines are higher in private settings. Original-brand antithrombotic medicines in private hospitals and pharmacies were unaffordable, costing between 256.14 and 3,418 days of wages.
Conclusion: The availability of most antithrombotic medicines was low across all sectors compared with the WHO target. Private hospitals showed relatively higher availability of these LPG medicines than other pharmacy outlets included in the study. There is a significant disparity between the availability and affordability of LPG and OB medicines. To address these issues, national drug procurement and distribution systems must be strengthened. Exploring local production and financial assistance programs, implementing effective stock management, regulating medicine prices, promoting high-quality generic medicines, and conducting further research to understand the national landscape are all essential.

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QUALITY IMPROVEMENTS

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Evaluation of Current Outpatient DOAC Management Practices Within Trinity Health Grand Rapids

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Introduction: Direct oral anticoagulants (DOACs) have become a preferred anticoagulation (AC) strategy over the past decade, but their utility does not come without risks. There have been numerous instances of both under or overdosing of these agents leading to thrombotic or bleeding events. Some institutions have sought to prevent these issues by extending their AC services to include a DOAC monitoring outpatient service line. This medication use evaluation provides baseline trends in appropriateness of DOAC prescribing, monitoring, and instances of safety events within a year of treatment and potentially illustrate if a DOAC service line should be considered.
Methods: One hundred eligible patients who were on DOAC therapy between January 1st, 2021 and July 31st, 2023 were included. The study population was divided so half were prescribed a DOAC for atrial fibrillation (AF) and the other half for conditions other than AF necessitating DOAC utilization. Patients were excluded if they were on DOAC therapy for less than one year or if the DOAC was prescribed by a provider outside of Trinity Health. The primary objective is to evaluate the appropriateness of DOAC prescribing and monitoring over a year of treatment. Secondary objectives included to describe safety outcomes including major bleeding and thrombotic events in this period, to assess the appropriateness of periprocedural DOAC management, and to describe prescribing and education trends surrounding DOACs.
Results: Overall appropriateness of DOAC prescribing for both groups combined was 88%, but when separated the new start DOAC group performed at a statistically significantly lower rate. The documented education in the new start DOAC group at baseline was 16% and the continuation group had 4% documented education over the course of the year.
Conclusion: The appropriateness of DOAC prescribing over a year was significantly lower for new start DOAC patients compared to those continuing DOAC therapy. The development of a monitoring service line for this first year of DOAC therapy that focuses on education would be optimal.

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Thrombophilia Screening in Inpatients: A Review of Testing Appropriateness and Clinical Impact in a Tertiary Hospital in Qatar

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Introduction: Thrombophilia testing is commonly performed in inpatient settings to diagnose and manage thrombotic events, but its clinical utility in these contexts is debated. Many tests are ordered inappropriately, providing limited benefit while increasing healthcare costs and inefficiencies. This study aims to assess the appropriateness of thrombophilia testing in hospitalized patients, evaluate its clinical impact, and identify factors contributing to inappropriate testing.
Methods: A retrospective analysis was conducted on adult inpatients discharged from the medical unit of a Tertiary Hospital in Qatar between January 2022 and March 2023. Data from 48 patients and 353 thrombophilia tests were analyzed. Appropriateness was determined using patient characteristics, concurrent anticoagulant use, admitting diagnoses, and comorbidities associated with thrombosis risk. Tests were classified as appropriate or inappropriate based on established clinical guidelines.
Results: The study found that 67.9% of thrombophilia tests ordered were inappropriate, leading to an estimated cost of 33,240 Qatari Riyals (QR). Inappropriate testing rarely influenced patient management, as results often did not alter therapeutic decisions. Tests with limited clinical utility included antithrombin III, lupus anticoagulant, protein C, protein S, and prothrombin gene mutation screenings. Inappropriate testing also diverted resources from other necessary diagnostic and therapeutic interventions.
Conclusion: Inappropriate thrombophilia testing is prevalent in medical inpatient settings, emphasizing the need for adherence to guidelines to optimize test utilization and reduce unnecessary costs. Strategies such as provider education, decision support tools, and regular monitoring of testing practices can improve resource allocation and enhance patient care.

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Evolution of an Electronic Health Record-Based Alert to Optimize Venous Thromboembolism Prophylaxis

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Introduction: Venous thromboembolism (VTE) prophylaxis in hospitalized patients requires carefully balancing bleeding and thrombosis risks. Electronic health record alerts (EHRAs) can help improve VTE prophylaxis and patient outcomes, but risk creating alert fatigue if not thoughtfully designed. Objective: Develop and refine an EHRA that minimizes unnecessary alerts while facilitating appropriate VTE prophylaxis ordering for medical patients.
Methods: A multidisciplinary team at an academic safety-net medical center created an EHRA to identify patients with increased thrombosis risk lacking VTE prophylaxis. The alert system was developed and refined through four phases: initial development and validation, monitoring and exclusion criteria adjustment, COVID-19-related modifications, and delayed surveillance.
Results: The EHRA fired an average of 33.3 times per day across all phases of the study. Phase one of EHRA implementation significantly increased alerts per patient (6.4 to 43.3 alerts per day, $p < 0.01$) as well as the percentage of patients with >5 alerts (2.8% to 60.0%, $p < 0.01$). Modifications in phase 2 and phase 3 increased alert rates without any significant effect on subsequent action taken by a provider. Phase 4 modifications led to a significant reduction in alert frequency (44.1 to 14.9 alerts per day, $p < 0.01$) coupled with a notable increase in provider action (0.24% to 7.73%, $p < 0.01$).
Conclusion: This multidisciplinary intervention successfully improved alert design, increasing provider engagement 32-fold while reducing alert frequency threefold. Continuous monitoring and maintenance, however, remain crucial to sustaining the alert system's effectiveness.

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Rural Improvements in Venous Thrombosis Treatment in Oklahoma: The RIVETT-OK Initiative

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Introduction: Annually, over 3,000 Oklahomans receive outpatient treatment for Venous Thromboembolic Disease (VTE) following an Emergency Department (ED) diagnosis. In Oklahoma, 19 of 77 counties (~25%) are classified as medically underserved, facing significant health disparities and care challenges. RIVETT-OK is a quality improvement project aimed at improving outpatient VTE care. The objectives are: Develop and implement evidence-based VTE management educational programs (online, virtual). Identify barriers to VTE care and implement system-based changes through telehealth and innovative technologies. Increase access to care, health equity, and patient adherence to VTE management in underserved areas, aiming to reduce low-risk VTE hospital admissions by 20%.
Methods: RIVETT-OK will be executed in four phases over two years, starting January 1, 2024: Phase Ia: Identify, evaluate, and address barriers to system-based outpatient VTE care. Phase Ib: Develop educational and support resources, including an online CE program and a decision support app. Phase II: Train rural ED staff and equip providers with tools for managing low-risk VTE patients, including virtual care. Phase III: Improve system changes and telehealth effectiveness using physician satisfaction and institutional feedback. Phase IV: Create and disseminate a RIVETT-OK ED VTE Toolkit, while scaling the program.
Results: Expected outcomes include overcoming barriers to outpatient VTE care, standardizing care processes, implementing sustainable changes, and providing innovative tools and education to rural ED providers.
Conclusion: The RIVETT-OK initiative aims to improve patient safety and quality of care, reduce complications, and increase provider confidence and satisfaction by partnering system-based initiatives and provider education with innovative technology use.

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Nonadherence to Early Discharge in Low-Risk Pulmonary Embolism: Insights from an Anticoagulation Stewardship Program in Latin America

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Introduction: Despite the benefits of early discharge for low-risk pulmonary embolism (PE), adherence to the recommendation of discharge within the first 24 hours remains low worldwide. There is limited knowledge about adherence in Latin America and factors associated with nonadherence.
Methods: We conducted a retrospective cohort study of low-risk PE patients managed within an Anticoagulation Stewardship Program at a University Hospital in Colombia from 2019 to 2024. Adherence to the European Society of Cardiology (ESC) Pulmonary Embolism Guideline recommendations for care setting was assessed. Clinical, socioeconomic, and physician-related factors associated with nonadherence were analyzed.
Results: Sixty-two patients with low-risk PE (median age 45.5 years, 58% women) were included. Early discharge occurred in 13 patients (20.9%). Nonadherence was associated with patient characteristics (chronic kidney disease (6.1%), anemia (14.2%), thrombocytopenia (6.1%)), physician factors (specialty training level, unnecessary echocardiograms (24.4%)),

socioeconomic conditions (low education level (52.6%), low socioeconomic status (59.1%)), and late anticoagulant dispensation (18.3%). No mortality, rehospitalization, or bleeding was observed within 30 days post-discharge.
Conclusion: Adherence to early discharge recommendations for low-risk PE in Latin America is suboptimal, often due to avoidable factors such as unnecessary tests or delayed anticoagulant provision. Training programs for managing low-risk PE and improving outpatient follow-up could address these barriers effectively.

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To Prescribe or Deprescribe: Antiplatelet Discontinuation versus Proton Pump Inhibitor (PPI) Addition in Veterans with Combined Antithrombotic Therapy

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Introduction: Combined antithrombotic therapy (CAT) with an anticoagulant and an antiplatelet (APT) is often indicated for patients with multiple cardiovascular disorders, however this combination carries an increased risk of bleeding, especially gastrointestinal bleeding (GIB). PPIs have emerged as an option for reducing the risk of GIB. The purpose of this study is to review medical records of Veterans on CAT and assess appropriateness of both anticoagulant and/or APT therapy for possible de-escalation of therapy. If CAT is indicated, a PPI will be initiated.
Methods: In this retrospective single-center study, 146 patients who were on CAT without a PPI were assessed. Patients who met inclusion criteria underwent an antithrombotic therapy evaluation for indication and duration using the APT Evaluation Note available in the Computerized Patient Record System. Record review was done initially by Clinical Pharmacists and then by Cardiology Service. Patients who were kept on CAT were started on a PPI.
Results: There were no statistically significant predictors for discontinuation or continuation of APT therapy, except for patients with an APT indication of PAD, who were least likely to undergo APT de-escalation (p=0.001). For both pharmacy and cardiology, most of the recommendations were to discontinue APT therapy. The pharmacy team recommended APT discontinuation for 65%. After cardiology evaluation, 55% of patients were recommended for APT discontinuation while the remaining continued on CAT and were prescribed a PPI. Cardiology and pharmacy services were in agreement for 85.7% of APT discontinuations (<0.001) versus 60% of CAT continuations (<0.001). The patients on CAT at VACHS decreased from 11.4% upon study initiation to 10.2% after completion, showing a 10.5% relative percentage decrease of CAT use.
Conclusion: Overall, most APTs were discontinued, thereby reducing patient GIB risk. Remaining patients were prescribed PPIs for GIB prophylaxis as recommended in clinical guidelines. In most cases, recommendations by cardiology and pharmacy providers were in agreement. This may allow pharmacy providers to have a more independent role in making these types of decisions in the future.

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Heparin Management - The Ultimate Goldilocks Dilemma: A Quality Improvement Project

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Introduction: Unfractionated heparin (UFH) is widely used for the prevention and treatment of thrombosis. As a high-alert medication, improper use can increase risk of patient harm. Multiple factors impact the efficacy and safety of UFH, including varying doses based on indication, frequent therapeutic monitoring of labs such as activated partial thromboplastin time (aPTT), and dose titration based on lab values. A medication use evaluation found that aPTTs were therapeutic on average 24% of the time, subtherapeutic >50% of the time, and following as needed bolus doses patients were becoming were supratherapeutic. The multidisciplinary Memorial Hermann Health-System (MHHS) Anticoagulation Stewardship Committee's (ASC) objective was to make changes to the UFH protocols to improve the efficacy and safety of UFH infusions.
Methods: The Six Sigma strategy of Define, Measure, Analyze, Improve, and Control (DMAIC) was used to evaluate the current heparin protocols across MHHS. From August 2023 to October 2024, the MHHS ASC analyzed the current UFH protocols to identify areas for change, improved the process by revising the protocols, and implemented changes to the UFH protocols across MHHS. During the control phase, ongoing evaluation occurred, resulting in revision of the protocols and piloting further changes. Analysis of pilot results prompted additional changes to the UFH protocols and implementation across the Health-System. Outcomes measured included percent of therapeutic aPTTs, sub- and supra-therapeutic aPTTs, and tracking of UFH-related safety event reports.
Results: Therapeutic aPTTs increased from the original UFH protocols to pilot protocols for DVT/PE and acute coronary syndrome (ACS) from 20% to 44% and 22% to 45%, respectively. Subtherapeutic aPTTs decreased for these two protocols to 25% and 22%, while supratherapeutic aPTTs remained similar. No improvement in therapeutic aPTTs was seen for the atrial fibrillation protocol.
Conclusion: The multidisciplinary MHHS ASC was able to implement multiple changes to the heparin protocols, resulting in improved efficacy and safety of the medication use. The DMAIC process will continue to be utilized to further evaluate the current protocols and implement future changes.

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Improving the Anticoagulation Program Enrollment Process: A Collaboration between Unlicensed Assistive Personnel and Registered Nurses to Improve Practice and Patient Care

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Introduction: Enrollment into the Anticoagulation Program is a complex transition of care. Registered Nurses (RNs) manage warfarin dosing and assure patients have knowledge to safely maintain

therapeutic range but also complete many tasks not requiring a RN license.

Objectives: 1) Streamline the patient enrollment process, transitioning 90% of workload not needing RN licensure to Unlicensed Assistive Personal (UAP) without adversely impacting patient safety. 2) Increase the number of patients taking the warfarin education class by 25%.

Methods: RN team standardized processes and defined gaps. Clinical Nurse Specialist collaborated to transition nurse's knowledge into a workflow allowing UAP and RNs to partner with onboarding new patients. UAPs complete chart reviews using a comprehensive resource. RNs determine eligibility for program and plan of care. UAPs welcome patients, review program information with new patients, send educational materials, assures privacy documentation is completed, and schedules educational class and first RN visit. The RN focuses on patient specific education, warfarin management, and meeting billing requirements.

Results: Twenty-six of twenty-eight tasks not needing RN licensure were transitioned to UAP. Three potential privacy concerns were eliminated, patient education class attendees nearly doubled, RN FTE decreased from 2.0 to 1.3 per day, and percent of billable patients increased. Feedback from RNs revealed patients are better prepared to receive patient education with scheduled appointments. The warfarin class prepared patients to engage with RNs about lifestyle modifications that directly affect their TTR.

Conclusion: Despite concerns, partnering with UAP to complete enrollments and streamlining the process has proven beneficial to the practice and patients.

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Parenteral Deep Vein Thrombosis (DVT) Prophylaxis Refusal

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Introduction: The American Society of Hematology recommends that patients with acceptable bleeding risk receive deep vein thrombosis (DVT) prophylaxis during their hospital stay. A study at Cone Health found that 11% of parenteral DVT prophylaxis doses were missed, primarily due to patient refusal (73.42%). This retrospective study evaluated changes in refusal rates after implementing clinical monitoring software alerts for pharmacists about DVT prophylaxis refusals.

Methods: A retrospective chart review assessed parenteral DVT prophylaxis refusal rates in medically ill admitted patients 18 years old or older. A random sample of 60 patients from September 2023 through August 2024 was analyzed based on clinical monitoring software alerts for DVT prophylaxis refusal of subcutaneous heparin or enoxaparin. Identified patients underwent further chart review to collect primary diagnosis for admission, duration of stays, DVT prophylaxis agent ordered, and reason for DVT prophylaxis refusal. The findings of this study were compared to refusal rate data collected in a previous IRB-approved study, providing valuable insights into the administration rates of parenteral DVT prophylaxis agents after implementing clinical monitoring software alerts to notify the pharmacy team of patient DVT prophylaxis refusals and providing practitioner education.

Results: After pharmacists addressed the clinical monitoring alerts for refused doses, 19.4% of these patients began receiving DVT parenteral prophylaxis. The rate of DVT prophylaxis refusal decreased by 45% since the previous review. The introduction of an oral option for prophylaxis against DVT presented a strategy to subvert the potential of patient refusal of parenteral prophylaxis against DVT.

Conclusion: Parenteral DVT prophylaxis refusal rates have been reduced since clinical monitoring software alerts to clinical pharmacists have been implemented.

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Evaluating the Clinical Utility and Appropriateness of Four-Factor Prothrombin Complex Concentrates for Anticoagulation Reversal at an Urban, Community Academic Hospital

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Background: Four factor-prothrombin complex concentrate (4F-PCC) is approved for the urgent reversal of vitamin K antagonists in patients with major bleeding or the need for an urgent procedure. Off-label uses including the reversal of DOACs and as factor replacement intraoperatively are not without risk and cost, and appropriate utility should be protocolized.

Objective: To evaluate the clinical utility and off-label 4F-PCC usage in an urban-community, academic hospital.

Methods: A single-center, retrospective, observational, quality improvement study was conducted to quantify all 4F-PCC utility in adult patients over a 2-year period. The primary outcome assessed the proportion of patients using on-label vs. off-label 4F-PCC. Secondary operational outcomes included evaluation of length of stay and cost of off-label 4F-PCC, and the impact of a mid-study policy change. Secondary clinical outcomes included the incidence of thromboembolic events within 30 days, in-hospital and 30-day mortality and recurrence or expansion of bleeding within 30 days.

Results: Out of a total of 291 4F-PCC administrations over a 2-year period, 227 (78%) were off-label. Off-label use was associated with $816,070.56. There was no major difference in appropriate use after the implementation of a new 4F-PCC policy. Of patients receiving at least 1 administration of 4F-PCC, (20/291) 7% had a thromboembolic event, (58/291)18% had recurrence or expansion of bleed, and mortality rates were (67/291) 23% and (10/291) 3% for in-hospital and 30-day mortality, respectively.

Conclusions: A majority of 4F-PCC use at a community academic hospital was off-label, suggesting a need to revisit policy and further protocolize factor use.

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Evaluation of Compliance with Recommendation to Take Rivaroxaban with Food

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Introduction: Rivaroxaban is a common anticoagulant use for the prevention of stroke in patients with atrial fibrillation (Afib) and in the prevention and treatment of thrombosis in patients with venous

thromboembolism (VTE). Current recommendation requires that patient on rivaroxaban 15 mg or 20 mg daily take it with food, as food affects its absorption. Bioavailability for rivaroxaban 20 mg is estimated at 66% in a fasted state vs. high bioavailability (>80%) with food. This study aims to assess the proportion of patients on rivaroxaban that is noncompliant with taking it with food.

Methods: A prospective study assessing the proportion of patients taking rivaroxaban without food. Patients on rivaroxaban 15 mg daily or 20 mg daily, for the indication of Afib or VTE, referred to an anticoagulation service for perioperative management between June 2021 and December 2024 were included. Rivaroxaban administration was assessed as part of the perioperative management process.

Results: A total of 641 patients were included in the analysis. Of those, 45 (7%) patients were not taking rivaroxaban with food. Majority of patients were taking rivaroxaban for Afib, 55%. There was a trend for higher proportion of noncompliance in patients with Afib vs. VTE, (8.6% vs. 5%, p = 0.07). Similar proportion of noncompliance was observed in patient managed by providers at Michigan Medicine vs. outside hospital regardless of specialty.

Conclusion: Approximately 7% of patient on rivaroxaban are not taking it with food, as recommended. Suboptimal absorption may result in suboptimal outcomes. Patients may benefit from reinforcement to take rivaroxaban with food.

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Patient Compliance with Aspirin and Rivaroxaban Post Elective Joint Replacement Surgery: A Quality Assurance Initiative

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Introduction: Aspirin is a common, over the counter (OTC) medication. In conjunction with a five-day lead-in of Rivaroxaban, it is effective VTE prophylaxis for total knee (TKA) and hip (THA) arthroplasty (EPCAT II study). Aspirin may be thought of as a benign medication by patients given its non-prescriptive nature. Considering its role in VTE prophylaxis, it is important to ensure patient adherence to the full treatment regime [5 days Rivaroxaban then Aspirin 81 mg x 9 days (TKA) or x 30 days (THA)]. This retrospective quality assurance (QA) study analyzed compliance rates with Rivaroxaban and Aspirin in an elective TKA/THA population.

Objective: The main objective was to measure patient adherence with Aspirin post TKA & THA surgery. Patients were also assessed for GI symptoms with Aspirin use. Compliance with the initial five-day run-in Rivaroxaban was also evaluated.

Methods: Patients undergoing elective TKA or THA on or after December 1, 2019 were eligible. REB was notified; given the QA nature of the study, formal REB approval was not required. Patients were called once VTE prophylaxis was completed so as not to influence compliance. To minimize recall bias, phone calls were completed within 60 days.

Results: 100 consecutive patients with TKA or THA surgery on or after December 1, 2019 were followed. Results demonstrate 99.2% compliance with Rivaroxaban and 96.1% with Aspirin. 95.9% of TKA patients reported it important to complete full course of VTE prophylaxis, compared to 85.2% of longer duration THA patients. 96% of patients recalled receiving VTE education pamphlet; some reported this as a contributor to compliance. 3% reported stomach upset.

Conclusion: Results reveal no difference in adherence with prescription Rivaroxaban versus OTC Aspirin. Overall results show excellent adherence rates. Education on VTE appears to positively influence adherence. It may be worthwhile further exploring the impact of targeted education in the longer duration THA population, given lower reported value placed on completion of entire regimen.

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Evaluation of Various Treatment Strategies for Acquired Hemophilia A

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Introduction: Acquired hemophilia A (AHA) is a rare bleeding disorder caused by formation of autoantibodies against factor VIII. Patients with AHA typically present with a prolonged activated partial thromboplastin, bruising, or bleeding. It is associated with a high morbidity and mortality rate if not managed promptly. Strategies for hemostasis include surgical management, bypassing agents, anti-fibrinolytics, desmopressin or exogenous factor replacement (recombinant or plasma-derived human FVIII concentrates or recombinant porcine factor III). Lastly, inhibitor eradication is treated with corticosteroids and immunosuppressive therapy. The intent of this study is to contribute to limited literature regarding the treatment of AHA, identify cost-effective modalities, and create a standardized protocol by evaluating treatment strategies.

Methods: This was a retrospective quality improvement, observational cohort study conducted across MUSC Health. Subjects admitted with bleeding related to AHA and received inhibitor eradication therapy or emicizumab were included. Exclusion criteria included congenital hemophilia A and lack of AHA admission/treatment. Subjects were divided into two groups, standard therapy versus emicizumab. The primary outcomes were incidence of bleeding and thrombotic events. Secondary outcomes included administration of packed red blood cells, or presence of headache, nausea, and arthralgia.

Results: Forty-eight subjects were screened with 18 subjects meeting inclusion in the standard group (n=10) and emicizumab group (n=8). The most common exclusion was lack of AHA admission/treatment. The primary outcomes of incidence of bleeding and thrombotic events occurred more in the emicizumab than standard group (4 events [50%] vs 3 events [30%]). One thrombotic event was likely attributed to emicizumab and a hypercoagulable state. The 2 subjects who utilized rapid emicizumab titration did not have any events related to the primary outcomes. In this study, there were three deaths and three transitions to comfort care, none of which were associated with use of either therapies. The projected average cost of emicizumab was $91,947.76/person average.

Conclusion: Based on this study, a protocol can be formulated for this institution's use. Robust prospective studies are needed to elucidate the impact of rapid titration of emicizumab.

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REVERSAL OF ANTICOAGULATION

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Variation in Anticoagulant Hemorrhage Management Guidelines for Factor-Xa Inhibitors: A Survey and Analysis of U.S. Academic Institutions

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Introduction: Before Andexanet alfa (AA) was approved by the United States (US) Food and Drug Administration in 2018, inactivated three- and four-factor prothrombin complex concentrates (3F-PCC and 4F-PCC) were the primary off-label options for managing factor-Xa inhibitor-associated hemorrhage. We aimed to compare institutional guidelines for factor-Xa inhibitor hemorrhage management.

Methods: A survey was emailed to members of the Venous Thrombo-Embolism Network US (VENUS). It asked whether institutional guidelines existed for managing hemorrhage related to factor-Xa inhibitors in specific scenarios. The survey also inquired whether a hematology consultation was recommended in these cases and requested respondents to share their institutional guidelines.

Results: Of surveys sent to 188 VENUS members, there were 29 (15%) responses, representing unique institutions across the US. Of the respondents, 71% (21/29) have factor-Xa inhibitor hemorrhage management guidelines at their institution. 21% (6/29) of institutions always involve hematology in clinical scenarios of factor-Xa inhibitor hemorrhage management, while 71% (21/29) involve hematology some of the time. Respondents at each institution could select multiple options; therefore, total responses may exceed 29, leading to variation in denominators. For intracranial and/or intraspinal hemorrhage, 44% (16/36) of institutions utilize AA as the preferred agent for hemorrhage management, 44% (16/36) utilize 4F-PCC, while 12% (4/36) use other agents. 4F-PCC is the preferred agent for hemorrhage management for emergent GI bleeds in 73% (24/33), emergent surgery in 67% (23/34), and other life-threatening bleeds in 73% (24/33) of responses. Of the 29 survey respondents, six shared their institutional practice guidelines. Two institutions do not have AA on formulary. Of the remaining four institutions, three recommend AA as the hemostatic agent for intracranial and/or intraspinal hemorrhage management if specific criteria are met. For emergent GI bleeds, emergency surgery, and other life-threatening bleeds, all four institutions recommend 4F-PCC.

Conclusion: US academic institutions differ in the management of factor Xa-inhibitor-associated hemorrhage in various clinical scenarios and in the criteria for using AA versus 4F-PCC. This study highlights the variability in clinical practice and importance of standardization in organizational guidelines.

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An Analysis of the Use of Andexanet Alfa at the University of Utah Hospital

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Introduction: Andexanet alfa is used to reverse the effects of apixaban and rivaroxaban but increases the risk of thrombosis, and there is a need for more real-world evidence evaluating andexanet use. The objective of this study was to assess the usage and outcomes of andexanet at the University of Utah Medical Center.

Methods: This was a retrospective cohort study of patients who received andexanet to reverse apixaban or rivaroxaban while in critical care at the University of Utah Medical Center from October 2019 through May 2024. We collected data regarding andexanet dosing and administration, and outcomes 30 days post-administration.

Results: A total of 35 patients taking apixaban (80%) or rivaroxaban (20%) received adexanet during the 4.5-year observation period. Most patients (28%) received andexanet for intracranial hemorrhage. Twenty (57%) patients received incorrect andexanet dosing, with ten (29%) of those patients experiencing an adverse event. Five (14%) patients on the correct andexanet dose had an adverse event. A total of fifteen (43%) patients experienced one or more thrombotic events within 15 days after receiving andexanet. The adverse events that patients experienced were bleeding, venous thromboembolism, myocardial infarction, or stroke. Eleven (31%) patients died within 8 days after receiving andexanet, with an average time to death of 5 days. Eight (23%) patients also received prothrombin complex concentrate.

Conclusion: Many patients received incorrect andexanet dosing, and a large percentage of patients experienced an adverse event. Deviating from andexanet's dosing protocol may expose patients to unnecessary risks.

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The Value of Point-of-Care Ultrasound in Warfarin-Associated Spontaneous Hemothorax in late postoperative cardiac surgery

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Introduction: Warfarin is frequently used in postoperative of cardiac surgery. Spontaneous hemothorax associated with warfarin is a rare but serious complication. We present the case of a 50-year-old male with a history of ischemic cardiomyopathy and recent myocardial revascularization and mitral valve replacement. 23 days after surgery the patien manifest hematuria, INR of 15.21 was found and moderate anemia. A Point-of-Care Ultrasound (POCUS) revealed a large hemothorax occupying the left hemothorax. Four units of fresh frozen plasma were administered.

Case Report: A 50-year-old male patient presented with a history of ischemic cardiomyopathy with left ejection fraction at 34% due to severe

compromise of left anterior descending and right coronary arteries, severe functional mitral regurgitation. He presented to the emergency department 23 days after myocardial revascularization and mitral valve replacement.The patient presented with hematuria as the chief complaint. On physical examination, the patient was hemodynamically stable. No signs of respiratory distress were observed. A Point-of-Care Ultrasound (POCUS) thoracic ultrasound was conducted, identifying a large pleural effusion occupying the entire left hemothorax. Given these findings and an INR of 15, the patient was to transfer to the intensive care unit, where four units of fresh frozen plasma were administered. Twelve hours after admission to the ICU, a follow-up thoracic ultrasound was performed, which showed signs of left hemothorax with clots and hyperechoic fibrin strands. Two hours later, the patient underwent surgical drainage and was returned to the ICU.
Results: Early diagnosis with POCUS let diagnosis of spontaneous hemothorax related to warfarin in late posoperative of cardiac surgery. The signs of ultrasound were related with intra pleural haematoma, fibrin and haematocrit signs, those items let to the clinicians to take decision of reverse anticoagulant effect with fresh frozen plasma and to the thorax surgeon to define thorasocopy to the drainage of extensive hemothorax.
Conclusion: Spontaneous hemothorax related to anticoagulant therapy with warfarin is uncommon, but potentially fatal. POCUS is a valuable to early recognition of minimal or asymptomatic pleural effusions and is associated to non invasive, low cost advantages in certain cases than other images.

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SPECIAL POPULATIONS

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Evaluation of Antiseizure Medication Impact on Efficacy of Direct Oral Anticoagulants

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Introduction: Concomitant use of direct oral anticoagulants (DOAC) and antiseizure medications (ASM) is common. Historically, levetiracetam (LEV) and valproic acid (VPA) have been favored in patients on DOAC therapy due to limited drug-drug interactions; however, a recent large claims-based study found concurrent use of DOAC and LEV or VPA was associated with increased risk of thrombotic events. The goal of our study was to evaluate the incidence of thrombotic events with concurrent DOAC and LEV and/or VPA therapy.
Methods: This retrospective study included patients >18 years who were prescribed LEV and/or VPA with a DOAC (apixaban, rivaroxaban) from August 1,2020 to July 31, 2022 at Lahey Hospital and Medical Center. The primary outcome was the incidence of thrombotic events, defined as a diagnosis of ischemic stroke or venous thromboembolism. Patients were reviewed until first thrombotic event, discontinuation of therapy, or death.
Results: 85 patients were included with a mean age of 72 years, 43.5% female, and a median duration of follow-up 17.8 months (IQR 6.5-31). DOAC included 70.6% apixaban, 25.9% rivaroxaban, and 3.5% switched between DOAC during follow up. Indication for anticoagulation was 55.3% atrial fibrillation, 36.5% venous thromboembolism, and 8.2% had both. ASM were 71.8% LEV, 23.5% VPA, and 4.7% both LEV and VPA. Primary outcome occurred in 2 patients (2.4%). Both events were ischemic strokes in patients with atrial fibrillation prescribed LEV and apixaban.
Conclusion: Incidence of thrombotic events with concurrent DOAC and VPA and/or LEV use was low in our patient population, suggesting concomitant use is safe.

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Evaluation of Direct Oral Anticoagulant Eligibility and Prescribing for Primary Venous Thromboembolism Prevention in High-Risk Ambulatory Patients with Cancer

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Introduction: Venous thromboembolism (VTE) significantly impacts morbidity and mortality in patients with active cancer. Venous thromboembolism in patients with cancer can disrupt or delay treatment, potentially worsening outcomes. Long-term effects of VTE, such as post-thrombotic syndrome and chronic thromboembolic pulmonary hypertension, can diminish quality of life and impose substantial financial burdens. Historically, thromboprophylaxis was limited to parenteral anticoagulants which presents as a challenge for patient self-administration in the ambulatory setting. In recent years, direct oral anticoagulants (DOACs) have proven beneficial for primary VTE prevention in patients with cancer at intermediate to high risk for VTE. The AVERT and CASSINI trials have shown promise in identifying patients who may benefit from DOAC use for primary VTE prophylaxis and ultimately led to changes in national treatment guidelines for cancer-associated thrombosis. Despite the benefits of this intervention, some institutions have reported low implementation rates.
Methods: A multi-site retrospective cohort study within a single health system evaluated adult patients with newly diagnosed pancreatic cancer between January 1, 2022 and December 31, 2022. The primary outcome was the proportion of ambulatory patients with pancreatic cancer eligible for DOAC primary VTE prophylaxis.
Results: Among the 171 adult patients with pancreatic cancer evaluated, 140 (81.9%) were eligible for VTE thromboprophylaxis. Within this group, 138 (98.6%) were eligible to receive a DOAC. However, only one patient ultimately received thromboprophylaxis. Of the 138 patients eligible for but not prescribed DOAC thromboprophylaxis, 42 (30.7%) developed a VTE with a median onset of 69 days (IQR: 29, 109). The patient who received DOAC thromboprophylaxis did not have a bleeding or VTE event within the 6-month follow-up period.
Conclusion: Most patients with pancreatic cancer were eligible to receive a DOAC as thromboprophylaxis. Improved processes are needed to consistently identify ambulatory patients with cancer qualifying for DOACs for primary thromboprophylaxis and engage in shared decision making with patients regarding initiation of this important supportive care therapy.

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Safety and Efficacy of Direct Oral Anticoagulants in Patients with Body Mass Index ≥40 kg/m^2

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Introduction: Obesity is a risk factor for venous thromboembolism (VTE) and atrial fibrillation (AF). Warfarin has been the preferred anticoagulant due to ability to monitor INR and due to limited data in use of DOACs and concern for decreased drug exposure. This study aims to determine if the safety and efficacy of DOACs in patients with BMI ≥ 40 kg/m^2 is similar to patients with BMI <40 kg/m^2

Methods: This study was a single-center, retrospective chart review. Adults with BMI ≥ 40 kg/m^2 or BMI <40 kg/m^2 taking a DOAC for AF or VTE were included in the study. Patients were matched based on age, sex, indication, and DOAC dose. The primary efficacy outcome was composite of VTE ischemic stroke. The primary safety outcome was a composite of major and clinically relevant non-major bleeding. The secondary outcome was assessment of predictors for thrombotic or bleeding events.

Results: A total of 107 patients were included in each group. There was no significant difference in the composite thrombotic and bleeding outcomes between the groups. After accounting for age, sex, renal function, indication, history of VTE/TIA/CVA, history of major bleeding, DOAC medication, and concomitant antiplatelet use, BMI ≥40 was not a significant predictor for a composite thrombotic event.

Conclusion: The results of this study add to the growing body of literature demonstrating that DOACs are a reasonable alternative for obese patients with AF or VTE. Larger studies are needed to further evaluate the efficacy and safety of DOACs in this population.

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Safety and Efficacy of Apixaban in Patients Receiving Hemodialysis Compared to Patients with Moderate Renal Dysfunction

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Introduction: Apixaban is FDA approved for use in patients with end stage renal disease (ESRD). Patients with ESRD were excluded from the phase three clinical trials, therefore dosing is based on single-dose pharmacokinetic and pharmacodynamic studies and extrapolated to be similar results to patients with moderate renal dysfunction (CrCl 30-50 mL/min). This study aims to determine if the safety and efficacy of apixaban in patients on dialysis is similar to patients with moderate renal dysfunction.

Methods: This study was a single-center, retrospective chart review. Adults on dialysis or with moderate renal function taking apixaban for atrial fibrillation (AF) or venous thromboembolism (VTE) were included in the study. Patients were matched based on age, sex, indication, and apixaban dose. The primary efficacy outcome was a composite incidence of stroke (CVA), transient ischemic attack (TIA), and VTE. The primary safety outcome was incidence of major bleeding.

Results: The study cohorts included 38 patients each. There was no significant difference in safety and efficacy outcomes between groups. When accounting for potential confounders such as age, BMI, history of comorbidities, and drug dosing, dialysis status increased the risk for experiencing a CVA or developing a VTE (HR 1.14 [95% CI 1.04-1.24], p = 0.004).

Conclusion: Dialysis status is a significant risk factor for CVA and VTE. Major bleeding events are likely not affected by dialysis. Larger studies are needed to further validate if dialysis patients taking apixaban will have safety and efficacy outcomes comparable to patients with moderate renal dysfunction.

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Safety and Efficacy of the Use of Direct Oral Anticoagulants in Patients with a History of Bariatric Surgery

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Introduction: Data in real-world use of direct oral anticoagulants (DOACs) in bariatric surgery patients is limited. The purpose of this study is to evaluate the safety and efficacy of DOACs in patients with a diagnosis of venous thromboembolism (VTE) or non-valvular atrial fibrillation (NVAF) and a history of bariatric surgery.

Methods: A retrospective matched case-cohort study of patients on a DOAC for the indication of VTE or NVAF and history of bariatric surgery compared to patients taking DOACs for the same indications but without a history of bariatric procedures. The efficacy outcomes were composite incidence of ischemic stroke, transient ischemic attack (TIA), VTE, and mortality from these events. Safety outcomes were composite incidence of clinically relevant non-major bleeding (CRNMB), major bleeding, and mortality from these events.

Results: A total of 110 cases and 110 controls were analyzed. There were no significant differences in incidence of VTE/TIA/CVA (4.6% vs. 3.6%, p = 0.73), composite bleeding (30% vs. 23.6%, p = 0.29), or major bleeding in cases vs. controls. CKD history was a statistically significant predictor for composite bleeding events (OR 2.2; p = 0.01 [1.16-4.04]).

Conclusion: There were no statistically significant differences in thrombotic or bleeding outcomes among patients on a DOAC with a history of bariatric surgery compared to those without a history of bariatric surgery.

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Fat-Specific S6 Kinase Gene Inhibition: A Novel Strategy to Improve Metabolic Health and Anticoagulation Outcomes in Diabetes-Associated Thrombosis

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Introduction: Type 2 diabetes (T2D) is associated with increased thrombosis risk due to chronic inflammation and metabolic dysregulation. Current therapies targeting systemic pathways often have significant side

effects, highlighting the need for tissue-specific interventions. This study investigates whether selective inhibition of the S6 kinase (S6K) gene in adipose tissue can improve systemic health and hemolymph coagulation in Drosophila melanogaster.
Methods: S6K inhibition was achieved in Drosophila melanogaster adipose tissue using the GAL4/UAS system. Experimental groups were raised on standard or high-sugar diets to simulate non-diabetic and diabetic-like conditions. Key assessments included larval and fat body dimensions, survival rates, motor activity (negative geotaxis and climbing assays), and inflammation measured via GFP-tagged apoptotic markers. Hemolymph coagulation was evaluated using a puncture wounding assay, recording clotting time in seconds. A minimum of 30 larvae or adults were tested per group, with data analyzed using standard statistical methods.
Results: Fat-specific S6K inhibition reduced larval obesity by 10% and GFP apoptotic markers by 44%, indicating decreased inflammation. Treated flies exhibited a 26% increase in adult motor activity and a 100% improvement in larval climbing ability under diabetic-like conditions. Hemolymph coagulation times improved by 22% in treated groups, suggesting enhanced clotting function. Survival rates of S6K-treated flies on high-sugar diets were 15% higher compared to controls.
Conclusion: Selective inhibition of S6K in adipose tissue mitigates diabetes-associated inflammation, improves systemic motor function, and enhances hemolymph coagulation. These findings highlight the potential for tissue-specific therapies to address thrombosis risks associated with T2D without the systemic risks of pathway manipulation.

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TRANSITIONS OF CARE

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Deficits in Warfarin Discharge Planning: Improving Transitions of Care for Patients on Warfarin at a Community Teaching Hospital

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Introduction: The majority of medication errors occur as patients transition between levels of care. These errors are more concerning with anticoagulants. Patients discharged from the inpatient setting on warfarin should receive standardized instructions and follow-up to minimize the risk of harm. The goal of this project is to improve transitions for patients on warfarin by identifying incomplete discharge plans.
Methods: A retrospective chart review identified patients with incomplete warfarin discharge plans. A complete discharge plan includes discharge INR, clear dose instructions, follow-up INR appointment and completed discharge anticoagulation form. The primary endpoint is identifying the number of patients with a complete discharge anticoagulation plan. Secondary endpoints include patients with a 90-day readmission for a bleeding or thromboembolic event, elements omitted from the discharge plan, significant drug interactions, characterization of INR at discharge and if warfarin-naïve patients received education at discharge. Patients included in the study were admitted between June and December 2023 and on current warfarin therapy. Patients managed by the advanced heart failure team were excluded. Data were collected by manual chart review.
Results: Of the 105 patients who met inclusion criteria, only 10% of discharge plans were complete. All patients had INR documented at discharge and all but 2 patients had clear warfarin instructions. Only 31% of patients were scheduled for a follow-up INR. A 90-day hospital readmission for an adverse event occurred in eight (7.6%) patients of which none had a complete discharge plan. Education was provided to 53.8% of warfarin-naïve patients at discharge. Approximately 42% of INRs measured at hospital discharge were therapeutic. There were 27 instances of significant drug interactions noted.
Conclusion: The anticoagulation discharge form was developed to ensure patients have essential warfarin-related information available to providers to ensure seamless discharge process. Events noted in this study could have been related to missing data about anticoagulation at discharge. Based on the study findings improvements are needed regarding use of the form and the importance of scheduling follow-up INR appointments.

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Patient-Education Video Development and Implementation

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Introduction: The creation and implementation of standardized patient-education videos has been a long-standing goal for the Froedtert & Medical College of Wisconsin health network. Currently, there is one pharmacy medication discharge video regarding bariatric surgery that has been successfully implemented into practice. However, due to the high cost of outsourcing, the inability to produce videos in-house, and the absence of a streamlined process for patient education video development, this video took two years to implement. This project's main objective is to develop and utilize a protocol that will optimize the creation of patient-education videos to be used within the Froedtert & Medical College of Wisconsin health network. To demonstrate effectiveness, the patient-education video process will be utilized to create one warfarin patient education video.
Methods: The warfarin patient-education video will be utilized at time of discharge at Froedtert & the Medical College of Wisconsin locations. A QR code and URL link to the warfarin education video will be included in the patients' After Visit Summary (AVS) and the Froedtert & the Medical College of Wisconsin "Things to Know When Taking Warfarin (Coumadin)" education booklet. After patients have watched the video, an anonymous survey will be utilized to assess patient-understanding of key warfarin counselling points. Pharmacists will also complete pre- and post-video implementation surveys to assess changes in the time spent counseling patients on warfarin and in their overall evaluation of the discharge process efficiency.
Results: Research in progress.

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Creation of Patient Self-Managed Warfarin Program Within an Anticoagulation Clinic

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Introduction: The main purpose of this project is to develop and implement a program for patients to self-manage their warfarin.
Methods: Patients were eligible if they had been self-testing their INR for at least 3 months, had an INR goal range of 2-3, were active on MyChart (EPIC's patient messaging system), and were currently using or willing to use 2 mg or 5 mg warfarin tablets. Patients were excluded if they had major bleeding or thrombus in the past three months, had a left ventricular assist device present, lived in a nursing facility, were receiving active cancer treatment, or had a planned procedure in the upcoming three months. A MyChart message was sent to qualifying patients to assess interest in the program. If interested, patients were enrolled in an education class to show how to use the self-management protocol which was adapted from an Anticoagulation Forum protocol.
Results: Seventy-one patients were screened for inclusion and exclusion criteria. Seventeen patients were excluded, the most common reason being a planned procedure within the upcoming three months. Of the remaining fifty-four patients, twelve (22%) expressed initial interest in being a part of the pilot program. After further review, one was removed due to a scheduled procedure within three months. The remaining eleven were contacted to further explain the program. Five of the eleven (45%) expressed interest and were enrolled in the education class. Six patients were no longer interested, most commonly due to not wanting to change tablet strengths. Of the five that were interested in being enrolled in the class, two had to change tablet strengths. Data is still being collected on patients completing the education class and the effectiveness of the dosing card for INR self-management.
Conclusion: After contacting the interested patients via phone, there was a high rate of program enrollment. Final conclusions will be presented at the 2025 AC Forum National Conference in Washington, D.C.

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VENOUS THROMBOEMBOLISM

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Analysis of Xa Levels and PTTs During the First 48 Hours of Anticoagulation with Unfractionated Heparin Infusion

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Introduction: For acute venous thromboembolism (VTE), the CHEST guidelines recommend a PTT goal of 1.5 to 2.5 times the control or anti-factor Xa level of 0.3 - 0.7 units/mL. In 2021, our institution added nurse-driven Xa nomograms to titrate heparin infusion. The objective of this study is to determine the proportion of patients on heparin infusion for VTE that achieved therapeutic Xa level or PTT within the first 48 hours of initiating heparin infusion.
Methods: This was an IRB-exempt, retrospective analysis of inpatient orders for heparin infusion at a community-based academic teaching hospital. Inclusion criteria were adult patients ordered for heparin infusion for the indication of VTE who received heparin infusion for at least 4 days. Xa levels and PTTs during the first 48 hours of initiating heparin infusion were collected and analyzed
Results: A total of 40 patients were included. For patients receiving Xa monitoring with boluses, the proportions of patients in therapeutic range were 10% at 6 hours, 70% at 12 hours, 40% at 18 hours, 40% at 24 hours, 50% at 30 hours, 40% at 36 hours, 90% at 42 hours, and 60% at 48 hours. For patients receiving PTT monitoring with boluses, the proportions of patients in therapeutic range were 10% at 6 hours, 20% at 12 hours, 30% at 18 hours, 40% at 24 hours, 50% at 30 hours, 40% at 36 hours, 30% at 42 hours, and 60% at 48 hours.
Conclusion: The majority of patients on PTT monitoring spend most of their first 48 hours on heparin infusion outside of therapeutic range. One hundred percent of patients on Xa monitoring achieve therapeutic Xa for at least one reading by the 24-hour mark after initiating heparin infusion. No patient had all therapeutic values. Fifty percent of patients receiving PTT monitoring with boluses never had a therapeutic PTT within the first 48 hours on heparin infusion.

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Anticoagulation in Patients with Provoked Venous Thromboembolism: A Real-World Analysis of Clinical Characteristics, Management Strategies, and Outcomes from an Outpatient Tertiary Anticoagulation Clinic in Qatar

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Introduction: Patients with venous thromboembolism (VTE) are categorized into having provoked or unprovoked episodes depending on the etiology of their disease. Such categorization has an important prognostic value and aids in determining treatment duration. This study aims to describe the clinical characteristics, treatment approaches, and outcomes of patients diagnosed with provoked venous thromboembolism encountered at the Anticoagulation Clinic of Hamad General Hospital, covering the period from the clinic's establishment in May 2016 to December 2024.
Methods: This cross-sectional retrospective descriptive study aims to examine the characteristics of patients receiving anticoagulant therapy for provoked venous thromboembolism (VTE) episodes. It outlines the provoking factors, types of anticoagulant medications used, treatment duration, thrombophilia investigation, the persistence or progression of the underlying etiology, and the reasons for extending treatment beyond the initially planned duration. Additionally, it assesses any adverse drug reactions.
Results: A preliminary analysis of the data revealed that the most common diagnosis among patients with provoked events was deep vein thrombosis

(44.4%), followed by pulmonary embolism or a combination of pulmonary embolism and deep vein thrombosis. Limited mobility due to travel or acute illness was the most frequently reported provoking factor, affecting 44% of patients, with surgery being the second most common factor (22%). Thrombophilia work-up was conducted in 33% of cases, yielding positive results based on clinical presentation or a significant family history of blood clotting disorders. However, in only 11% of patients, the findings from thrombophilia testing led to a change in the management plan, resulting in lifelong anticoagulation.
Conclusion: The findings of this study provide real-world data on patients attending Qatar's largest anticoagulation clinic, serving as a foundation for generating hypotheses for future anticoagulation research.

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Evaluating the Effectiveness and Tolerability of UFH vs. LMWH for VTE Prevention in Underweight Patients: A Retrospective Cohort Study

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Introduction: Venous thromboembolism (VTE) poses a major risk in hospitalized patients, with deep vein thrombosis (DVT) and pulmonary embolism (PE) affecting nearly 900,000 Americans annually. Thromboprophylaxis reduces VTE incidence by up to 65%, but optimal dosing remains unclear for underweight patients, who face higher bleeding risks. Current guidelines lack clarity on dosing adjustments for patients ≤50 kg or BMI ≤18.5 kg/m^2. This study aims to evaluate VTE prophylaxis patterns and assess VTE and bleeding incidence in underweight patients, addressing a critical gap in evidence for this high-risk population.
Methods: This retrospective, single-center cohort study at the Hospital of the University of Pennsylvania reviewed records of 210 patients who received prophylactic doses of UFH or LMWH between January 2022 and December 2023. The primary objective was to assess the effectiveness and tolerability of UFH versus LMWH for VTE prophylaxis by evaluating the incidence of lower extremity DVT (proximal and distal), PE, and major bleeding (MB) as defined by the ISTH. MB included fatal bleeding, bleeding in a critical organ, a hemoglobin drop of ≥2 g/dL or requiring transfusion of ≥2 units of blood. Eligible patients were ≥18 years old, had a BMI ≤18.5 kg/m^2 or body weight ≤50 kg, received prophylactic UFH or LMWH for ≥48 hours, and were hospitalized or in the ED for ≥72 hours. Exclusion criteria included platelet count <50,000/μL, active bleeding or recent major bleeding within the past 3 months, VTE diagnosis or therapeutic anticoagulation at presentation, multiple anticoagulant regimens, dialysis, HIT history, severe liver disease with coagulopathy (INR ≥1.5 not on anticoagulants), or hypersensitivity to UFH or LMWH. The study aimed to determine whether UFH reduces VTE and/or bleeding risk compared to LMWH in hospitalized underweight patients.
Results: Research in progress.

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GLOBAL THROMBOSIS FORUM

The Anticoagulation Forum was pleased to invite high school students from the Global Thrombosis Forum (GTF) to present six abstracts at the 18th National Conference for Anticoagulation Therapy. An affiliate of the North American Thrombosis Forum, GTF's mission is to raise awareness about thrombosis by providing students with hands-on experience in writing and presenting research.

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Direct Oral Anticoagulants in End State Renal Disease

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Category: Inpatient Anticoagulation Management.
Introduction: Since their introduction, the use of DOACs has significantly expanded. Warfarin has been the preferred anticoagulant for patients with AF, VTE, and severe renal impairment. Apixaban and rivaroxaban require careful consideration in at-risk populations, such as those with kidney disease. As patients with ESRD are at risk for both bleeding and thrombotic events, close attention is essential to mitigate the additional risks associated with anticoagulation.
Methods: We reviewed the literature on DOACs in patients with ESRD to determine whether any DOACs could be used safely in this population.
Results: Apixaban is a direct Factor Xa inhibitor with a peak effect within 1-2 hours and a half-life of 12 hours. Dabigatran is a direct thrombin inhibitor with a peak effect within 2 hours and a half-life of 12-14 hours. For renal impairment, apixaban clinical efficacy and safety studies did not include patients with ESRD on dialysis. For patients with ESRD undergoing intermittent hemodialysis, the recommended dose of apixaban is 2.5 mg twice daily for those with AF who meet two of three frailty criteria: age ≥ 80 years, body weight ≤ 60 kg, or serum creatinine ≥ 1.5 mg/dL. The dose adjustment for dabigatran depends on the indication: For AF, no adjustment is needed with CrCl ≥30 mL/min. When CrCl is between 15 to ≤30 mL/min, the dose should be reduced to 15 mg twice daily. When CrCL is < 15 mL/min, dabigran should be avoided. For deep vein thrombosis (DVT), no dosage adjustment is needed for CrCl ≥30 mL/min, but its use should be avoided if CrCl ≤30 mL/min.
Conclusion: Apixaban is excreted primarily via the biliary route and feces, making it a better choice for ESRD patients. Periodic monitoring is not required in these patients, which is a distinct advantage of apixaban. Since renal impairment affects PK, periodic monitoring of patients with signs of bleeding may be considered.

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Elevation of D-Dimer Without Any Evidence of Venous Thromboembolism: What Is Your Interpretation?

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Category: Venous Thromboembolism.
Introduction: VTE is the leading cause of morbidity and mortality among hospitalized patients. Many factors, including the extent of thrombosis and fibrinolytic activity, play a key role in changing the sensitivity and specificity of D-dimer testing. A typical D-dimer level is less than 0.50 mg/L. The D-dimer test is highly sensitive (>95%) in DVT and PE. Upon presentation, patients with high D-dimer levels should prompt a more intense diagnostic approach, irrespective of pretest probability.
Objective: We wanted to find the relationship between elevated D-Dimer levels and the presence of evidence of VTE, such as DVT or PE.
Case Report: We present here a case of an 84-year-old male who suffered from pneumonia and significantly elevated D-Dimer levels but with no evidence of DVT or PE.The patient was hospitalized and underwent CT Scan (with contrast) and Veinography. Results: (1) 84y, M, H/O asthma, diabetes, lipidemia, HTN (2) SpO2 97 (3) COVID-19 negative (4) Elevated D-dimer 1395 ng/ml (threshold for age 80: 800 ng/ml) (5) TTE: No DVT (6) CT Angio Chest W/ IV Contrast: No PE (7) Community-acquired pneumonia of the right lower lobe (8) Acute pulmonary edema.
Conclusion: D-dimer is ordinarily undetectable or detectable at a very low level. It is well established that with a high level of D-dimer, a blood clot is suspected, necessitating further evaluation. In our case, despite the significant elevation of D-Dimer, any blood clots were ruled out. This case emphasizes that D-Dimer has a very valuable test but may be associated with negative findings.

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History of the Introduction of Direct Oral Anticoagulants and Their Mechanism of Action

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Category: Inpatient Anticoagulation Management.
Introduction: Direct Oral Anticoagulants (DOACs) were introduced at the beginning of the 21st century and have gradually replaced traditional agents such as warfarin. They represent a better, more manageable alternative to vitamin K antagonists for preventing stroke in patients with nonvalvular atrial fibrillation and for preventing and treating venous thromboembolism (VTE). Based on their action on the segments in the coagulation cascade, there are two types of DOACs: Factor Xa inhibitors (apixaban, edoxaban, and rivaroxaban) and Direct thrombin inhibitors (DTI), such as dabigatran.
Methods: We conducted a systematic literature review of the mechanism of action, advantages, disadvantages, and their effect on the quality of life (QOL).
Results: Compared to warfarin, DOACs show comparable QOL, higher treatment satisfaction, fewer hospitalizations, and a non-significant trend toward fewer bleeding episodes. Indications of DOACs include the treatment and prevention of deep vein thrombosis and pulmonary embolism, as well as the prevention of recurrent deep vein thrombosis and pulmonary embolism. The advantages of DOACs are that they act quickly, provide rapid anticoagulation, and have predictable responses, simplifying dosing. Routine INR monitoring is unnecessary. Compared to warfarin, there are fewer ischemic and bleeding events, fewer food restrictions, and controllable blood levels. The disadvantages of DOACs are that they are expensive, and not all have FDA-approved antidotes in case of complications. One missed dose can increase the risk of clot. Additionally, DOACs may not be suitable for everyone, and can have risks such as bleeding and kidney function impairment. DOACs offer predictable anticoagulation with substantial benefits, significantly enhancing patient outcomes and QOL.
Conclusion: The development of DOACs has provided a safer and more convenient alternative to traditional anticoagulants. DOACs offer predictable anticoagulation with substantial benefits, significantly enhancing patient outcomes and QOL.

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Women in Science

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Category: Special Populations.
Introduction: For a long time, women have struggled to hold positions in scientific fields, being denied opportunities and resources. “Women are not capable of understanding or working in these areas.” Celebrating the successes of women in science can inspire everyone.
Methods: Our goal was to consider barriers for women in science. We researched the trends of women’s contributions to conferences, publications, and leadership because this issue deserves more attention.
Results: (1) Female Personalities Who Made Their Name in Science: (i) Florence Nightingale and Marie Curie are some of the pioneers of female leadership. (ii) Presidents of organizations: Alisson Burnett (AC Forum), Anne Rose (THSNA), Rachel Rosovsky (PERT), and Ruth L. Bush (AVF). (2) Attendance at Medical Conferences: (i) Women remain underrepresented. (ii) Thirty-four respondents had attended a conference or symposium for women in medicine. (3) Women in Research/Publications: (i) Less than 30% of the world’s researchers are women. (ii) Women scientists publish about half as many articles as men do. (4) Causes of Female Under-Representation: (i) A lack of role models and mentors. (ii) Unconscious bias. Most people are biased toward men. (5) Solutions: (i) Appointing more senior women mentors. (ii) Change in promotion guidelines to make them reasonably accommodating for women.
Conclusion: A significant gap exists in the representation of women across various fields. Female participation in different fields is increasing, but there is still less representation. Women in Science significantly impact the field, primarily by increasing the number of female medical students and graduate school admissions.

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Worldwide Heparin Shortage

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Category: Inpatient Anticoagulation Management.
Introduction: Heparin is a practical, relatively safe anticoagulant with a firm place in medicine. However, a global shortage of heparin has been reported in recent years.
Methods: The authors researched the various aspects of the global heparin shortage and developed a few simple measures to handle the dire situation.
Results: (1) Some facts about the shortage: (i) China is the world's largest swine producer, making 80% of the world's heparin. (ii) African swine fever killed more than one-third of the country's pigs, threatening China's annual supply of more than 30 trillion international units of heparin. (2) The role of the FDA in combating heparin shortage: (i) Bovine-based heparin manufactured in South America may be used. (ii) In cases of intolerance to heparin, several anticoagulant compounds (danaparoid, ancrod, r-hirudin, abciximab, tirofiban, argatroban) have been used in the past. (iii) Drugs such as enoxaparin, fondaparinux, ovine, or recombinant heparin could be used. (3) Role of researchers and industry to combat heparin shortage: (i) Come up with an alternate synthetic drug that does not rely on animals. (ii) An enzymatic approach that eliminates the need for animal source material and also improves polydispersity. (4) Steps to curb the shortage of heparin: (i) Clinicians start prioritizing certain patients and situations. (ii) Heparin is to be reserved for patients with the greatest need. (iii) Prioritizing UFH for only urgent surgeries.
Conclusion: Simple techniques can manage the shortage efficiently. The FDA, clinicians, and hospital pharmacists must collaborate during the crisis.

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The Youth is our Future, and the Future is Here

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Category: Special Populations.
Introduction: The Global Thrombosis Forum (GTF) is an organization that recognizes and nurtures the research talents of high school students early on. The levels of achievement in GTF are 1) resume writing, 2) easy research projects, 3) interviewing patients, 4) interning/conducting research, and 5) publishing and presenting research at conferences. GTF provides internship opportunities at Brigham and Women's Hospital (BWH), Loyola University, the PACO Foundation, PERT, and São Paulo University. The typical life of an intern consists of working 8-12 hours a day under the guidance of a mentor. He or she must also present his or her research weekly to the faculty. In honor of the GTF Scholars, Loyola University has labeled one day every year as the High School Scholars Day, where the GTF Scholars present their research to the Loyola Faculty. A research internship award for high school scholars was initiated at Loyola University under Jawed Fareed, PhD.
Objectives: GTF aims to empower high schoolers to see the role of life research. We present here the curriculum for GTF scholars developed by the members of the Board of Directors of GTF and how the GTF Scholars are mentored and developed to make some of the outstanding scholars in the community get a competitive edge on college admissions and their career.
Results: GTF scholars have presented their research in multiple countries and published peer-reviewed journal articles. In the past 12 years, 65 GTF scholars have secured admissions to medical school (17), dental school (2), podiatry school (1), and IT (45).
Conclusion: GTF aims to bring out the best in high school scholars. We have coached scientific research to our scholars, created internships, and given them opportunities to present their research at domestic and international scientific meetings. Because of this, our slogan is, "The Youth is our Future, and the Future is Here".

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