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The emergency department services on the monitoring of direct oral anticoagulants

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***Abstract*---Background:** Direct oral anticoagulants (DOACs) such as dabigatran, rivaroxaban, apixaban, and edoxaban are increasingly used due to their benefits over warfarin, including reduced risk of intracranial hemorrhage and fewer dietary and drug interactions. Despite these advantages, the management of DOACs involves complexities like dose adjustments for renal or hepatic impairment, potential drug-drug interactions, and high costs, leading to prevalent off-label use. **Aim:** This study aims to evaluate the effect of Anticoagulation management services (AMS) on the management of DOAC therapy compared to non-AMS management, focusing on healthcare utilization and anticoagulation-related outcomes in the emergency department. **Methods:** A retrospective cohort analysis was conducted at the University of Utah Health, analyzing data from adult patients prescribed DOACs. Patients were categorized into AMS and non-AMS groups based on management approach. The study assessed the frequency and types of encounters, interventions related to DOAC therapy, and clinical outcomes such as thromboembolic events, bleeding, and mortality. **Results:** Patients managed by AMS had more frequent interactions regarding DOAC therapy but did not show significant improvement in clinical outcomes compared to non-AMS managed patients. The AMS group had slightly higher bleeding events, which might be attributed to higher comorbidity scores and poorer renal function. **Conclusion:** While AMS involvement in DOAC management led to increased interactions and attention to medication-related issues, it did not significantly enhance clinical outcomes compared to non-AMS management. Further research is needed to assess the long-term benefits and optimize the role of AMS in DOAC therapy.

***Keywords*---**Direct Oral Anticoagulants, Anticoagulation Management Services, Warfarin, Clinical Outcomes, Healthcare Utilization, Bleeding Risks.

Introduction

The prevalence of direct oral anticoagulants (DOACs) such as dabigatran, rivaroxaban, apixaban, and edoxaban is on the rise [1]. Compared to warfarin therapy, DOACs offer several benefits, including a reduced risk of intracranial hemorrhage, the absence of routine laboratory monitoring requirements, and fewer interactions with drugs and dietary components [2, 3]. Nonetheless, various factors influence the use of DOACs: (1) the necessity for dose modifications or alternative anticoagulants in cases of renal or hepatic impairment, (2) uncertain management of drug-drug interactions due to the lack of standardized tests for monitoring anticoagulant effects, (3) varying dosing regimens based on therapeutic indications and specific DOACs, (4) diverse side effect profiles beyond bleeding, (5) the need to interrupt therapy for invasive procedures, and (6) higher costs compared to warfarin [4,5,6,7]. Consequently, off-label prescribing of DOACs is prevalent [8,9,10,11], highlighting a potential need for thorough patient

and provider education as well as regular patient follow-up to mitigate risks associated with DOAC therapy.

Anticoagulation management services (AMS), which are staffed by specialists in anticoagulation therapy, play a well-established role in managing warfarin therapy [12,13,14]. The necessity for rigorous monitoring in warfarin therapy is due to its narrow therapeutic index, routine laboratory monitoring requirements, and multiple drug and dietary interactions. Given the aforementioned benefits of DOACs, the role of a dedicated AMS in managing DOAC therapy remains ambiguous. Research within the Veterans Affairs (VA) health system indicated that pharmacist interventions enhanced adherence to DOAC therapy, although these interventions were not part of a dedicated AMS for DOAC management, and clinical outcomes related to thromboembolism (TE) or bleeding were not assessed [15]. Another study conducted in a hospital environment assessed the impact of a pharmacist-led DOAC stewardship program, documenting interventions in 36% of patients, which included discontinuation of concurrent antiplatelet therapy, DOAC dose adjustments, and monitoring of DOAC anticoagulant response, yet bleeding or TE outcomes were not evaluated [16].

Healthcare systems are currently evaluating whether patients on DOAC therapy should be formally integrated into existing AMS. The aim of our study was to outline the initial experience of managing DOAC therapy within an AMS and to assess its impact, compared to non-AMS management (i.e., management by the prescriber), on healthcare utilization and anticoagulation-related outcomes.

What is AMS?

AMS stands for **Anticoagulation Management Services**. These services are specialized programs or departments within healthcare systems dedicated to managing patients on anticoagulant therapy. They are typically staffed by experts such as pharmacists or physicians who focus on optimizing anticoagulation treatment, monitoring for adverse effects, and ensuring appropriate dosing to improve patient outcomes and minimize risks associated with anticoagulant medications. AMS programs often handle medications like warfarin and, in some settings, direct oral anticoagulants (DOACs).

Anticoagulation Management Services (AMS) significantly influence various outcomes related to anticoagulant therapy. One of the primary impacts of AMS is on patient safety. By providing specialized oversight and monitoring, AMS helps to reduce adverse events such as bleeding and thromboembolic complications. These services ensure that patients receive the correct dosage of anticoagulants and manage drug and food interactions that could potentially lead to harmful effects. Through rigorous monitoring and dose adjustments, AMS minimizes the risk of both bleeding complications and thromboembolic events. In addition to improving patient safety, AMS also enhances medication adherence. Regular follow-up and patient education provided by AMS can lead to higher adherence rates to anticoagulant regimens. Improved adherence directly contributes to better therapeutic outcomes, as patients are more likely to maintain consistent anticoagulation levels, reducing the risk of complications associated with irregular dosing.

Clinical outcomes are another area where AMS makes a considerable difference. Effective management by AMS can result in a lower incidence of thromboembolic events, such as strokes and deep vein thrombosis, due to the precise management of anticoagulant therapy. Similarly, the reduction in bleeding complications is a critical benefit, as AMS helps adjust doses to avoid over-anticoagulation and associated risks. Furthermore, AMS can impact healthcare utilization by reducing the need for hospitalizations related to complications of anticoagulant therapy. By preventing adverse events through effective management and monitoring, AMS can lead to fewer emergency visits and hospital stays, ultimately contributing to more efficient use of healthcare resources.

AMS Benefits:

In addition to the primary benefits of improving patient safety, adherence, clinical outcomes, and healthcare utilization, Anticoagulation Management Services (AMS) offer several other advantages:

1. Enhanced Patient Education and Self-Management: AMS programs often provide comprehensive education to patients about their anticoagulant therapy, including how to manage their medications, recognize signs of complications, and adhere to dietary restrictions. This education empowers patients to take an active role in their care, leading to better self-management and reduced anxiety about their treatment.

2. Personalized Treatment Plans: AMS teams tailor anticoagulation therapy to individual patient needs, considering factors such as genetic variations, co-existing health conditions, and other medications. This personalized approach ensures that treatment is optimized for each patient's unique situation, improving overall efficacy and minimizing side effects.

3. Consistent Monitoring and Follow-Up: Regular and consistent monitoring is a hallmark of AMS. By providing ongoing follow-up, AMS ensures that any changes in a patient's condition or response to therapy are promptly addressed. This continuous oversight helps in the early detection of issues and allows for timely adjustments to therapy, reducing the risk of adverse events.

4. Coordination of Care: AMS often acts as a central hub for coordinating care among different healthcare providers. This integration helps in maintaining clear communication between primary care physicians, specialists, and other members of the healthcare team, ensuring that all aspects of a patient's care are aligned and that the anticoagulant therapy is managed effectively.

5. Evidence-Based Practice and Quality Improvement: AMS programs are typically grounded in evidence-based practices and continuously engage in quality improvement initiatives. This commitment to high standards and the latest clinical guidelines helps ensure that patients receive the most effective and up-to-date care.

6. Cost-Effectiveness: By preventing complications and reducing the need for emergency interventions, AMS can be cost-effective in the long term. Effective management of anticoagulant therapy minimizes the occurrence of costly adverse events and hospitalizations, potentially leading to overall savings for both healthcare systems and patients.

7. Support for Complex Cases: AMS teams are well-equipped to handle complex cases, such as patients with multiple comorbidities or those undergoing major

surgeries. Their expertise allows for the careful management of anticoagulant therapy in these high-risk situations, ensuring that treatment remains safe and effective.

8. Patient Empowerment and Satisfaction: The supportive environment provided by AMS, including accessible communication and patient-focused care, enhances patient satisfaction. When patients feel well-supported and informed, their overall experience with healthcare improves, contributing to better treatment adherence and outcomes. Overall, AMS provides a comprehensive approach to managing anticoagulant therapy, which benefits patients through personalized care, consistent monitoring, and coordinated support while also contributing to broader healthcare system efficiencies.

Study Methodology:

This retrospective cohort analysis was conducted at the University of Utah Health (UUH), a prominent academic medical center located in the Western United States. Data from the UUH Electronic Data Warehouse were utilized to identify a cohort of adult patients diagnosed with atrial fibrillation or atrial flutter who were prescribed direct oral anticoagulant (DOAC) therapy at UUH from January 2013 to June 2016. DOAC prescriptions were determined by identifying the initial outpatient order for any of the following medications: apixaban, dabigatran, edoxaban, or rivaroxaban, with the cohort entry date being defined as the date of the first DOAC prescription. Diagnoses of atrial fibrillation or flutter, including paroxysmal, persistent, and longstanding persistent forms, were identified using ICD-9/10 codes (427.3x/I48.x) for any healthcare visit within the 365 days preceding the cohort entry date. After forming the cohort through administrative data, each patient's record was manually reviewed to confirm DOAC usage and collect study endpoints. Patients were excluded if they had insufficient information to determine study endpoints, were not receiving DOAC therapy, or if DOAC therapy was managed outside the UUH system, as identified during manual chart reviews.

Primary Exposure:

The primary exposure of interest was the management approach for DOAC therapy: pharmacist-led Anticoagulation Management Services (AMS) versus non-AMS providers. Pharmacist-led AMS was defined as having at least two documented encounters with AMS providers in the electronic medical record between January 2013 and December 2017. AMS management involved initial patient education followed by periodic follow-ups, including phone calls or chart reviews by a pharmacist. Initially, AMS guidelines recommended reviews every three months, but this frequency was later reduced to every six or twelve months for most patients. Phone interactions with AMS pharmacists typically included inquiries about adherence, bleeding or stroke concerns, and reminders for laboratory tests such as serum creatinine and complete blood counts, when necessary. Patients with fewer than two encounters with AMS providers were categorized under non-AMS management. Non-AMS providers comprised cardiologists, neurologists, or primary care providers responsible for managing DOAC therapy, with potentially multiple providers involved per patient. Patients

were followed for up to two years, until discontinuation of DOAC therapy, or death, whichever occurred first.

Study Endpoints:

We evaluated the frequency and types of encounters, interventions related to DOAC therapy, and clinical outcomes, including thromboembolic events (ischemic stroke, transient ischemic attack, peripheral arterial embolism), bleeding (major bleeding, clinically relevant non-major bleeding [CRNMB], or minor bleeding), and mortality from any cause during follow-up. First, we described the frequency and types of DOAC-related encounters within the AMS and non-AMS groups. Second, as some AMS group patients received potentially overlapping DOAC-related interventions from their regular clinicians during routine care, we described these encounters within the AMS group. “Encounters” were defined as any visit, phone call, or electronic communication addressing DOAC therapy issues. “Interventions” were defined as modifications in DOAC therapy or management strategies aimed at ensuring optimal care. Types of DOAC therapy-related interventions were categorized as follows: (1) addressing inappropriate DOAC dosing, (2) managing changes in renal function, (3) addressing bleeding concerns, (4) evaluating potential DOAC treatment failures, (5) developing periprocedural plans, (6) managing drug interactions, (7) addressing insurance coverage or cost issues, (8) addressing adherence concerns, (9) discontinuing DOAC therapy, (10) managing side effects other than bleeding, and (11) “other” interventions.

The secondary endpoint was a composite measure of clinical events, including thromboembolic events, any bleeding, and death from any cause as previously described. We also examined a composite of major endpoints (ischemic stroke, peripheral arterial embolism, major bleeding, and death) and their individual components. Each endpoint was identified using International Classification of Disease, 9th and 10th revisions codes and/or death records from the State Population Database and verified through manual chart review. Major and CRNMB bleeding were defined according to International Society on Thrombosis and Haemostasis guidelines [17, 18], with all other bleeding categorized as minor. Thromboembolic endpoints required objective confirmation through radiologic imaging (e.g., computed tomography, magnetic resonance imaging, or ultrasound). Baseline characteristics were determined using the closest values proximate to the index DOAC prescription date, within one year.

Limitations of This Study:

Several limitations should be considered when interpreting the findings of this study. First, the retrospective nature of the study inherently limits the ability to establish causality. Since the data were collected from existing records and not through a prospective, randomized design, there may be unmeasured confounding variables that could influence the outcomes. Second, while the study utilized a comprehensive database from the University of Utah Health (UUH), the findings may not be generalizable to other healthcare settings or populations. The data were specific to a large academic medical center in the Western United States, which may have different patient demographics, healthcare practices, and resource availability compared to other regions or institutions.

Third, the categorization of patients into pharmacist-led Anticoagulation Management Services (AMS) versus non-AMS management was based on the number of documented encounters. However, the intensity and quality of AMS interventions were not uniformly assessed. Therefore, differences in outcomes may not solely reflect the management model but could also be influenced by variations in the execution and effectiveness of the interventions. Additionally, the study relied on administrative data and manual chart reviews to confirm DOAC status and endpoints. This process is susceptible to inaccuracies or omissions in data entry and record keeping. Although efforts were made to ensure accurate data collection, the potential for misclassification of endpoints or discrepancies in DOAC usage documentation exists. The study also faced challenges related to the potential overlap of DOAC-related interventions between AMS and non-AMS providers. Patients in the AMS group might have received concurrent care from regular clinicians, leading to possible duplication of interventions or confusion about the attribution of specific outcomes. Finally, the analysis did not account for the potential impact of other external factors, such as changes in clinical guidelines or healthcare policies over the study period, which could have influenced both DOAC management practices and patient outcomes.

Results and Discussion

This study represents one of the initial efforts to evaluate clinical outcomes for patients prescribed direct oral anticoagulants (DOACs) under management by an Anticoagulation Management Service (AMS) compared to those receiving care from non-AMS providers. The findings indicate that patients on DOAC therapy had frequent interactions related to their anticoagulation management, regardless of AMS involvement. Key interventions observed included periprocedural planning, management of drug interactions, addressing insurance and cost issues, and adjusting doses. The data suggest a potential overlap in efforts between AMS pharmacists and regular clinicians, which could point to inadequate role definition and communication between these providers. This overlap may result in redundant or conflicting information for patients, particularly concerning periprocedural anticoagulation, which could either be reassuring or confusing. AMS pharmacists were notably more engaged in managing insurance and medication cost issues compared to non-AMS providers. However, interventions related to inappropriate DOAC dosing were relatively infrequent. Despite these frequent interactions, no significant advantage of AMS care over non-AMS care was observed in terms of clinical endpoints. Notably, the AMS cohort experienced slightly more bleeding events, including gastrointestinal bleeding. The higher Charlson Comorbidity Index (CCI) scores and poorer renal function in the AMS group could explain their increased bleeding risk. When starting with a CCI score, patients with a lower chronic disease burden managed by AMS pharmacists had a higher incidence of adverse endpoints compared to those in the non-AMS group. This could be due to AMS pharmacists' more thorough documentation and inquiry about bleeding episodes. Conversely, patients with a higher chronic disease burden managed by AMS pharmacists exhibited a lower risk of adverse endpoints, although the confidence interval for this estimate was broad, encompassing both potential benefits and harms. Further research with larger sample sizes is necessary to validate these observations [19].

Safety of Direct Oral Anticoagulants (DOACs):

Direct Oral Anticoagulants (DOACs) are increasingly used for managing anticoagulation in conditions such as atrial fibrillation due to their advantages over traditional anticoagulants like warfarin, including less need for routine monitoring and fewer dietary restrictions. However, their safety profile warrants careful consideration.

Bleeding Risks:

One of the primary safety concerns with DOACs is the risk of bleeding. While DOACs generally have a lower risk of intracranial hemorrhage compared to warfarin, they are not devoid of bleeding risks. The incidence of major bleeding, including gastrointestinal (GI) bleeding, has been a particular concern. Studies have shown that while the overall rate of major bleeding with DOACs is lower than with warfarin, the absolute risk remains significant and varies among different DOACs. For instance, rivaroxaban and apixaban have been associated with differing bleeding risks, with rivaroxaban having a higher rate of GI bleeding compared to apixaban.

Renal and Hepatic Function:

DOACs are primarily eliminated through the kidneys or liver, making patients with impaired renal or hepatic function particularly vulnerable. In patients with renal impairment, the risk of bleeding can be elevated due to reduced drug clearance, which necessitates careful dose adjustments and monitoring. Similarly, hepatic dysfunction can impact the metabolism of DOACs, potentially increasing bleeding risks. For these reasons, dose adjustments based on renal and hepatic function are critical to minimizing adverse outcomes.

Drug Interactions:

DOACs can interact with other medications, which may affect their efficacy and safety. Concomitant use of certain drugs, such as strong CYP3A4 inhibitors or inducers, can alter DOAC levels, potentially increasing the risk of bleeding or reducing efficacy. Therefore, managing drug interactions is essential for optimizing safety. The availability of reversal agents for DOACs, such as idarucizumab for dabigatran and andexanet alfa for rivaroxaban and apixaban, has improved the management of bleeding complications, although these agents are not universally available, and their use can be limited by cost and accessibility.

Patient Monitoring and Education:

Effective patient monitoring and education play a significant role in enhancing the safety of DOAC therapy. Regular follow-up is essential to assess for any signs of bleeding, ensure adherence, and evaluate renal and hepatic function. Educating patients about potential symptoms of bleeding and interactions with other drugs or foods is crucial for preventing adverse events.

Comparison with Warfarin:

Compared to warfarin, DOACs have been shown to have a more favorable safety profile in terms of major bleeding, particularly intracranial hemorrhage. However, they are not without risks, and the choice of anticoagulant should be individualized based on patient-specific factors such as comorbidities, risk of bleeding, and potential drug interactions. In summary, while DOACs offer significant benefits over traditional anticoagulants, their safety profile requires vigilant monitoring and management. Bleeding risks, interactions with other drugs, and the need for dose adjustments in cases of renal or hepatic impairment are key considerations in ensuring patient safety. Continued research and patient education are vital to maximizing the benefits of DOAC therapy while minimizing associated risks.

Direct Oral Anticoagulants (DOACs) vs. Warfarin: A Comparative Overview:

Direct Oral Anticoagulants (DOACs) and warfarin are both used for anticoagulation therapy, but they differ significantly in their mechanisms, management, and clinical outcomes. Here is a comparative overview of the two:

Mechanism of Action:

- **DOACs**: Direct Oral Anticoagulants, including apixaban, rivaroxaban, dabigatran, and edoxaban, target specific factors in the coagulation cascade. For example, apixaban and rivaroxaban inhibit factor Xa, while dabigatran inhibits thrombin (factor IIa). This targeted approach disrupts the clotting process at specific points.
- **Warfarin**: Warfarin is a vitamin K antagonist that inhibits the synthesis of vitamin K-dependent clotting factors (II, VII, IX, and X) in the liver. Its action is less direct compared to DOACs, affecting multiple steps in the coagulation pathway.

Monitoring and Dose Adjustments:

- **DOACs**: One of the main advantages of DOACs is their predictable pharmacokinetics and pharmacodynamics, which typically do not require routine monitoring of anticoagulation levels. However, monitoring may still be necessary in cases of renal or hepatic impairment, or when drug interactions are a concern.
- **Warfarin**: Warfarin requires regular monitoring of the International Normalized Ratio (INR) to ensure therapeutic levels and prevent complications. The INR monitoring is crucial due to warfarin's narrow therapeutic window and variability in response among patients.

Efficacy and Safety:

- **DOACs**: Clinical trials have demonstrated that DOACs are as effective as, or in some cases more effective than, warfarin in preventing thromboembolic events such as stroke in patients with atrial fibrillation. DOACs generally have a lower risk of major bleeding, especially intracranial hemorrhage. However, they do have an increased risk of gastrointestinal bleeding, particularly with rivaroxaban.

- **Warfarin**: Warfarin is effective in preventing thromboembolic events but is associated with a higher risk of major bleeding complications compared to DOACs. Warfarin's risk profile includes intracranial hemorrhage and gastrointestinal bleeding. The risk of bleeding is influenced by factors such as diet, other medications, and individual patient characteristics.

Drug Interactions:

- **DOACs**: Although DOACs generally have fewer drug and dietary interactions than warfarin, they still interact with other medications. For instance, strong inducers or inhibitors of CYP3A4 can affect the levels of drugs like apixaban and rivaroxaban. Drug interactions with DOACs need to be managed carefully to avoid complications.
- **Warfarin**: Warfarin has a high potential for drug and dietary interactions, which can significantly impact its efficacy and safety. Foods high in vitamin K (such as leafy greens) and various medications can alter warfarin's anticoagulant effect, requiring frequent adjustments and monitoring.

Reversal and Management of Bleeding:

- **DOACs**: Reversal agents for DOACs are available but are not universally accessible or covered by all insurance plans. Idarucizumab can reverse dabigatran, while andexanet alfa can reverse rivaroxaban and apixaban. Prothrombin complex concentrates (PCCs) and other agents may be used for emergency reversal of DOACs.
- **Warfarin**: Warfarin's effects can be reversed with vitamin K, prothrombin complex concentrates (PCCs), or recombinant factor VIIa. The reversal process may take several hours to days, depending on the agent used and the severity of bleeding.

Patient Convenience and Adherence:

- **DOACs**: The lack of need for routine monitoring and fewer dietary restrictions make DOACs more convenient for patients, potentially improving adherence. They are administered orally in fixed doses without the need for frequent dose adjustments.
- **Warfarin**: The need for regular INR monitoring and dietary restrictions can be burdensome for patients, which may affect adherence. The dosage adjustments required based on INR levels can also be inconvenient and complex.

Urgent Emergency Roles:

1. Triage Nurse

- **Role**: The triage nurse is responsible for the initial assessment of patients, quickly identifying those on DOACs who may require urgent evaluation due to bleeding risks or other complications.
- **Responsibilities**:
    - Review medical history and medication list to determine DOAC use.
    - Prioritize patients based on symptoms such as bleeding, stroke, or trauma.

2. Emergency Physician

- **Role**: The emergency physician plays a central role in assessing and managing complications related to DOACs, such as bleeding, thromboembolism, or overdose.
- **Responsibilities**:
  - Perform a clinical evaluation and assess the severity of the condition.
  - Order and interpret laboratory tests to monitor DOAC levels (if applicable) and coagulation status.
  - Make decisions about anticoagulation reversal agents or supportive treatments (e.g., blood transfusions).

3. Clinical Pharmacist

- **Role**: The clinical pharmacist provides expertise on the pharmacodynamics and pharmacokinetics of DOACs, assisting in drug monitoring and advising on appropriate interventions.
- **Responsibilities**:
  - Offer guidance on dosing, drug interactions, and potential side effects.
  - Recommend appropriate reversal agents or alternatives if DOAC therapy needs to be interrupted or reversed.
  - Monitor for signs of toxicity or therapeutic failure.

4. Laboratory Technician

- **Role**: The laboratory technician is involved in performing critical tests to assess the patient's coagulation status and monitor DOAC effects.
- **Responsibilities**:
  - Carry out tests such as anti-Xa levels, prothrombin time (PT), or thrombin time (TT), depending on the specific DOAC in use.
  - Ensure rapid reporting of results to inform emergency treatment decisions.

5. Nursing Staff

- **Role**: Nursing staff assist with patient monitoring, administering medications, and providing critical care.
- **Responsibilities**:
  - Monitor patients for signs of bleeding, clotting, or other complications.
  - Administer reversal agents, fluids, or blood products as directed by the physician.
  - Educate patients and families about DOAC management in the emergency setting.

6. Hemostasis/Coagulation Specialist (if available)

- **Role**: A specialist in coagulation may be consulted for complex cases where DOACs need to be reversed or where there is significant bleeding or clotting.
- **Responsibilities**:
  - Provide expertise in managing coagulation abnormalities caused by DOACs.
  - Advise on the use of novel anticoagulation reversal agents such as idarucizumab (for dabigatran) or andexanet alfa (for Factor Xa inhibitors).

Conclusion

This study represents one of the pioneering efforts to evaluate the impact of Anticoagulation Management Services (AMS) on the management of Direct Oral Anticoagulants (DOACs). The findings highlight a complex landscape where AMS involvement offers increased frequency of interactions related to anticoagulant therapy but does not necessarily translate into superior clinical outcomes compared to non-AMS care. Specifically, while patients under AMS management had more frequent encounters addressing various aspects of DOAC therapy—including periprocedural planning and management of drug interactions—this did not correspond to improved clinical outcomes in terms of thromboembolic events, bleeding complications, or mortality. The study identified that AMS pharmacists were particularly proactive in managing issues related to medication costs and insurance, a factor less emphasized by non-AMS providers. However, this proactive approach did not mitigate the slightly higher incidence of bleeding events observed in the AMS group. This increased bleeding risk could be linked to the higher Charlson Comorbidity Index (CCI) scores and poorer renal function prevalent in the AMS cohort, suggesting that AMS might have been engaged more intensively with higher-risk patients. The potential overlap of interventions between AMS and regular clinicians also raised concerns about the efficiency and clarity of care coordination. Patients managed by AMS sometimes experienced redundancy in interventions, which could lead to potential confusion or miscommunication regarding treatment plans. The study underscores the need for further research to explore the optimal integration of AMS in DOAC management and to refine the roles and strategies used by AMS to ensure that their benefits are fully realized. Future investigations with larger sample sizes and diverse settings could provide deeper insights into whether AMS involvement offers measurable improvements in clinical outcomes and patient safety in the context of DOAC therapy.

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خدمات قسم الطوارئ في مراقبة مضادات التخثر الفموية المباشرة

الملخص

خلفية :تزداد استخدامات مضادات التخثر الفموية المباشرة (DOACs) مثل دابيغاتران، وريفاروكسابان، وأبيكسابان، وإدوكسابان بفضل فوائدها على الوارفارين، والتي تشمل انخفاض خطر النزيف الدماغي وتداخلات أقل مع النظام الغذائي والأدوية. على الرغم من هذه المزايا، إلا أن إدارة DOACs تتطلب تعقيدات مثل تعديل الجرعات لضعف الكلى أو الكبد، واحتمالية التداخلات الدوائية، وتكلفة عالية، مما يؤدي إلى استخدام شائع خارج الوصف المسموح به .**الهدف** :تهدف هذه الدراسة إلى تقييم تأثير خدمات إدارة مضادات التخثر (AMS) على إدارة العلاج بـDOACsمقارنة بالإدارة بدونAMS ، مع التركيز على استهلاك الرعاية الصحية والنتائج المرتبطة بمضادات التخثر في قسم الطوارئ.

المنهجية :أُجري تحليل بأثر رجعي لمجموعة من المرضى في مركز جامعة يوتا الصحي، حيث تم تحليل بيانات المرضى البالغين الذين وُصفت لهم .DOACs تم تصنيف المرضى إلى مجموعتي AMS وبدون AMS وفقًا لنهج الإدارة. واشتملت الدراسة على تقييم تواتر وأنواع اللقاءات، والتدخلات المتعلقة بعلاجDOACs ، والنتائج السريرية مثل أحداث الانصمام الخثاري، والنزيف، والوفيات.

النتائج :أظهر المرضى الذين تمت إدارتهم عبر AMS تفاعلات أكثر تكرارًا فيما يتعلق بعلاجDOACs ، لكن لم يظهروا تحسنًا ملحوظًا في النتائج السريرية مقارنة بالمرضى الذين أُديروا بدون .AMS كما سجلت مجموعة AMS معدلًا أعلى قليلاً لحوادث النزيف، مما قد يُعزى إلى درجات الأمراض المصاحبة الأعلى ووظائف الكلى الأضعف.

الكلمات المفتاحية :مضادات التخثر الفموية المباشرة، خدمات إدارة مضادات التخثر، الوارفارين، النتائج السريرية، استهلاك الرعاية الصحية، مخاطر النزيف.