Exploring the Relationship Between Anemia Severity and Bleeding Events in Anticoagulated Patients

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PB0647

INTRODUCTION

- Anticoagulation is widely used to prevent thromboembolic events (e.g., atrial fibrillation, prosthetic valves, MI, VTE).
- Bleeding complications occur in:
  - 10–17% of patients overall
  - 2–5% experience major bleeding annually
- Anemia is an independent risk factor for bleeding:
  - Severe anemia (Hb ≤8 g/dL) doubles the risk of major bleeding
  - Triples the risk of fatal bleeding
  - Highest risk occurs within the first year of outpatient therapy
- Current guidelines lack clear recommendations for:
  - Managing pre-existing anemia in anticoagulated patients
  - Routine anemia monitoring during treatment

METHOD

Study Design:

- Retrospective study using de-identified EHR data from a resident safety-net clinic at an urban hospital
- IRB-approved; adhered to ethical standards for de-identified data use

Sample:

- 170 patients on long-term anticoagulation (AFib, VTE, mechanical heart valves)

Exclusion Criteria:

- Short-term anticoagulation for inpatient prophylaxis
- Inherited bleeding disorders (e.g., Von Willebrand disease, hemophilia)
- Cirrhosis

Data Collection:

- *Variables:* demographics, baseline hemoglobin, anticoagulant type, bleeding events (stratified by severity)

Analysis:

- Descriptive statistics to explore associations between anemia, anticoagulant use, and bleeding
- Multivariate logistic regression to identify independent predictors (sex, age, anemia status, anticoagulant type)
- Performed using Python 3.13

RESULTS

Patient Characteristics and Bleeding Risk During Anticoagulation

- **171 patients** (90 male, 81 female)
- **Mean age:** 63.77 ± 11.53 years
- **Mean Hemoglobin at Anticoagulation Start:** 12.74 ± 2.32 g/dL
- **Anemia Prevalence:** 51%
- **Bleeding Events:** 68 patients (39.77%) experienced 103 bleeding episodes

Anemia Investigation:

- 71.1% had no anemia workup completed
- 13.8% underwent anemia investigations
- 2.94% recommended for outpatient follow-up

Anticoagulant Usage:

- **Apixaban:** 73 patients (42.94%) — more females (42) than males (31)
- **Rivaroxaban:** 46 patients (27.06%) — more males (27) than females (19)
- **Warfarin:** 43 patients (25.29%) — nearly equal gender distribution
- Other anticoagulants used less frequently

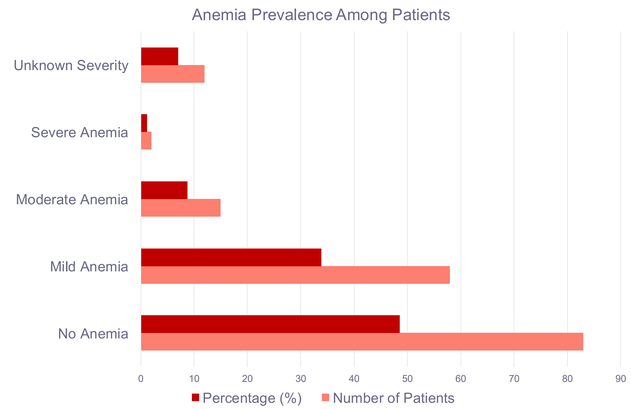

Figure 1 Anemia Prevalence Among Patients
This figure illustrates the distribution of patients according to their anemia status. The majority of patients (48.54%) had no anemia, followed by those with mild anemia (33.9%). Moderate and severe anemia cases were less common, accounting for 8.77% and 1.17%, respectively. Some patients (7.01%) had an unknown anemia severity.

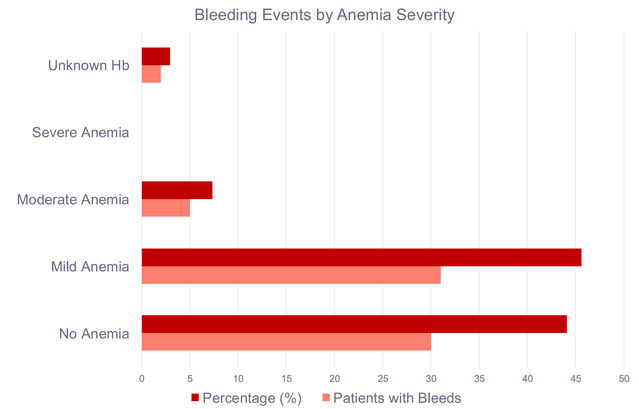

Figure 2 Bleeding Events by Anemia Severity
This figure displays the number and percentage of bleeding patients categorized by anemia status. Patients with mild anemia constituted the largest group of bleeding cases (45.58%), closely followed by those without anemia (44.11%). Bleeding was less frequent among patients with moderate anemia (7.35%), while no bleeding events were observed in severe anemia cases.

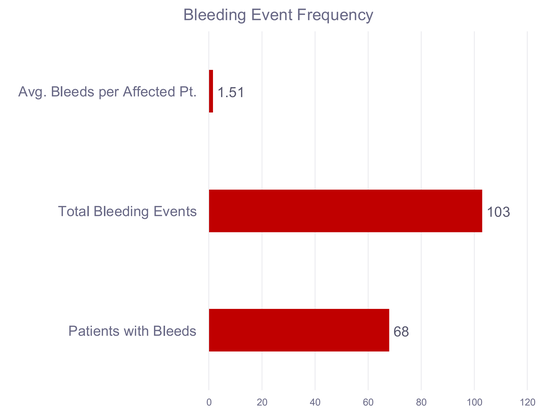

Figure 3 Bleeding Event Frequency
This figure summarizes the frequency of bleeding events among patients. Out of 171 patients, 68 experienced bleeding, with 103 bleeding events recorded. On average, each bleeding patient had approximately 1.51 bleeding episodes.

CONCLUSIONS

- **Anemia at the time of anticoagulation initiation is associated with higher bleeding risk, particularly in patients with mild to moderate anemia.**
- Severe anemia may be underrepresented due to clinical hesitancy to initiate anticoagulation in high-risk cases.
- Routine screening and monitoring of anemia may improve anticoagulation safety and guide treatment decisions.
- Larger, multi-center studies are needed to confirm findings and evaluate outcomes across anemia subtypes.

ACKNOWLEDGEMENTS

Supported by the William P. Haas Research Development Grant. Special thanks to Dr. Sudhanshu Mulay and the Gengras Clinic team for their support.

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