Enoxaparin anti-factor Xa level monitoring and coinciding dose adjustments

Blake Lutzow, Pharm.D. Candidate, Carrie Vogler, Pharm.D., BCPS
Southern Illinois University Edwardsville

Southern Illinois University Edwardsville School of Pharmacy

BACKGROUND

- Anti-factor Xa level monitoring for enoxaparin is not usually recommended in the general population. In certain populations with obesity or renal impairment while not routinely recommended, it may be a useful tool to ensure safety and efficacy of treatment doses.
- Anti-factor Xa levels should be drawn 4-6 hours after a steady state dose with a goal reference range of 0.6 – 1 units/mL for twice daily dosing of enoxaparin and 1 – 2 units/mL for once daily dosing.[1]
- Dose change recommendations using anti-factor Xa level are based on a dose adjustment nomogram from Nutescu EA, et al. 2009[1]

OBJECTIVE

- This study was performed to identify the patient population in which anti-factor Xa levels are monitored and evaluate the appropriateness of the resultant anti-factor Xa levels. This study evaluates the utility of anti-factor Xa monitoring and its impact on current practice.

METHODS

Study Design
- IRB approved single center retrospective chart review performed at an academic medical center in Springfield, IL

Inclusion Criteria
- Patients aged 18 years and older and admitted to the hospital between June 2016 and June 2019 and had an anti-factor Xa level checked while receiving enoxaparin.

Exclusion Criteria
- Patients treated with any anticoagulant other than enoxaparin at the time of anti-factor Xa testing.

Study Measures
- **Primary outcome:** Appropriateness of anti-factor Xa levels drawn and what dose changes coincide with the resultant level.
- **Secondary outcomes:** Appropriateness of initial dose, indication for anticoagulation, risk factors for development of venous thromboembolism, and adverse effects.

Study Measures: Dependent variables
- Anti-factor Xa level and coinciding dose changes

Study Measures: Independent variables
- Timing of anti-factor Xa level
- Risk factors for venous thromboembolism
- Indication for anticoagulation
- Initial dose of enoxaparin

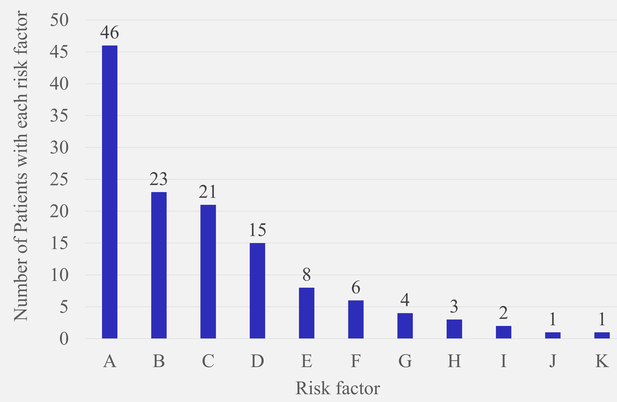
Data Analysis
- Descriptive statistics were performed on the data

RESULTS

Baseline Characteristics	DVT n = 37+	PE n = 36+	Atrial fibrilation n = 11	All n = 87
Gender (% Male)	54%	50%	82%	56%
Age (median, IQR)	57 (15)	50 (23.5)	60 (12)	55 (23.5)
BMI (%)				
Underweight < 18.5 kg/m²	3%	3%	9%	2%
Normal 18.5 – 24.9 kg/m²	11%	8%	9%	9%
Overweight 25 – 29.9 kg/m²	13%	14%	0%	12%
Obese 30 – 39.9 kg/m²	35%	17%	27%	28%
Morbidly Obese ≥ 40 kg/m²	38%	58%	55%	49%
Race (%)				
Caucasian	89%	83%	82%	85%
African American	11%	14%	18%	13%
Other	0%	3%	0%	2%

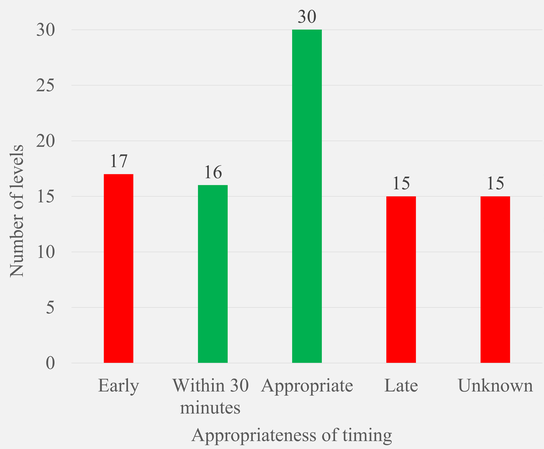
+10 patients had both DVT and PE

Risk factors present in patients with a DVT or PE (n = 63)



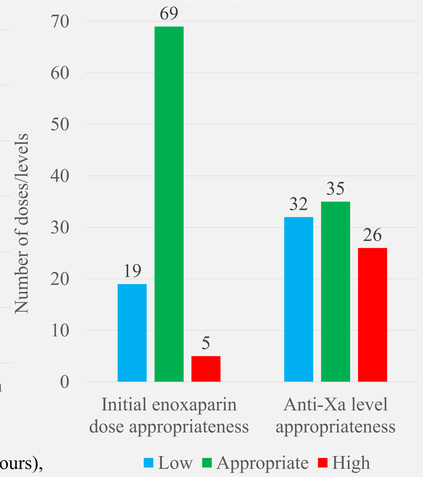
Risk factor	Letter Keyed
Obesity	A
Malignancy	B
Hx of VTE	C
T2DM	D
Surgery	E
CKD	F
Physical Debility	G
Genetic Coagulability Disorders	H
Trauma	I
OCP use	J
None	K

Timing of anti-factor Xa level (n = 93)*



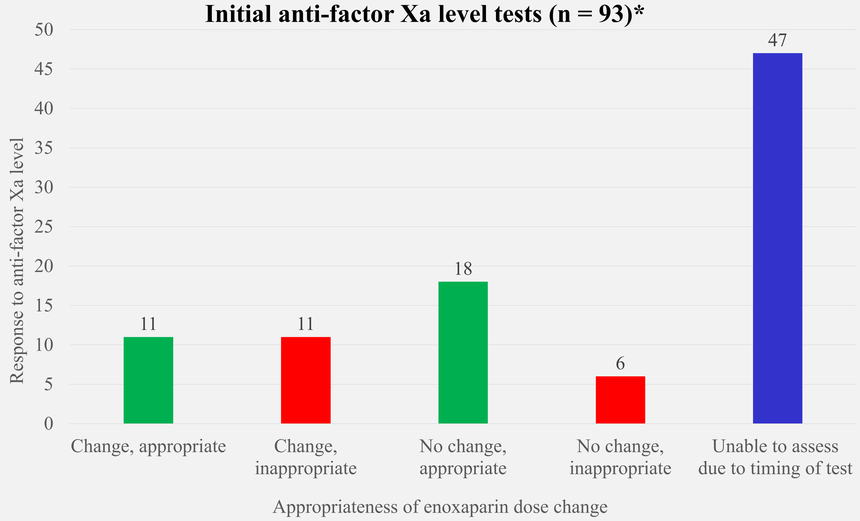
Early levels (< 3.5 hours), Within 30 minutes of dose (3.5 – 6.5 hours), Appropriate (4-6 hours), Late (> 6.5 hours)

Initial enoxaparin dose and anti-factor Xa appropriateness (n = 93)*



RESULTS

Initial anti-factor Xa level tests (n = 93)*



- Appropriateness of dose change assessed using dose change nomogram from Nutescu, Et al.[1]
- Only levels within 4-6 hour range or within 30 minutes of 4-6 hours were assessed.
- 87 patients included, 22 patients excluded

*5 patients readmitted with additional anti-factor Xa levels drawn

Limitations

- Single center retrospective chart review with small sample size
- Relied on documentation
- Predominantly Caucasian patients, lacking diversity
- Indication for anti-factor Xa monitoring was unknown

CONCLUSION

- Anti-factor Xa levels were only drawn in the appropriate range of 4-6 hours after the previous dose 32% of the time.
- Anti-factor Xa levels are not always effectively utilized. When appropriately timed, action after anti-factor Xa monitoring was appropriate 63% of the time.
- Provider education regarding appropriate timing of anti-factor Xa levels is warranted.

- Abbreviations: Deep Vein Thrombosis (DVT); Pulmonary Embolism (PE); Chronic Kidney Disease (CKD); Type 2 Diabetes Mellitus (T2DM); Oral Contraceptives (OCP)
- The authors have nothing to disclose

1. Nutescu EA, Spinler SA, Wittkowsky A, Dager WE. Low-molecular-weight heparins in renal impairment and obesity: available evidence and clinical practice recommendations across medical and surgical settings. The Annals of Pharmacotherapy. 2009 Jun;43(6):1064-83. doi: 10.1345/aph.1L194. Epub 2009 May 19. Review. PubMed PMID: 19458109.