Therapeutic Enoxaparin Anti-Factor Xa Monitoring: Are We Doing Enough? A Retrospective Analysis

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Background

Anti-factor Xa (AXA) monitoring for patients on treatment-dose enoxaparin is indicated in several populations, including patients with renal impairment, at extremes of body weight (over- or under-weight), during pregnancy, during an extended duration of anticoagulation treatment, as well as patients in which lack of efficacy or toxicity related to anticoagulation is suspected.

Blood samples for therapeutic enoxaparin AXA monitoring should be taken at peak level, approximately four hours post-dose at steady-state drug concentration. The target AXA level for therapeutic enoxaparin is generally 0.5-1.0IU/mL, depending on the specific assay utilised.

Several studies in the literature have shown that AXA monitoring is performed inappropriately[1]. There is no published data regarding the extent of utilisation of AXA monitoring in patients with an indication for monitoring.

Aims

- To quantify the prevalence of AXA monitoring performed in patients with a pre-defined indication for monitoring.
- To determine the number of AXA levels taken inappropriately
- To determine the number of dose adjustments made based off inappropriate AXA levels
- To assess compliance with recommended weight-based enoxaparin dosing

Methods

A retrospective chart review of inpatients receiving therapeutic enoxaparin during the month of September 2017 was undertaken.

Patients were identified through direct-to-patient dispensing of enoxaparin syringes ≥60mg, using dispensing records from pharmacy dispensing software and automated dispensing cabinets.

Patients were included if enoxaparin was being used therapeutically (e.g. for treatment of venous thromboembolism (VTE)) and received therapy for at least 48 hours.

Electronic medical records were reviewed to obtain data regarding patient demographics, relevant pathology (AXA level, creatinine, haemoglobin), and enoxaparin therapy (dose, frequency, indication).

The indications for AXA monitoring in this study were defined as:

- Weight >100kg
- Weight <50kg
- Consistent enoxaparin treatment for ≥5 days
- Estimated creatinine clearance (CrCl) <50mL/min
- Pregnancy
- Suspected treatment failure or anticoagulation-related toxicity.

Data were analysed using Microsoft® Excel.

Results

80 of 197 records reviewed met inclusion criteria (40.6%).

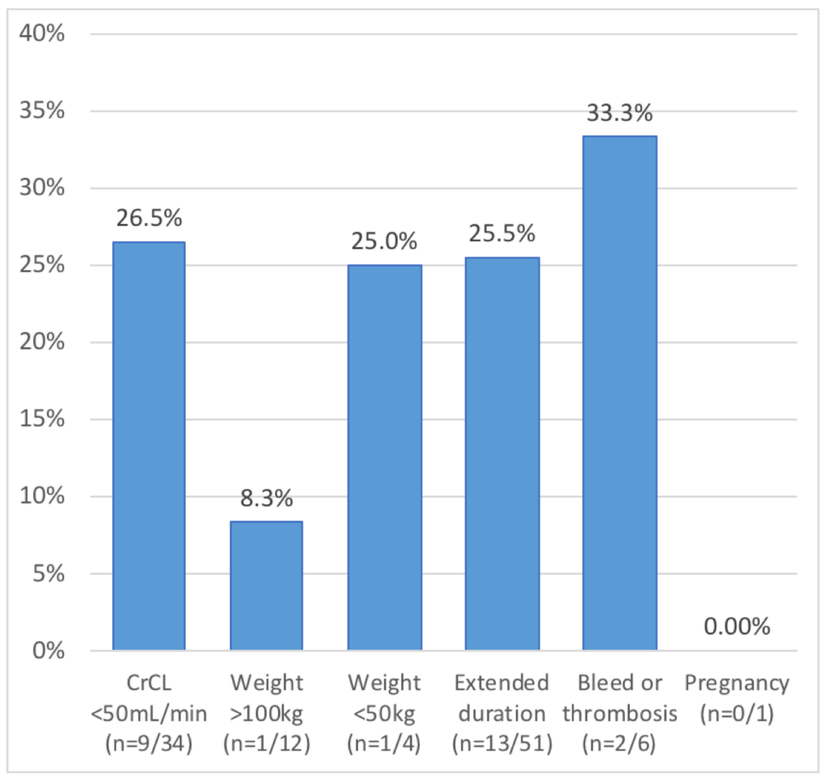

Figure 1: Prevalence of AXA monitoring performed in patients with that indication for monitoring

19 AXA levels across 15 unique patient admission episodes were performed during the study period. Approximately 50% of AXA levels were taken inappropriately (47.37%, n=9/19). Three AXA levels were taken prior to enoxaparin reaching steady-state (33.3%) while the remainder were due to levels not being taken at peak level (66.7%). Five of the six levels (83.3%) not taken as a peak level were taken >5 hours post-dose.

The majority of patients who had AXA levels performed had at least one indication for monitoring, and over 50% met at least two monitoring criteria. (Figure 2)

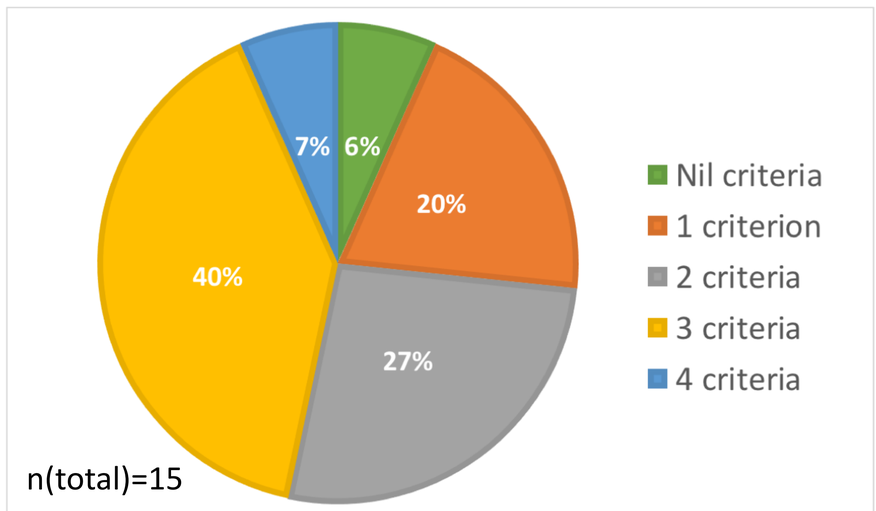

Figure 2: Proportion of patients with AXA levels taken according to the number of monitoring criteria met for each patient

Dose changes to therapeutic enoxaparin were made on nine occasions, with five of these (55.5%) occurring based upon inappropriate AXA levels. For low AXA levels (n=4/5), each enoxaparin dose was increased by 10-20mg/dose (median increase of 25%).

For all patients who met inclusion criteria, the median weight-based dose of enoxaparin for patients with an estimated CrCl >30mL/min was 0.97mg/kg for BD dosing (n=62) and 1.24mg/kg for daily dosing (n=6). The median dose was 0.93mg/kg for patients with a CrCl <30ml/min receiving daily dosing (n=7). Three patients had a CrCl <30ml/min but received BD dosing and two patients did not have a weight recorded during admission.

Discussion

The vast majority of patients who had at least one indication for AXA monitoring did not receive such monitoring during their admission. However, the vast majority of patients who did receive monitoring did have at least one indication.

AXA levels were taken inappropriately in almost half of occasions, mostly due to not being taken at peak level. Dose changes to enoxaparin therapy were made based off inappropriate levels in the majority of instances. No systematic rationale for the magnitude of dose changes was apparent.

Adherence with recommended dosing of enoxaparin was good.

Conclusion

AXA monitoring is not being performed in the majority of patients in which it is indicated, and AXA levels are being taken and acted upon inappropriately. A greater level of pharmacist intervention is warranted.

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1 Dekker at al., 2016; Kufel t al., 2017; Levine et al., 2013; Sacha et al., 2016; Thompson-Moore et al., 2015