Utilising anti-Xa for monitoring therapeutic heparin during COVID-19

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INTRODUCTION

- Patients with COVID-19 in intensive care have a **high incidence of thrombotic events** such as strokes, pulmonary embolism, cutaneous and alveolar micro-thromboses.[1]
- COVID-19 can lead to **abnormalities of coagulation parameters** which can affect the monitoring methods used for heparin.[1]
- It has been found that APTTr monitoring for heparin in COVID-19 patient could lead to the use of higher doses of heparin and **bleeding complications**.[1]
- Anti-Xa monitoring led to a reduced number of dose adjustments and length of **time to reach therapeutic anticoagulation** compared to APTTR.[2]
- Anti-Xa monitoring for heparin in COVID-19 patient has been found to be **a more accurate method for monitoring heparin** dosing than APTTr in COVID-19 patients.[1,2]

AIMS & OBJECTIVES

- To analyse and compare APTTr versus anti-Xa during therapeutic heparin monitoring in critical care patients with COVID-19
- To assess compliance with a new anti-Xa heparin monitoring protocol using the following standards (expected 100%). COVID-19 positive patients in critical care prescribed heparin:

1. Should have an **Anti-Xa level test 5-7 hours after starting the infusion (target 6 hours)**
2. Should have **the correct dose alteration in response to the Anti-Xa levels**
3. Should have received an **adjustment of the heparin infusion rate within 2 hours of the Anti-Xa level result**

METHODS

Ethical approval was not required for this project as the anti-Xa innovation was classified as service evaluation and improvement. The audit was logged following the standard Trust governance procedure.

1 Anti Xa Vs APTTr comparison study

- Anti-Xa levels and APTTr were requested on each blood sample taken for routine monitoring of therapeutic heparin between April and December 2020 inclusive.
- A retrospective cohort analysis of unfractionated heparin anti-Xa levels and APTTr was performed on data extracted from the electronic clinical information system for critical care (Philips ICCA)
- The reference ranges used were ≥0.5 to <0.8 and ≥1.5 to <2.5 respectively.
- Only results for patients who also tested positive for COVID-19 by PCR were included for analysis
- Results were mapped against the respective dosing titration protocols to determine whether the result dictated an increase, decrease or no change in the heparin rate

2 Unfractionated heparin titration protocol audit

- Audit data were collected for all patients retrospectively identified as having received heparin and with a positive COVID-19 PCR in critical care from April to June 2020 inclusive using Phillips ICCA and ICE.
- The audit tool was piloted on 2 patients and minor adjustments made
- Scanned copies of the paper heparin charts were retrieved from the patient management system (Careflow EPR)

RESULTS

From April 2021 to June 2021 inclusive, records of 13 patients were audited against the required standards (Figure 1). The 13 patients had 59 anti-Xa results reported. Only 38 of these had a time documented against the subsequent action taken by the nurse. One patient was excluded from standard 1 as there was no infusion initiation time recorded

482 paired samples (anti-Xa and APTTr processed from the same tube) were reported for 24 patients with confirmed COVID-19 infection on a therapeutic heparin infusion April 2021 to December 2021 inclusive (Figure 2). The mean number of samples per course of treatment was 20.

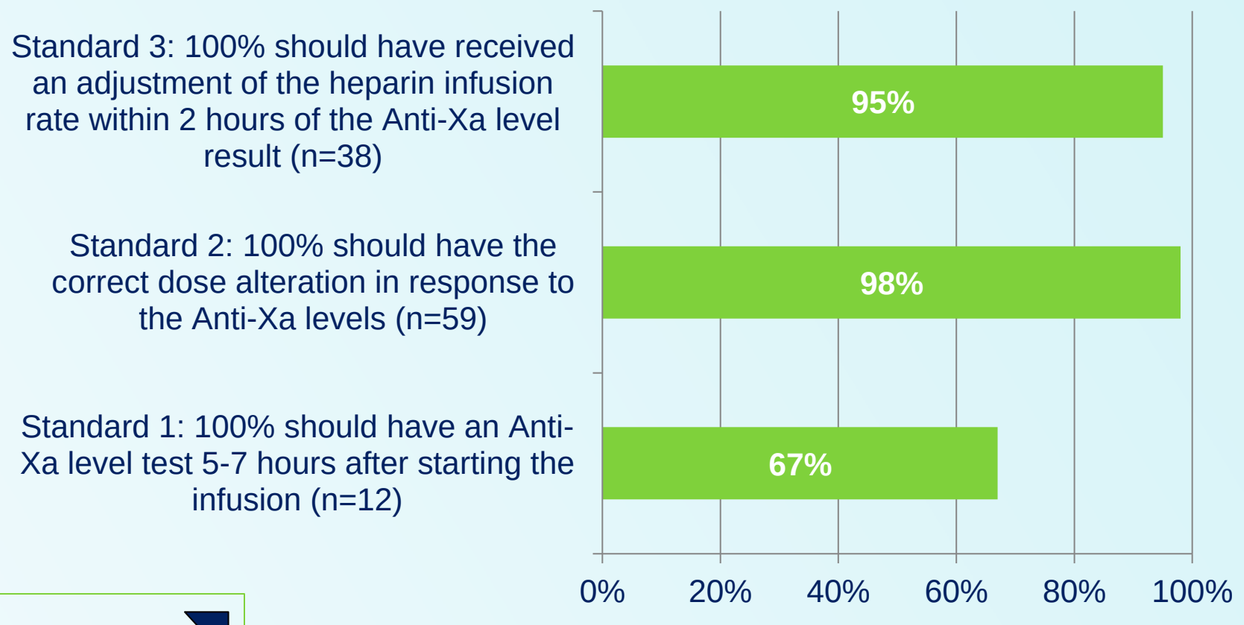

Figure 1: Performance against audit standards

Figure 2: Paired tests on individual blood samples. (Therapeutic range –APTTr: 1.5-2.5; Anti-Xa: 0.5-0.8)

- 55% of paired samples resulted in conflicting advice regarding dose amendments depending on whether Anti-Xa or APTTr was used
- 35% of samples were in range for Anti-Xa whilst using APTTr suggested increasing the dose
- 6% of paired samples recommended opposite actions, using Anti-Xa a dose reduction; APTTr a dose increase

CONCLUSIONS

- The project found a higher discordance rate (55%) than reported in the literature (49%)[2].
- The higher discordance rate potentially highlights the decreased reliability of APTTr due to COVID-19 and suggests that the use of APTTr monitoring would have led to significantly higher rates of heparin in COVID-19 patients.
- The audit demonstrated that although 100% adherence was not achieved for any of the standards, there is a high level of adherence to the new guideline in critical care.
- The audit has highlighted that the process of result acknowledgement needs to be improved regardless of whether it necessitates a change in rate or not.

REFERENCES

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