Anti-Xa levels used to titrate enoxaparin dose for major burns at Middlemore Critical Care Unit (CCU)

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Background

Major burns have a high incidence of venous thromboembolic events (VTE) (1). Patients suffering burns of 40-59% TBSA have the greatest risk at 2.4%. Other risk factors include mechanical ventilation, duration of critical care stay, presence > 2 medical co-morbidities and inhalation injury (1). Although VTE chemo-prophylaxis reduces risk, unpredictable pharmacokinetics in major burns means standard dosing may be ineffective (2). We present an audit over the first 18 months using anti-Xa levels to guide individualised enoxaparin dosing in major burns.

Methods

The local 'AORTIC' database searched adults with major burns (>20%) between January 2019 and June 2020 (Figure 1). Demographic details, anti-Xa levels, thrombotic and bleeding events were obtained from electronic and paper notes. Enoxaparin dosing obtained from medication chart.

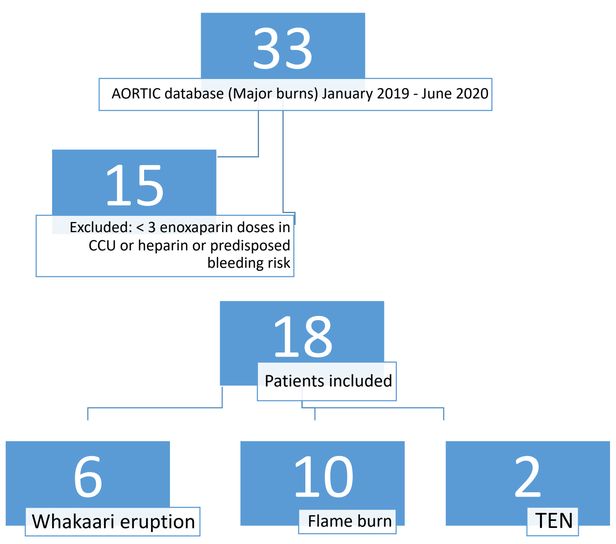

Figure 1. Patients included in audit

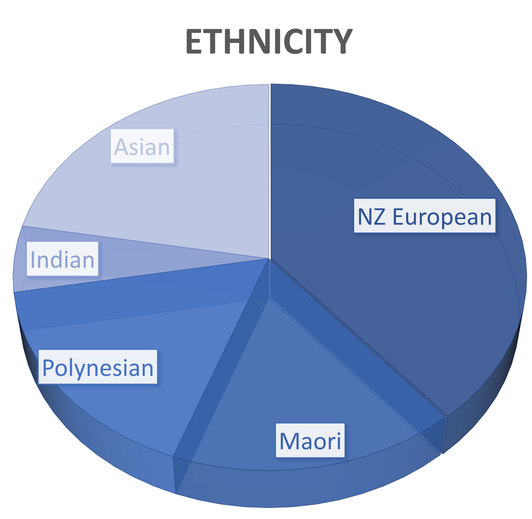

Figure 2. Ethnicity of major burns

Results

18 patients were included and 6 were a result of the Whakaari eruption (Figure 1). Patient demographics are included in table 1 and figure 2. 94% of patients were started on enoxaparin in the first 48 hours. However, only 66% of patients had anti Xa levels measured during the CCU stay and no patients had complete adherence to the protocol. 25% of patients had low levels that were not acted upon. Of initial anti Xa levels measured, 64% were low, 36% were on target and no patients had high levels (Figure 3). 38% of patients had enoxaparin dose increases during their CCU stay. Comparison of initial and final daily doses of enoxaparin are illustrated figure 4.

33% had a clinically significant VTE, half of which occurred whilst anti-Xa levels were in the target range. 38% had clinically significant bleeding events, none of which were thought related to prophylactic enoxaparin. Two patients suffered a bleeding event deemed in part secondary to enoxaparin when anticoagulated for femoral DVTs; one of which received protamine.

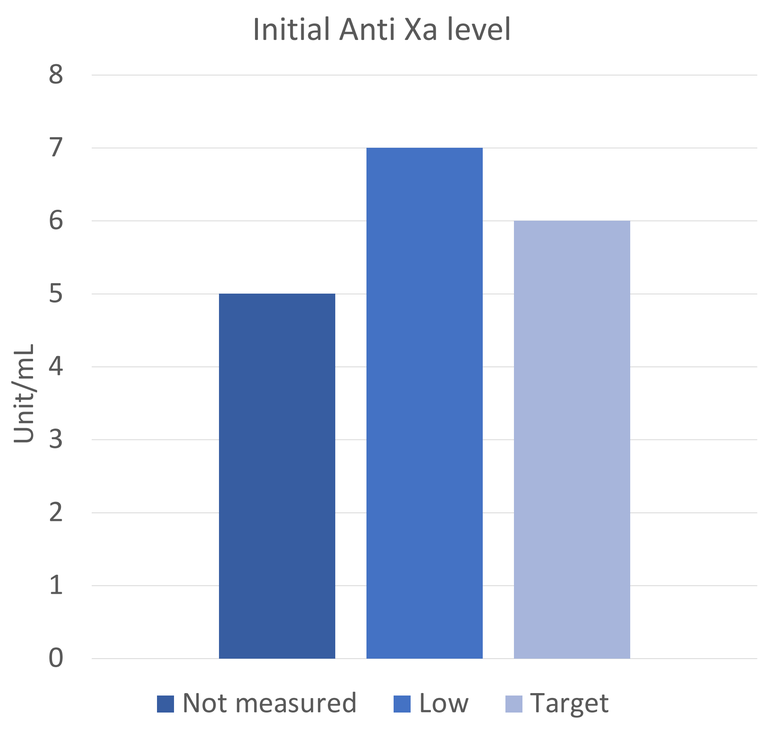

Figure 3. Initial Anti-Xa level

Discussion

Global adherence to protocol was poor. The proportion of anti-Xa levels being measured was low. In those measured with appropriate prophylactic dose adjustment made, bleeding events did not seem to be increased. Titration of enoxaparin using anti-Xa levels led to a higher daily dose of enoxaparin. A prospective study is required to accurately quantify the risk/benefit of this practice.

Conclusion

Standard VTE prophylaxis results in sub prophylactic anti-Xa levels in this patient group. Up titration of enoxaparin using anti-Xa levels did not appear to increase haemorrhagic events. Review of local practice is required to improve protocol adherence.

	Mean	Standard deviation
Age	37.9	14.6
Male:Female	8:10	
Body Mass Index	28.5	7.6
Total Body Surface Area (%)	49.4	16.0
ICU length of stay (days)	22.6	19.3
Hospital length of stay (days)	58.6	35.5
Transferred from outside Auckland (%)	83%	

Table 1. Demographic details

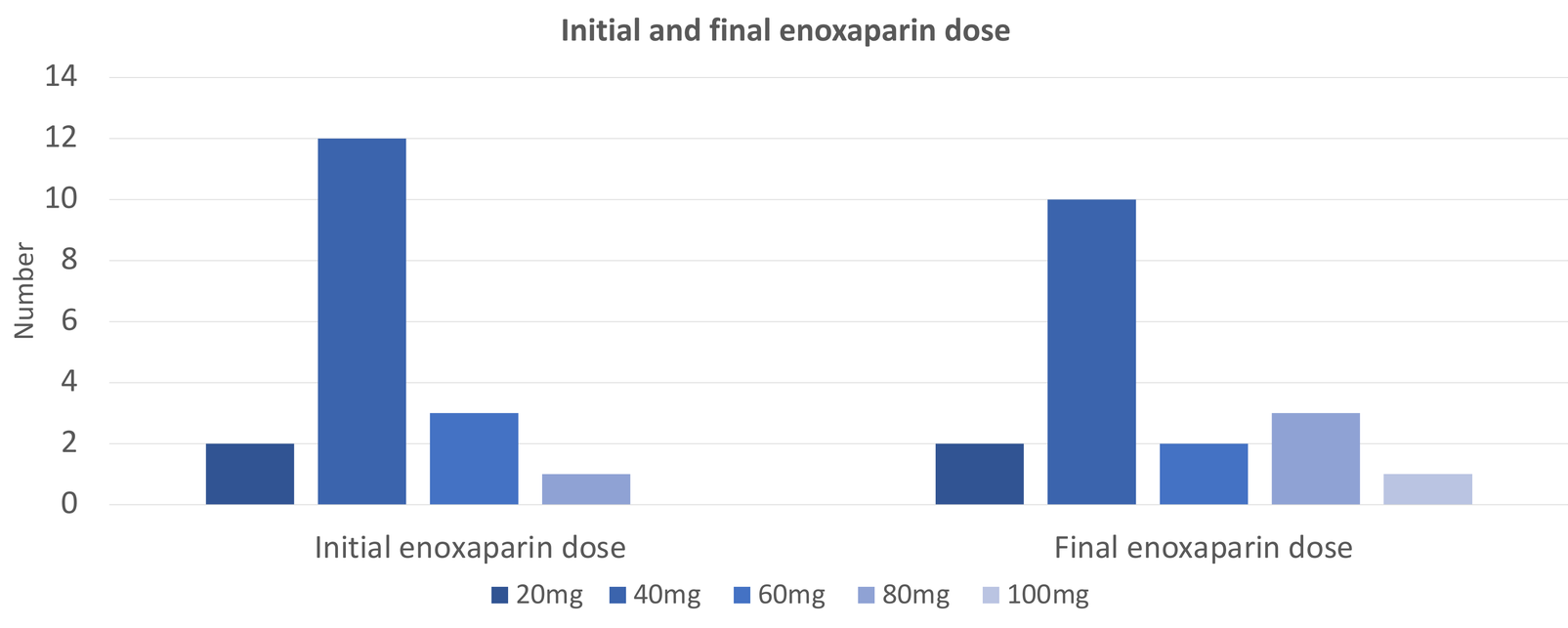

Figure 4. Comparison of the initial and final enoxaparin dosing

References
1) Pannucci CJ, Osborne NH, Wahl WL. Venous thromboembolism in thermally injured patients: analysis of the National Burn Repository. J Burn Care Res. 2011;32(1):6–12.
2) Blanchet, Benoit, et al. Influence of burns on pharmacokinetics and pharmacodynamics of drugs used in the care of burn patients." Clinical pharmacokinetics. 2008 47 (10): 635-654.