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Safety of 10,000 Unit Unfractionated Heparin Boluses for Acute Myocardial Infarction in the Emergency Department

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BACKGROUND

- Anticoagulation with unfractionated heparin (UFH) helps to mitigate the risk of further thrombosis in acute coronary syndromes.
- The American College of Cardiology Foundation/American Heart Association (ACCF/AHA) guidelines suggest the use of a 50-100 units per kilogram intravenous bolus prior to percutaneous coronary intervention (PCI) depending on intended use of a glycoprotein IIb/IIIa (GIIB/3A) antagonist.[1]

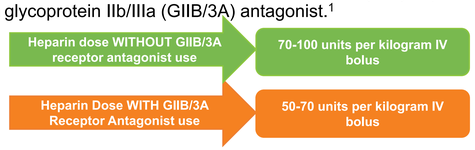

Figure 1

- The 2021 American College of Cardiology (ACC), the American Heart Association (AHA), and the Society for Cardiovascular Angiography and Interventions (SCAI) Guideline for Coronary Artery Revascularization recommend targeting an activated clotting time (ACT) of 250-300 seconds during PCI.[2]
- Parkview Health guidelines currently recommends a 70 unit/kg UFH bolus in a patient with an acute coronary syndrome.

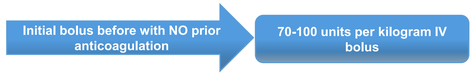

Figure 2

- The use of 10,000-unit UFH boluses is becoming increasingly common in the emergency department (ED) at Parkview Health prior to cardiac catheterization. For many patients, this set dosing exceeds guideline recommendations.

OBJECTIVES

- The purpose of this retrospective chart-review study is to evaluate the safety and efficacy of a 10,000 unit unfractionated heparin bolus in the emergency department prior to PCI.
- The primary objective was percentage of ACT values within goal range of 250-300 seconds.
- Secondary objectives included major bleeding rate, weight-based UFH bolus dose in comparison to guideline recommended bolus dose, percentage of initial ACT values within goal range, protamine use, and need for additional UFH boluses.

METHODS

- This was a retrospective chart review study at Parkview Regional Medical Center ED between January 1st, 2020 and August 31st, 2022.
- Patients were identified based on diagnosis of myocardial infarction, who received a 10,000 unit bolus of UFH in the ED, were at least 18 years old, and underwent PCI with at least 1 ACT value recorded.
- Exclusion criteria included an elapsed time of greater than 6 hours between UFH bolus administration and PCI, or initiation of a heparin IV infusion before PCI.
- ACT values collected during PCI were recorded.
- Administration of additional UFH boluses and reversal agents was recorded, as well as administration of blood products during and up to 24 hours after PCI.
- Manual chart review was completed to determine major bleed rates based on Thrombolysis in Myocardial Infarction (TIMI) criteria.

RESULTS

Table 1

Baseline Characteristic	n=120
Actual body weight, mean ± SD, kilograms	94.49 ± 25.71
Adjusted body weight, mean ± SD, kilograms	79.39 ±14.34
PCI in past 12 months, n (%)	5 (4.1)
Bleed in past 12 months, n (%)	0 (0)
Home anticoagulant use, n (%)	0 (0)
Prior aspirin use, n (%)	20 (16.6)
Prior clopidogrel use, n (%)	9 (7.5)
Approach, n (%)	
Radial	61 (50.8)
Femoral	58 (48.3)
Other	1 (0.8)

Figure 3

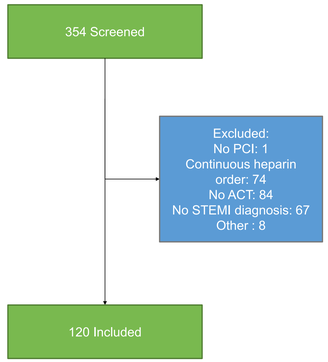

Figure 4

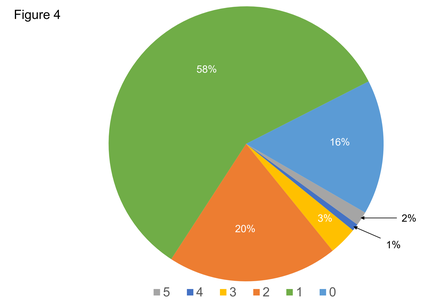

Table 2

Secondary Outcomes	N=120 (%)
Bleeding events, major	1 (0.83)
Blood product usage, 24 hours	1 (0.83)
Protamine use	0 (0)

Figure 5

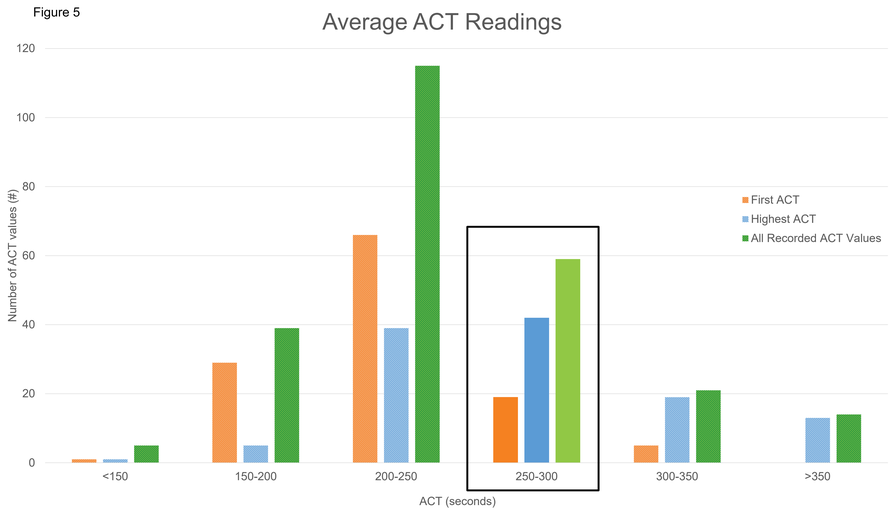

Table 3

Heparin Results	n=120 (%)
Initial dose units/kg, mean ± SD (AdjBW)	130.30 units/kg ± 25.41
Initial dose units/kg, mean ± SD (TBW)	112.78 units/kg ± 28.64
Number of additional doses mean ±SD	1.2 ± 0.894
Total UFH dose, mean ± SD	14,805.79 units ± 3745.76
% of all ACT readings in goal range	20 (16.6%)
First ACT reading in goal range (% of total)	19 (15.8%)
First ACT above goal range (%)	5 (4.2%)
First ACT below goal range (%)	96 (80%)

DISCUSSION

- Mean total units of UFH received was 14,805.79 units over an average of 1.2 doses, with 84% of patients requiring an additional dose of heparin during PCI.
- There was one additional bleeding event that occurred outside the 24-hour timeframe.
- The patient who experienced a bleeding event received 2 doses of UFH, totaling 18,000 units of UFH meaning the bleeding event cannot be attributed to the 10,000 unit bolus alone.
- The study relied on documentation in the patient chart during PCI. The study is unable to account for ACT values that were not documented or variabilities in the documentation of sheath insertion and removal, making the time frame of PCI difficult to evaluate in some cases.
- Greater than 80% of patients evaluated in this study required additional boluses, making evaluation of the impact of the 10,000-unit bolus alone difficult.
- There were 5 patients with supratherapeutic initial ACT readings, 1 of those patients required an additional UFH doses of 5000 units during PCI.

CONCLUSION& FUTURE DIRECTIONS

- Based on these results 10,000 unit UFH boluses prior to PCI do not put patients at an increased risk for bleeding events.
- These 10,000 unit boluses should still be used with caution based on the results of our study. The highest mg/kg dose based on actual body weight was >200 mg/kg.
- The mean unit per kilogram dose in the study was 130. 3 units per kilogram. Based on these results it would be appropriate to recommend a 10,000 unit UFH bolus for patients with an adjusted body weight greater than 75 kilograms. Any patient with an adjusted body weight less than 75 kilograms should receive guideline directed weight-based dosing.

REFERENCES

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2. Writing Committee Members, Lawton JS, Tamis-Holland JE, et al. 2021 ACC/AHA/SCAI Guideline for Coronary Artery Revascularization: A Report of the American College of Cardiology/American Heart Association Joint Committee on Clinical Practice Guidelines [published correction appears in J Am Coll Cardiol. 2022 Apr 19;79(15):1547]. *J Am Coll Cardiol*. 2022;79(2):e21-e129. doi:10.1016/j.jacc.2021.09.006

Disclosure

All authors of this presentation have nothing to disclose concerning possible financial or personal relationships with commercial entities that may have a direct or indirect interest in the subject matter of this presentation.