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Evaluation of an adjusted body weight based heparin protocol

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OBJECTIVE

Determine the efficacy and safety of a pharmacist-driven adjusted body weight protocol for therapeutic intravenous (IV) heparin dosing in patients of all weights in a community health system.

BACKGROUND

- Anticoagulation guidelines from the American College of Chest Physicians, American College of Cardiology, and American Heart Association support the use of weight-based therapeutic heparin.[1,2]
- Guidelines do not define what weight to use when dosing therapeutic heparin.
- Previous studies suggest obese patients may require relatively lower rates of weight-based heparin to obtain therapeutic anticoagulation compared to normal weight patients.[3,4,5]
- Current institution protocols dose all therapeutic heparin infusions by adjusted body weight.

METHODS

- **Study design:** Retrospective chart review of patients who received pharmacist-dosed therapeutic IV heparin infusion, including a bolus. Subjects evaluated in groups divided by body mass index (BMI) as defined by the World Health Organization (WHO). Data included from May 2019 through August 2019.
- **Inclusion criteria:** Patients with at least one activated partial thromboplastin time (aPTT) drawn 6 hours after heparin initiation.
- **Exclusion criteria:** Patients who received heparin prior to arrival at the study site, those receiving thrombolytics prior to heparin initiation, or those on heparin with Impella or neurologic conditions.
- **Primary outcome**: Percent of initial aPTTs in therapeutic range at least 6 hours after heparin initiation
- **Secondary outcomes:**
  - Percent of aPTTs in therapeutic range for 72 hours after heparin initiation
  - Percent of patients with two consecutive therapeutic aPTTs
  - Time to two consecutive therapeutic aPTTs
  - Number of dose changes within 72 hours of heparin initiation
  - Percent of patients requiring additional heparin boluses
  - Number of patients with two consecutive aPTTs >95 seconds
  - Time to next aPTT following an aPTT >110 seconds
- **Safety outcomes:**
  - Incidence of minor bleeding as defined by the Bleeding Academic Research Consortium (BARC)
  - Incidence of major bleeding as defined by BARC criteria
  - Percent of patients with an aPTT >110 seconds
  - Incidence of new thrombosis after heparin initiation

RESULTS

Table 1

Demographics	Normal (n=91)	Overweight (n=111)	BMI Class I & II (n=143)	BMI Class III (n=57)
Age, years	70.4	65.7	65.3	56.8
Male	48 (52.7)	72 (64.9)	90 (62.9)	30 (52.6)
Caucasian	87 (95.6)	101 (91)	135 (94.4)	50 (87.7)
Heparin Initiation Location				
Emergency	39 (42.9)	52 (46.8)	61 (42.7)	30 (52.6)
Intensive Care	21 (23.1)	18 (16.3)	26 (18.2)	8 (14)
Medical	31 (34)	41 (36.9)	56 (39.1)	19 (33.4)
Indication				
DVT/PE†	35 (38.5)	32 (28.8)	39 (27.3)	25 (43.9)
ACS‡	32 (35.2)	36 (32.5)	73 (51)	15 (26.3)
Other¥	24 (26.3)	43 (38.7)	31 (21.7)	17 (29.8)

†Deep vein thrombosis/pulmonary embolism (goal aPTT 55-80), ‡Acute coronary syndromes (goal aPTT 50-70), ¥ Other (goal aPTT 50-70)
*Unless otherwise stated, all numbers represented as n (%)

Figure 1

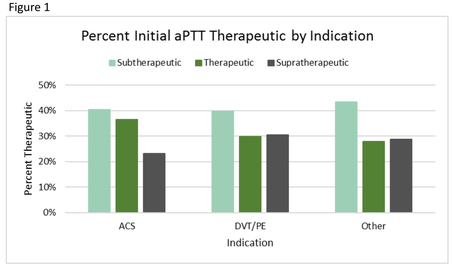


Table 2

Percent Achieving 2 Therapeutic aPTTs Consecutively and Time to Event	n (%)
Normal	
Yes	35 (38.5)
No	56 (61.5)
Average time, hours	38.5
Overweight	
Yes	38 (34.2)
No	73 (65.8)
Average time, hours	29.6
BMI Class I and II	
Yes	57 (39.9)
No	86 (60.1)
Average time, hours	32.9
BMI Class III	
Yes	15 (26.3)
No	42 (73.7)
Average time, hours	28.8

Figure 2

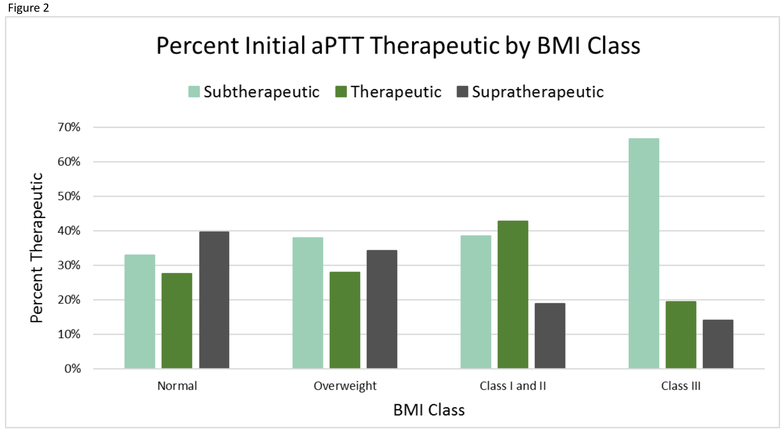


Figure 3

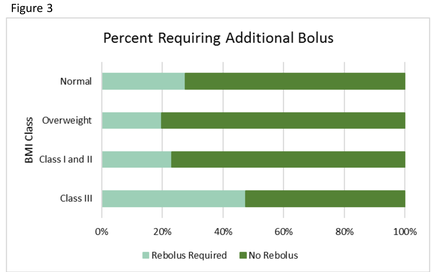
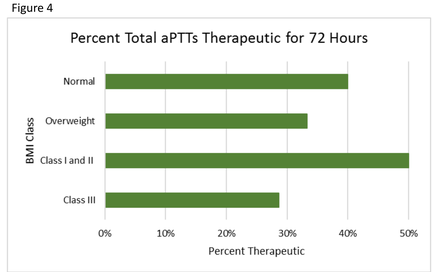


Figure 4



RESULTS

Outcomes

- 41.3% of WHO Class I and II obesity (BMI ≥30-40) patients were therapeutic at the first aPTT level drawn at least 6 hours after therapeutic heparin was initiated.
  - WHO Class III obesity (BMI >40) patients had the lowest rates of initial therapeutic aPTTs at 19.3%.
- On average, WHO Class III patients required 2.9 rate changes to become therapeutic compared to 2.5 rate changes in other groups.
- Normal weight and overweight patients had the most aPTTs >95 seconds consecutively (6.6% and 5.4% respectively) compared to WHO Class I and II, and Class III patients (2.1% and 0%).
- Following an aPTT >110 seconds, the time to next aPTT was an average of 8 hours.

Safety

- Incidence of minor bleeding is likely limited by under reporting.
- Only 2.7% of patients experienced bleeding requiring transfusion while on heparin, and no deaths due to bleeding occurred.
- 16.2% of patients had at least one aPTT >110 seconds.
- No incidence of new thrombosis after heparin initiation was found.

CONCLUSIONS

- The current protocol is effectively managing patients of all weight groups receiving therapeutic IV heparin, however some improvements could be made in the heaviest patients.
- Findings suggest patients with a BMI ≥40 may benefit from the utilization of a higher dosing regimen to obtain more therapeutic aPTTs.
- Studies utilizing actual body weight based dosing for therapeutic heparin have demonstrated a risk for bleeding similar to that of this study.[3,5]
- Use of actual body weight may be a more appropriate approach for dosing therapeutic heparin in patients with a BMI ≥40.

REFERENCES

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Disclosure

The authors of this presentation have the following 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:
Jenna Deininger: Nothing to disclose Elizabeth Meisberger: Nothing to disclose Kris Howard: Nothing to disclose