

Dosing of Thromboprophylaxis by Various Anthropometric Stratification: Are We Missing the Mark?



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Abstract: 480

Objective

Describe the prevalence of inappropriately dosed pharmacologic thromboprophylaxis (PTP) in critically ill adult patients

Background

- VTE is common in critically ill patients
 - Prolonged stay, increased costs, increased morbidity and mortality
- Omission of indicated PTP common (1 out of every 6 patients)
- PTP failure rate over 7%

Pharmacologic Thromboprophylaxis

- Guidelines make recommendations for PTP in critically ill patients
 - Ambiguous/unclear recommendations for patients with high bleeding risk, high risk for thrombosis, or patients with extremes in body weight

Methods

- Post-hoc analysis of nested cohort from previous cross-sectional study of ICU patients from 9 institutions
 - Patients receiving PTP with either enoxaparin (ENOX) or unfractionated heparin (UFH) included
- Outcomes
 - Primary: prevalence of inappropriate dosing based on BMI and total body weight (TBW)
 - Secondary: identify risk factors for inappropriate dosing
- Statistical analysis:
 - Univariable analysis using logistic regression
 - Multivariable generalized linear mixed-effect models to determine independent risk factors for inappropriate dosing

Definitions of Appropriate Dosing

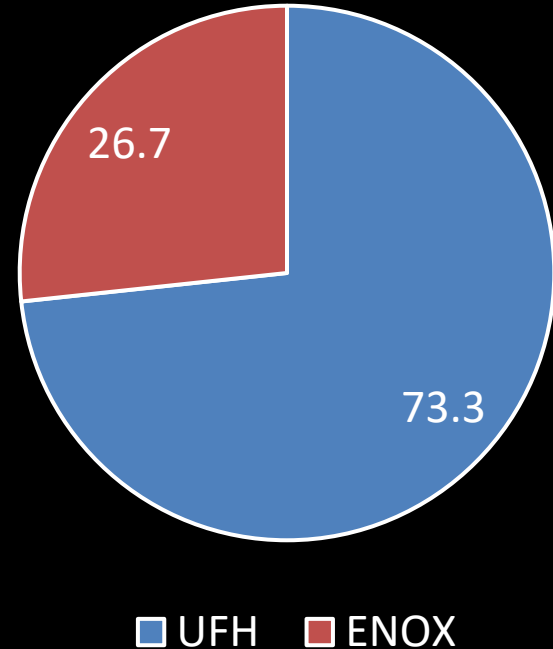
Anthropometric Stratification	ENOX Total Daily Dose (mg)	UFH Total Daily Dose (units)
BMI (kg/m ²)		
< 18.5	30	10,000
18.5 – 24.9	40	15,000
25 – 34.9	≥ 60	≥ 22,500
≥ 35	≥ 80	≥ 22,500
TBW (kg)		
< 50	30	10,000
50 – 99.9	40	15,000
100 – 149.9	≥ 60	≥ 22,500
≥ 150	≥ 80	≥ 22,500

Baseline Demographics

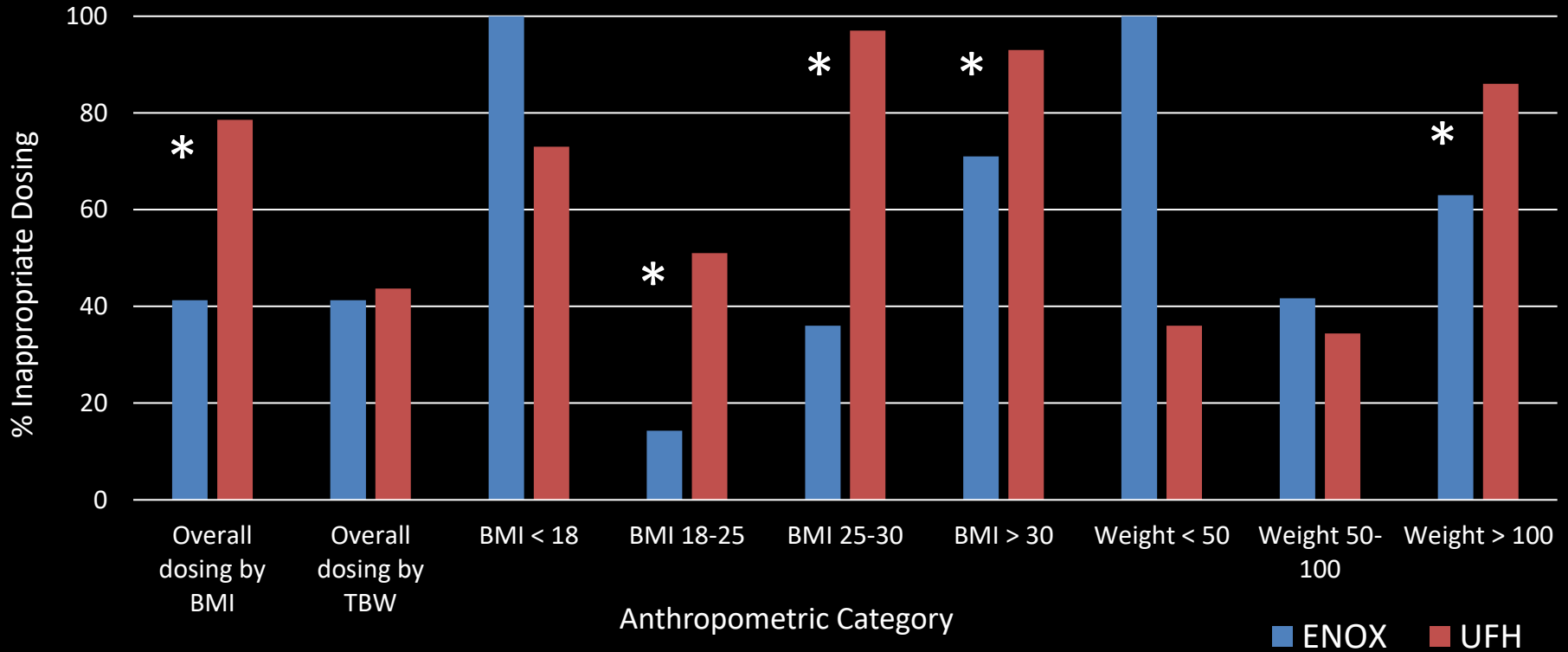
Patient Characteristic	UFH n = 126	ENOX n = 46	p-value
Age (years), median (IQR)	63.5 (52, 71)	52 (35, 68)	0.004
Male (n, %)	63 (50)	28 (60.9)	0.21
Weight (kg), median (IQR)	77.1 (59.6, 95.4)	81.5 (67.9, 98)	0.21
BMI (kg/m ²), median (IQR)	27.4 (22.4, 31.8)	27.8 (23.3, 31.8)	0.48
SOFA score, median (IQR)	5 (3, 7)	4 (3, 6)	0.14
ICU day, median (IQR)	5 (2, 10)	8 (4, 15)	0.02
Less than 48 hours post-op (n, %)	21 (16.7)	9 (19.6)	0.66
Renal injury (n,%)	61 (48.4)	9 (19.6)	0.001

Inappropriate Dosing is Prevalent

- 68.6% (n=118) by BMI
- 43% (n=74) by TBW



Appropriateness of Dosing by Agent and Anthropometric Category



Multivariable Analysis of Factors Associated with Inappropriate Dosing using BMI

Characteristic	Odds Ratio	95% CI
BMI < 18 or > 25 kg/m ²	10.45	4.38 – 24.92
Unfractionated heparin	6.93	1.06 – 8.77
Trauma	0.46	0.12 – 1.82
Hemoglobin > 9 g/dL	0.94	0.42 – 2.08
Surgery within 48 hours	0.77	0.29 – 2.08

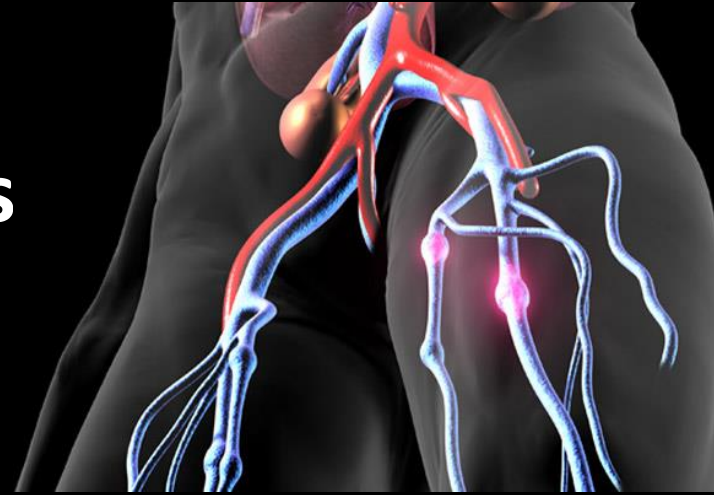
Multivariable Analysis of Factors Associated with Inappropriate Dosing using TBW

Characteristic	Odds Ratio	95% CI
TBW < 50 or > 100 kg	4.85	2.15 – 10.96
Unfractionated heparin	1.89	0.74 – 4.88
Trauma	6.03	1.28 – 28.44
Hemoglobin > 9 g/dL	1.66	0.83 – 3.34
Surgery within 48 hours	2.2	0.88 – 5.5

Discussion

- Inappropriate PTP dosing occurs frequently
 - Patients in extremes of body weight (by BMI and TBW) more likely to receive inappropriate dose
 - Inappropriate dosing more common with UFH than ENOX
 - Patients dosed by BMI - UFH independent risk factor for inappropriate dosing
- Comparative dosing strategies in predefined subgroups across anthropometric categories warranted to evaluate safety and efficacy

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