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# In Pursuit of Zero Preventable Deaths: A Retrospective Analysis of Venous Thromboembolism in Trauma Patients

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## Background

**Venous thromboembolism (VTE)** occurs when a blood clot forms in a vein

- VTE includes **deep vein thrombosis (DVT)** and **pulmonary embolism (PE)**

Studies have found the development of VTE can be attributed to various factors such as age, injury severity score (ISS), shock index, tranexamic acid (TXA) administration, and mechanism of injury.

While rates of VTE at LVHN in the past few years have been consistent, several VTE events have been noted recently and a question of preventability was raised.

- This study seeks to evaluate possible factors behind the development of VTE in trauma patients

	Deep Vein Thrombosis	Pulmonary Embolism
2017	1%	0.40%
2018	0.80%	0.60%
2019	0.50%	0.20%
2020	0.70%	0.20%
2021	0.80%	0.20%
2022	0.60%	0.30%

Table 1: Percentage of trauma patients who developed a VTE at LVHN

## Methods

Classified

- Retrospective process improvement analysis of 271 patients at a level I trauma center from January 2020 to June of 2023.
- Inclusion criteria: >18 age, ISS>0, and >48-hour hospital stay

Reviewed

- Demographics, comorbidities, injury characteristics and outcomes were analyzed by Fischer's exact test/ Chi-square for categorical data or Mann Whitney U for continuous data

Analyzed

- Univariate analysis was performed to control for confounding factors related to venous thromboembolism formation. Logistic regression analysis was used to evaluate causative factors for development of VTE

## Results

	No VTE (n=197)	Yes VTE (n=74)	p-value
Age	69.5	59.3	0.001
Gender			0.056
Male	44.2%	58.1%	
Female	55.8%	41.9%	
Mechanism			0.001
Fall	57.4%	35.1%	
Fall from height	19.3%	17.6%	
Motor vehicle collision	14.2%	28.4%	
Motorcycle collision	0%	8.1%	
Pedestrian struck	2.5%	0%	
Penetrating	2%	4.1%	
Other	4.6%	6.8%	
Shock Index	0.6	0.73	0.001
ISS	8.89	18.77	0.001
Transfusion within 24h?	10.2%	41.9%	0.001
Prothrombin Complex Concentrate Administered?	2.5%	8.1%	0.076
Tranexamic Acid Administered?	0%	18.9%	0.001
Central Line Insertion?	2%	50%	0.001
History of DVT	8.2%	13.7%	0.172
History of PE	3.1%	5.5%	0.467
IVC Filter	1.5%	2.7%	0.615
Cancer History	19.9%	11%	0.104
Pregnant/Postpartum	0%	0%	n/a
Hormone Replacement Therapy	2%	0%	0.577
Oral Contraceptive Use	1%	0%	1
Inflammatory Bowel Disease	4.6%	2.8%	0.733
Aspirin Use	28.9%	12.2%	0.004
Plavix Use	9.6%	8.1%	0.816
Warfarin Use	0%	0%	n/a
Apixaban Use	0%	0%	n/a
Rivaroxaban Use	0%	0%	n/a
Other Use	3.6%	1.4%	0.453

Table 2: VTE Risk Factors

VTE Factor	P Value
Age	0.797
Mechanism	0.372
Shock Index	0.003
Aspirin Use	0.016
ISS	0.001
TXA Administration	0.001

Table 3: Univariate ANOVA Test.

VTE Factor	Cofactor	P-Value
Shock Index	0.529	0.467
Aspirin Use	-8.668	0.003
ISS	40.499	0.001
TXA Administration	27.751	0.001

Table 4: Logistic Regression Test

## Conclusions

These data are consistent with previously published studies for risk factors for VTE.

- Aspirin was found to be protective and may represent an opportunity for VTE prevention in patients who are not otherwise candidates for VTE chemoprophylaxis
- As TXA usage was significantly associated with VTE creation, selective utilization of TXA may be appropriate in certain scenarios, and may be selectively utilized by thromboelastography

Further data collection is necessary to determine if there are other points of impact for VTE prevention.

Other subgroup analyses would be useful as well to determine other process improvement opportunities (ie prophylaxis holds for OR, TBI prophylaxis initiation, high grade solid organ injury prophylaxis initiation)

## References

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