

# Validation of the Caprini Score for Venothromboembolism in Neurosurgical Patients Undergoing Cranial Procedures

Christine Tschoe MD; Thai Vu MS, PA-C; James Holsapple; Keith G. Davies MD, MBBS, FRCS
   
 Boston University School of Medicine
   
 Boston Medical Center



## Learning Objectives

By the conclusion of this session, participants should be able to:

- 1) Familiarize oneself with the Caprini risk assessment model
- 2) Understand the risks of VTE in relation to cranial neurosurgery

## Introduction

Neurosurgical patients undergoing craniotomies are at high risk for developing venothromboembolism (VTE), with reports of an incidence of DVTs up to 25% and a mortality rate from PE between 9-50%. The Caprini risk assessment model is a method to stratify the risk of post-operative thromboembolic events (0 = very low risk; 1-2 = low risk; 3-4 = moderate risk; 5 or greater = high risk). Our goal is to validate the use of this model to assess the risk of VTE events in neurosurgical patients undergoing cranial procedures.

## Methods

We performed a retrospective review of those patients undergoing cranial procedures at our institution between July 2015 and June 2016. Inclusion criteria were all cranial procedures and available 30-day post-operative follow up. Exclusion criteria were the presence of VTE prior to or at the time of surgery and intra-operative and immediate post-operative death. The Caprini score, number of VTE events, and timing of chemoprophylaxis were recorded for each patient.

## Results

197 patients met the inclusion criteria (Fig 1). The VTE incidence was 8.6%. The mean Caprini score was 6.6 (range 1 - 18) for patients without VTE and 9.3 (range 3 - 14) for patients with VTE (Fig 2). There was a significant correlation between development of VTE and Caprini score (Spearman rho 0.25,  $p < 0.001$ ) (Fig 3). Not all patients were started on chemoprophylaxis due to various factors.

## Conclusions

This is the first report evaluating the Caprini risk assessment model in a neurosurgical population undergoing cranial procedures. It validates the Caprini model as a measure of post-operative risk of developing VTE. Patients with higher scores were at greater risk of post-operative VTE. The cutoff score was 3.

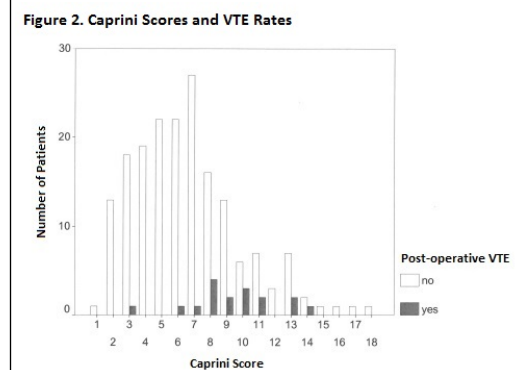
## References

1. Bahl V, et al. A validation study of a retrospective venous thromboembolism risk scoring method. *Ann Surg.* 2010 Feb;251(2):344-50. doi: 10.1097/SLA.0b013e3181b7fca6.
2. Caprini JA, Arcelus JI, Hasty JH, Tamhane AC, Fabrega F. Clinical assessment of venous thromboembolic risk in surgical patients. *Semin Thromb Hemost.* 1991;17 Suppl 3:304-12.
3. Cassidy MR, Rosenkranz P, McAneny D. Reducing postoperative venous thromboembolism complications with a standardized risk-stratified prophylaxis protocol and mobilization program. *J Am Coll Surg.* 2014 Jun;218(6):1095-104. doi: 10.1016/j.jamcollsurg.2013.12.061.
4. Hewes PD, et al. Evaluation of the Caprini Model for Venothromboembolism in Esophagectomy Patients. *Ann Thorac Surg.* 2015 Dec;100(6):2072-8. doi: 10.1016/j.athoracsur.2015.05.098.
5. Pannucci CJ, et al. Validation of the Caprini risk assessment model in plastic and reconstructive surgery patients. *J Am Coll Surg.* 2011 Jan;212(1):105-12. doi: 10.1016/j.jamcollsurg.2010.08.018. Epub 2010 Nov 18.
6. Shuman AG, et al. Stratifying the risk of venous thromboembolism in otolaryngology. *Otolaryngol Head Neck Surg.* 2012 May;146(5):719-24. doi: 10.1177/0194599811434383.

**Figure 1. Cranial Procedure Categories**

Cranial Procedures	Number of Cases
Burr hole drainage	11
Burr hole stereotactic guided biopsy	2
Craniocervical decompression	6
Cranioplasty	16
Craniotomy	127
DBS	3
Flap revision	1
Trigeminal balloon gangliolysis	4
Posterior fossa decompression	12
Ventriculo-peritoneal shunt	10
Endonasal transsphenoidal	4
Wound revision	1

**Figure 2. Caprini Scores and VTE Rates**



**Figure 3. VTE Risk by Caprini Score**

Caprini Score	VTE Risk
0	0%
1-2	0%
3-4	0.5%
5-6	2%
7-8	10%
9-10	21%
11-12	17%
13 and greater	20%