

Venous Thromboembolism Risk Stratification: The Missing Link in Hospitalized Patients

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Venous thromboembolism (VTE) is a serious, commonly encountered medical condition that is associated with significant adverse clinical outcomes. It also has a major negative impact on patients' quality of life and healthcare cost. Acutely ill patients admitted to medical wards are at particular risk for VTE during and following their hospitalization. A retrospective analysis showed that the incidence of VTE is more than 100 times greater among hospitalized patients compared to that among community residents¹. Most VTEs can be prevented by using risk assessment models (RAM) and well targeted thromboprophylaxis, however, sadly VTE prophylaxis remains largely underutilized².

Risk assessment models are tools used to accurately identify those at highest risk of VTE in whom the benefit of thromboprophylaxis outweighs the risk of bleeding. The Caprini RAM was first published in 1991. The RAM was subsequently updated to its most widely used version in 2005 to reflect new evidence, and improved understanding of VTE predictors³. The RAM uses individual risk factors (a total of 39 risk factors) to derive an aggregate score which places patients into four different categories based on their VTE risk. On the other hand, the Padua score (PS) is a prediction system that was developed in Italy in 2010. It uses 11 parameters to dichotomize patients into high and low VTE risk groups⁴. Risk assessment is the first step in preventing death and disability from VTE.

In his recent publication⁵, Zhou et al and col-

leagues report the results of a well-designed retrospective case-control study (902 patients in each arm) that examined the VTE discriminatory capacity of the Caprini RAM and PS in medical patients admitted to a large general hospital in China. The authors showed a linear relationship between the Caprini RAM and the risk of VTE. High risk classification was associated with increased risk of VTE (adjusted OR 4.10). These results solidify the evidence from several previous trials performed in different countries that assessed the utility of the Caprini RAM in medical patients⁶. In addition to risk stratification, another advantage of the Caprini RAM is that it provides recommendations regarding appropriate VTE prophylaxis methods. The study also showed that the Caprini RAM was able to precisely predict in-hospital and 6-month mortality in patients with VTE, which adds prognostication value to the model.

The investigators found that the Caprini RAM stratified 84.3% of the cases as moderate to high risk, and 57.1% as high risk for VTE, while, the PS identified 49.1% of the cases as high risk for VTE. These findings are compatible with prior results from different studies⁷. We believe that the higher sensitivity of the Caprini score is due to a more detailed set of risk factors. Family history of thrombosis, a powerful predictor of VTE is missing in the Padua score. This omission, results in overlooking protection for patients with a positive family history. Consider the case of a 68-year-old obese man with family history of VTE, admitted with urinary tract infection. Padua score=2 (low risk), however this is a high-risk patient (score=6) according to the Caprini score. We acknowledge the retrospective design of the study and

its effect on collection of the RAMs variables. This would have had a larger effect on the Caprini score, since almost all of the PS VTE risk factors are incorporated within the Caprini RAM.

So overall, we believe that utilizing the Caprini RAM will lead to the identification and protection of a greater number of patients from VTE. Rightfully, some of the critiques of the caprini RAM are its complexity and its time-consuming process. We recently devised and tested a patient-completed form of the Caprini RAM⁸⁾. We demonstrated an almost perfect correlation between patient- and physician-completed scores. Having the patient fill out the form with their family removes the onus of extensive patient questioning, and simplifies the face-to face encounter with the admitting physician. Collecting all of these data using the EMR and linking the score to a treatment plan is ideal.

Surprisingly, and despite the proven benefit of thromboprophylaxis only 4% of the patients in the VTE group of this study received thromboprophylaxis. Protection of 96% of the patients could have been achieved if a proper VTE prevention protocol was implemented. The underutilization of VTE prophylaxis seems to be a global problem. In a large international cross-sectional study across 32 countries, 39.5% only of at-risk medical patients received VTE prophylaxis²⁾. On a national level, in 2011 around 2000 VTE events and 940 deaths have been avoided in England by implementing a compulsory VTE risk assessment tool⁹⁾. Similarly, implementation of the Caprini RAM in Boston Medical Center, the largest safety-net urban hospital in New England has been highly successful. Their protocol resulted in decreasing the incidence of deep vein thrombosis by 84% from 1.9% to 0.3% and the incidence of pulmonary embolism by 55% from 1.1% to 0.5%¹⁰⁾. Based on these experiences, one can safely conclude that optimal risk assessment and thromboprophylaxis use decrease the burden of VTE. We believe that implementing a single risk assessment model in a hospital electronic medical record system and mandating the prescription of appropriate VTE prophylaxis based on the risk score will reduce VTE events. The use of different models for medicine vs. surgery in the same hospital can prove to be very confusing. Additionally, appropriate education of healthcare workers and patients are necessary steps to decrease the incidence of VTE. Finally, the availability of several oral medications to simplify ongoing prophylaxis should create the opportunity to design mandatory care pathways for providing pro-

phylaxis according to the level of risk since most events occur following hospitalization. Further studies are necessary to refine this process to decrease VTE outcomes including fatal pulmonary emboli.

Conflicts of Interests

None.

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