

Study will help physicians calculate risk of post-surgical venous thromboembolisms

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New research from the UC Davis Comprehensive Cancer Center, published in the *Journal of Surgical Research*, may help clinicians determine which patients are at highest risk for post-surgical blood clots in the legs or lungs.

A team led by Robert Canter, UC Davis associate professor of surgery, studied the [medical histories](#) of more than 470,000 [surgical patients](#) to determine which factors increased their risk of blood clots, also called venous [thromboembolism](#) (VTE). The team then created a nomogram, a type of calculator, which can help clinicians predict an individual's 30-day VTE risk. The results could change clinical practice by providing a more rational approach to preventing dangerous blood clots.

Blood clots are a critical safety and quality challenge for hospitals around the nation. While they can be prevented by administering [blood thinners](#), such as heparin, these measures increase the risk of bleeding. To complicate matters, clinicians have had no way of determining which patients are at higher risk for blood clots, forcing them to adopt a one-size-fits-all approach to prevention.

"The standard [preventive measure](#) is heparin," said Canter. "However, there are many questions surrounding its use: What type of heparin should be administered? What dosage? Should we give it to patients before or after surgery? By identifying patients who are at higher risk for VTE, we attempt to answer many of these questions and help to personalize treatment."

Blood clots of the legs or lungs are a serious surgical complication, which can cause [shortness of breath](#), longer hospital stays and, in rare cases, death. Successful treatment often requires patients to take the blood thinner Coumadin for three to six months after discharge.

The researchers combed through the American College of Surgeons National [Surgical Quality](#) Improvement (ACS-NSQIP) database to identify 471,000 patients who underwent abdominal or thoracic surgeries between 2005 and 2010. Their goal was to identify VTE events within 30 days of surgery, both in the hospital and after discharge (VTEDC). VTE includes deep vein thrombosis (clots in the legs) or pulmonary embolism (clots in the lungs).

The team considered many patient factors: age, body mass index (BMI), gender, race, pre-existing conditions, medical history, smoking and others. The group also factored in different approaches to surgery—abdominal, thoracic, laparoscopic, etc.—as well as the specific procedure type such as gastrointestinal, hernia, bariatric, splenectomy or lung. They also looked at post-operative complications, as these could affect both the length of stay and blood clot prevention efforts.

"There are a multitude of factors that go into whether a patient is at risk for VTE, as well as how to prevent it," said Canter. "Prior to this study, no one had ever looked at so many of these factors so comprehensively."

Overall, 1.5 percent of patients experienced a blood clot before discharge, while .5 percent experienced one after discharge. These rates were very consistent throughout the study years. A variety of factors were associated with increased blood clot risk, including age, high BMI, preoperative infection, cancer and non-bariatric laparoscopic surgery. Splenectomies carried the highest risk for blood clot, while bariatric surgeries had a lower incidence. In addition, major complications after surgery raised the incidence of VTEDC.

Perhaps most significant, the risks indicated by the study deviate sharply from current Joint Commission risk appraisals. For example, based on the study's findings, a patient with a history of colon cancer who is having his colon partially removed laparoscopically to treat recurrent cancer has a 10 percent chance of suffering a blood clot. Meanwhile, a patient having an emergency hernia repair has less than a 5 percent risk. Under current guidelines, however, both patients would be treated as having equal risk. Use of the [nomogram](#) to calculate risk could allow clinicians to more precisely respond to each patient's individual risk factors.

Charles LaFlamme, of Sacramento, is a good example of a patient whose care could have benefited from a better understanding of blood-clot risks. After having a very large liposarcoma removed from his abdomen, he was sent to the intensive care unit, where he experienced a persistent elevated heart beat but no other symptoms. Approximately a week later, he experienced shortness of breath while walking in his hospital room. A CT scan identified a pulmonary embolism. Aggressive treatment was prescribed for his remaining hospital stay and, after discharge he was placed on Coumadin for six months. The treatment was successful and LaFlamme fully recovered.

"The medical staff handled the situation well, but I would have preferred to have avoided it altogether," said LaFlamme.

The UC Davis research produced a couple of surprises. Though high BMI generally increased risk, the risk did not carry over to bariatric procedures, perhaps because more aggressive measures are often taken to prevent blood clots in bariatric cases. That splenectomies put patients at higher risk for clots was also a surprise, as the researchers expected the procedure would instead expose them to a higher risk of bleeding.

Canter notes that while hospitals around the nation have been focused

for several years on reducing VTE and VTEDC, these measures have not reduced their frequency.

"Despite all the attention to eliminating this as a post-operative complication, the numbers have remained static," said Canter. "This shows us that the approach needs to be more individualized."

While these results need to be validated, Canter believes the data will help clinicians take a more evidence-based approach to administering [heparin](#) and reducing the incidence of [blood clots](#). He says use of the information fits with hospitals' overall concern about safety, quality and cost. Specifically, these data could help hospitals and clinicians better focus their quality-of-care initiatives, ensuring that incentives and penalties are based on an accurate model of patient risk.

Provided by UC Davis

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