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Improving Awareness and Outcomes Related to Venous Thromboembolism

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Over the last 2 decades, understanding of risk factors, prevention, and acute and long-term treatment of venous thromboembolism (VTE) have increased substantially. This disorder, comprising deep vein thrombosis (DVT) and pulmonary embolism (PE), is the third leading vascular diagnosis after myocardial infarction and stroke, contributes to at least 3.2% of cardiovascular-related deaths in the United States (43,579 cases), and may affect 900,000 individuals annually (<http://www.cdc.gov/ncbddd/dvt/data.html>)¹. Surveillance for fatal and non-fatal VTE is not performed in the United States, so these statistics are imprecise. Recent evidence suggests that the lifetime absolute risk of VTE among black and white Americans after age 45 is 9.1%, with higher rates in those with risk factors including obesity (10.9%), factor V Leiden (17.1%) and sickle cell trait or disease among blacks (18.2%) (M Cushman, unpublished data). These rates correspond to lifetime risks at age 45 of 1 in 12 overall, 1 in 9 with obesity, 1 in 6 with factor V Leiden and 1 in 5 with sickle cell trait or disease, and may be compared to lifetime risks of 1 in 8 for breast cancer among women at age 40 or 1 in 6 for stroke among men at age 55.

The annual incidence rate of VTE in adults is 1-2 per 1000, increasing to ~1% annually at very old age, thus aging is an important risk factor. The worldwide obesity epidemic and aging population, along with the advent of more sensitive diagnostic tests, have all led to increases in disease incidence and prevalence. For many patients, VTE is a chronic burdensome disease, with recurrence rates of 5-10% annually after a first event, and with post-thrombotic syndrome occurring in up to 40% after a DVT¹.

About half of VTE events are unprovoked or occur during use of oral contraceptives, postmenopausal estrogen, or with pregnancy, and the remaining events are considered provoked, occurring in association with triggering factors such as hospitalization, surgery,

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trauma, immobilization and cancer. The triggers can carry a very high VTE risk, and pharmacological prophylaxis is often used. Less commonly recognized risk factors include inflammatory bowel disease, chronic kidney disease and minor injury. VTE is multicausal and the risk factors combine to additively or multiplicatively increase the risk. For example, obesity and oral contraceptives each double the risk of VTE, whereas obese women exposed to oral contraceptives have a 10-fold increased risk². Among those older than 70, risk factors such as relative immobility and minor injury, appear to contribute more substantially to VTE incidence compared to their influence in younger populations. For example, in one report the population attributable risk of VTE for immobility-related factors in the absence of hospitalization (defined as fracture, use of a lower extremity cast or splint, minor lower extremity injury and transient immobility in the home due to infection, malaise, fracture, minor injury or back pain), was 15% in those aged 70 and older, while these risk factors are uncommon precipitants in younger people³. Further, the PAR for hospitalization-related immobility was 27%, as compared to younger people where this PAR was 15%³.

VTE may be considered a “silent killer” because awareness of the disease is poor in the general population and symptoms can be attributed to other disorders, thus leading to delay in diagnosis.

Approximately 10% of patients with PE die before they are diagnosed and another 10% with PE die shortly after diagnosis⁴. It has been known for more than 50 years that anticoagulation reduces VTE mortality,⁵ so lack of awareness of VTE on the part of patients may contribute to these statistics. In a recent global survey of 7,233 adults, 57% of 800 Americans were aware of DVT and 70% of PE, compared to 89% for stroke and 90% for myocardial infarction⁶. In the global sample, self-reported positive response to a question asking if respondents knew what DVT or PE would feel like was poor; 28% for DVT and 19% for PE. Only 45% of survey respondents were aware that VTE could be prevented, and only 16%, 25% and 23% knew that cancer, hospitalization and estrogen containing medications, respectively, were risk factors. Patients with high risk conditions might be more aware of VTE, but in a survey of patients with cancer, less than 20% could name symptoms and only 3% knew that cancer treatments were associated with high VTE risk⁷.

Insufficient knowledge of risk factors, clinical presentation, prevention, and treatment of VTE may also exist among medical professionals although available data are limited. A survey of 155 general practitioners in France revealed that the majority were not aware of the diagnostic algorithm for PE⁸. Awareness of risk factors was also inadequate; although 99% knew prior VTE was a risk factor and 88% knew oral contraceptives were, only 55% recognized that age and 43% recognized that obesity were risk factors for VTE⁸. Awareness of contemporary treatment approaches is also low. Although clinical trials in the mid-1990's documented the safety of outpatient treatment of DVT, a recent study in a national sample found that only 28% of patients diagnosed with DVT in 2003-10 were treated in the outpatient setting⁹.

Improved public awareness reduces mortality from disease. For example, improved awareness of stroke and its symptoms is contributing to more rapid diagnosis and treatment, and to reduced mortality from stroke. There is little information on the effectiveness of

increasing public awareness on incidence or mortality from VTE. For example, during a public education campaign in a 100,000-person urban area of Poland the rate of diagnosis of DVT increased, but after the campaign ended the rates returned to baseline¹⁰.

Education of medical professionals to increase knowledge of VTE, and improvement in systems of care through implementation of prevention, diagnosis and treatment guidelines should reduce mortality from VTE, as these do for other cardiovascular diseases. Yet, coordinated programs for VTE guideline implementation, and assessment of practitioners' management of VTE are not available in the US, with the exception of performance measure-based programs from the Joint Commission and the National Quality Forum, which are primarily focused on providing VTE prophylaxis in certain hospitalized populations. Initiatives are needed to refine these measures to incorporate new knowledge on high risk groups and develop new programs that allow practitioners and health care systems to provide high quality care to patients with VTE at each stage of the disease – prevention, diagnosis, initial treatment and long term treatment. Several types of scalable quality initiatives would be beneficial:

- Prevention: office-based electronic record-embedded programs that automatically incorporate patient information to calculate the absolute risk of VTE in common situations such as prescription of contraception, preparation for surgery or initiation of cancer treatment, and then to translate the risk information to a suggested prevention strategy.
- Diagnosis: electronic algorithms to support diagnostic testing of patients with signs or symptoms of VTE, guided by pre-test clinical probability testing using findings on history, physical and laboratory testing; then imaging or clinical follow up when indicated.
- Treatment: systems of care that facilitate appropriate use of outpatient treatment as compared to inpatient admission, that assist clinicians on acute treatment options, and ultimately suggest a personalized plan for anticoagulation treatment duration based on individual characteristics and whether or not the VTE was provoked.

Emerging programs by scientific societies and voluntary health organizations hold promise for raising awareness of VTE, and long-term programs are most likely to yield success. The American Heart Association (AHA) held a Vascular Disease Summit in August 2015 to convene scientists and key stakeholders to advise on new organizational initiatives to improve patient and healthcare professional awareness of VTE and peripheral arterial diseases. A full report is forthcoming but key discussion points included implementation of public awareness campaigns and evidence-based quality / systems of care initiatives. The AHA is also a partner in a recent global program of the International Society on Thrombosis and Haemostasis to raise thrombosis awareness through World Thrombosis Day activities.

As new knowledge emerges on the risks, prevention, diagnosis and treatment of VTE, information must be practically disseminated to the public, and translated by healthcare professionals. Quality initiatives that provide a framework for the care of VTE patients or those at risk of VTE must be nimble, for rapid modification over time.

Advocates, policymakers, healthcare professionals, hospitals, insurers, researchers, patients and the general public should redouble their efforts to raise awareness in support of effective prevention, diagnosis, treatment and long term care of this third leading vascular disease.

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