One of the goals of the Harvard Medical School Orthopedic Trauma Initiative (HMSOTI) is to develop clinical practice guidelines to decrease variation in orthopedic trauma care within our clinical practices. Our Partners Orthopaedic Trauma Service (Massachusetts General Hospital and Brigham & Women’s Hospital) has had a protocol for deep vein thrombosis (DVT) prophylaxis for more than ten years. We have recently updated this protocol with the best-available evidence and HMSOTI surgeon buy-in, to develop a common protocol for our entire community (included & online).

DVT is a common cause of morbidity and mortality in hospitalized patients and is a well-known complication after fractures of the pelvis and lower extremity. Among patients with a hip fracture, venous thromboembolism (VTE) represents one of the more common causes of death after surgery.1,2

The detection of this life-threatening condition is often complicated in the trauma setting as frequently patients already have lower extremity swelling caused by their injuries. Major lower extremity trauma and prolonged immobility are well-recognized risk factors for DVT. This is in addition to the fact that up to half of DVTs present asymptomatically.

A study of two hospitals in Queensland, Australia found a 78% adherence to appropriate prophylaxis in orthopedic patients3 while a large review of an international, longitudinal registry reported an 86% compliance with the 2008 American College of Chest Physicians (CHEST) guidelines for VTE prophylaxis in patients who underwent total joint arthroplasty (TJA) or hip fracture surgery.4 These are rates of appropriate prophylaxis use in the context of published guidelines.

The American Academy of Orthopaedic Surgeons (AAOS) has guidelines for VTE prophylaxis in patients undergoing elective hip and knee arthroplasty, but they do not have guidelines for patients who have been injured. The CHEST guidelines include hip fracture surgery as a major orthopedic procedure that confers an increased risk of VTE to patients and recommends the use of thromboprophylaxis. However, these guidelines focus on the event of surgery in patients with a hip fracture and thus are mainly concerned with the recommendation of post-operative prophylaxis. Similar to their recommendations for TJA patients, they recommend the start of thromboprophylaxis as “either 12h or more preoperatively, or 12h or more postoperatively.”5 They do not take into account a key difference between orthopedic trauma patients and TJA patients: from the time of injury, patients with major lower extremity fractures are generally immobile until after their surgery. The National Institute for Health and Clinical Evidence (NICE) guidelines in the United Kingdom are the only major guidelines that offer explicit direction for hip fracture patients without contraindication to anticoagulation to start pharmacological VTE prophylaxis at admission (using low-molecular weight heparin or unfractionated heparin), stopping 12 hours before surgery and then re-starting 6-12 hours after surgery.6

In a review of our own data, we have focused on a subset of patients who are not explicitly addressed in many of the guidelines: orthopedic trauma patients who have transferred from a community hospital to a tertiary care center. Our most recent audit has shown a surprising result: approximately 77% of these patients have not had VTE prophylaxis prior to transfer. Even among patients with a hip fracture – patients whom the CHEST clearly places in a high-risk group - pre-transfer thromboprophylaxis was administered only 33% of the time. We are thus unclear as to why this is so, and wonder whether the anticipation of transfer and uncertainty of the transferring physician contributes to a lack of VTE prophylaxis in these patients.

The incidence of DVT among patients transferred to our hospitals was 18%. Our data show that patients who develop a DVT upon transfer from an outside hospital were more likely to be older and have a hip fracture. The impact of age as a risk factor for VTE has been variable in previous studies – in various patient populations, several studies have shown it to be an independent risk factor for VTE,7,8,9,10 while others have gotten a
demonstrates that identifying age as an independent risk factor for DVT.

Rates of asymptomatic DVT occurrence in patients with lower extremity fractures have been reported as high as 69% in those who do not receive prophylaxis. A 1995 study of asymptomatic DVT’s in trauma (not exclusively orthopedic) patients receiving DVT prophylaxis reported an incidence of 10%. It should be noted that our 18% incidence is in a largely unprophylaxed population and it is a rate of both symptomatic and asymptomatic DVT. Additionally, it is the rate of DVT upon transfer, meaning that the majority of patients developed their DVT within the first 3 days from their injury (the median length of stay at the outside hospital was 2.0 days). This highlights previous reports that early DVT/PE (pulmonary embolism) within 48 hours of an inciting circumstance can and does occur. Menaker et al. reported data that suggest up to 37% of PE after injury occurs within the first two days of hospitalization. Thus, early detection and treatment of DVT’s may lower the risks of development of PE.

Our DVT prophylaxis guidelines have been developed in consideration of the CHEST and NICE guidelines. We simplified the algorithm to ensure ease-of-use for surgeons, residents, and mid-level providers. Certain institutional specific resources such as the Coumadin Management Clinic at Brigham & Women’s and department-wide practices (i.e. Coumadin use postoperatively for all TJA patients at Brigham & Women’s) are the rationale for some variation in the guidelines between our hospitals. We will continue to update these guidelines as needed based on emerging evidence in the literature and our own population-specific DVT/VTE rates.

References

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