

## **Hospital Pharmacists and DVT Prevention During Hospitalization and at the Time of Hospital Discharge: A Patient Safety Issue**

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Venous thromboembolism (VTE), comprised of deep vein thrombosis and pulmonary embolism remains a threat to patient safety. Clinical evidence supporting the benefits of thromboprophylaxis has led to the development and publication of consensus statement guidelines from the American College of Chest physicians (1). The authors use a grading system reflecting the body of evidence supporting their recommendations. The grading is strongest when there is certainty that the magnitude of the benefit outweighs the risk. Despite the widespread dissemination of these guidelines, adherence in clinical practice requires improvement. The adherence to the 1995 Guidelines was assessed in 1,907 surgical patients across 10 teaching and community hospitals. Patients undergoing high risk abdominal surgery failed to receive adequate prophylaxis (2). A similar study in 2005 across 38 medical centers and community hospitals showed anticoagulation was often omitted in as many as 20% of high risk orthopedic surgical cases (3). More importantly the duration of anticoagulation was limited to the hospitalization period. These studies suggest that publication of consensus statements alone is insufficient to ensure the incorporation of current clinical information in routine clinical practice.

Pharmacists can play a major role in filling these gaps in practice. In a 483-bed teaching hospital a pharmacist driven education program directed at physicians, nurses and other practitioners was able to significantly improve prophylaxis prescribing. The educational program showed the current level of thromboprophylaxis, the patient population at risk, and the optimum prophylaxis to prescribe. Education consisted of didactic lectures, targeted round table discussions, newsletters and flyers, and interventions during clinical work rounds. Optimal prophylaxis improved in as many as 70% of patients. Similarly in a medical-surgical ICU a behavioral based program was implemented over a 1.5 year period that consisted of interactive education, verbal and written prompts, performance feedback, and computer generated prompts (5). The proportion of thromboprophylaxis improved to 100% of patients with adherence maintained 1 year later.

While increasing the prescribing of thromboprophylaxis will reduce VTE, anticoagulant therapy has been a major source of adverse drug events and patient injury. These drugs are receiving targeted attention from the Joint Commission, which has included anticoagulation therapy as a proposed 2008 National Patient Safety Goal associated with and from the Institute for Healthcare Improvement (IHI), which has targeted anticoagulants and several other high-alert drugs for improvement in its recently launched 5 Million Lives Campaign (6-7). Around the country the use of pharmacist to managed anticoagulation has proven effective in improving treatment outcomes. In hospitals with out pharmacist provided anticoagulation management length of hospital stay, costs and bleeding complications were significantly higher when compared to hospitals with pharmacist participation (8). At Brigham and Women's Hospital a great deal of emphasis has been placed computer-based technology to reduce error. We found that electronic infusion devices (pumps) were capable of intercepting programming errors that lead to anticoagulation overdoses and under doses (9). Similarly the use of bar code technology to ensure the correct drug and dosage form at the time of drug administration may capture and avoid errors. Early analysis showed the number of pharmacy dispensing errors that could lead to adverse events was reduce by 85% (10).

It is now recognized that as many as 75% of VTE events occur in the ambulatory setting (11). Extending prophylaxis beyond the hospitalization period for orthopedic patients requiring hip, knee or hip fracture surgery has been shown effective in reducing VTE events (12-14). Self-administration of extended thromboprophylaxis is feasible and can be accomplished in elderly patients even in the setting of rheumatoid and osteoarthritis (15). Little data exist on VTE prophylaxis in elderly medical patients at the time of hospital discharge. With the physiological changes in the coagulation cascade, impaired circulation and limited mobility, elderly hospitalized patients that are sent home to convalesce maybe a population at even greater risk. Studies are ongoing to evaluate these patients, determine current clinical practices, and identify optimal prophylaxis. The EXCLAIM trial, an ongoing trial, is evaluating the use of low molecular weight heparin prophylaxis for 28 days.

In summary, while practice guidelines exist for VTE prophylaxis, steps are required to ensure they are carried out in routine clinical practice. Beyond computer and human alerts, the use of pharmacists to provide education and identify patients at risk has been shown to be an effective strategy. Anticoagulant therapy requires careful monitoring to ensure patient safety. Operational improvements in administration may include smart pump technology and bar code drug scanning. Finally the VTE threat extends into the community. Further work is required to quantify the risk and identify safe and effective interventions.

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