

Editorial Focus

Venous thromboembolism prophylaxis: Quality, location (hospital vs. home), and duration

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Venous thromboembolism (VTE) prophylaxis for hospitalised patients at risk for deep venous thrombosis (DVT) or pulmonary embolism (PE) has been underutilised. Consequently, VTE has been identified as the number one cause of preventable death among hospitalised patients. Deaths and non-fatal VTE caused by failure to prophylax occur not only in the hospital but continue for at least several months after hospital discharge.

Government policy makers, patients, and health care providers have declared that the contrast between our in-depth knowledge of how to prevent VTE and our lackadaisical implementation of prophylactic measures is unacceptable. In 2008, Steven K. Galson, MD, MPH issued *The Surgeon General's Call to Action to Prevent Deep Vein Thrombosis and Pulmonary Embolism* (1). The Surgeon General estimates that in the United States alone, 100,000 to 180,000 deaths occur annually because of VTE. He states that although "we have made progress in our knowledge of how to prevent, diagnose and treat DVT/PE..., it is also clear that we are not applying that knowledge on a systematic basis."

Meanwhile, Medicare has devised a financial incentive for hospitals to enforce VTE prophylaxis among high-risk patients. Medicare is now authorised to withhold payment to hospitals for treatment of serious preventable complications termed "never events." Examples of "never events" include leaving a surgical instrument in the abdomen or transfusing blood with incompatible blood types. Medicare will not pay the incremental cost to manage a "never event," such as repeat surgery to remove the forgotten surgical instrument or additional hospital care to treat a transfusion reaction resulting from major blood type incompatibility. Rather, the hospital where the error occurred will bear the additional financial burden (2). As of October 1, 2008, Medicare declared the occurrence of VTE after total knee or hip replacement to be a "never event." This means that hospitals will have to pay for the extra costs of treating postoperative DVT or PE following knee or hip replacement.

Quality improvement programs have tried to increase in-hospital VTE prophylaxis rates, because this metric is readily ob-

tainable and easy to understand. Focus is placed on the percent of high-risk hospitalised patients who are receiving VTE prophylaxis. However, this simple statistic does not tell the whole story. The methodology for assessing *quality* of VTE prophylaxis is far more complex. Patients receiving pharmacological prophylaxis require the right drug, the correct dose, and the optimal dosing regimen with respect to duration of anticoagulant. Those patients with active bleeding or at very high risk of bleeding should receive prophylaxis, but with mechanical measures such as graduated compression stockings or intermittent pneumatic compression devices rather than with anticoagulants. The duration of VTE prophylaxis should extend beyond hospitalisation if the risk factors for PE or DVT have not diminished by the time of hospital discharge.

Evidence is compelling that VTE can strike after hospitalization (3). In a survey of 1,897 patients with VTE in the Worcester, Massachusetts area, 74% developed DVT or PE in the outpatient setting; 23% had undergone surgery and 37% had been hospitalised within the prior three months. Of the 516 who had been hospitalised and subsequently developed VTE, 67% developed VTE within one month of the preceding hospitalisation encounter. In a separate prospective RIETE registry of patients with acute VTE, 1,602 postoperative patients were identified (4). The average time elapsed from surgery to acute VTE was three weeks. These findings indicate the need to consider extended VTE prophylaxis after hospital discharge.

A collaboration among 14 Swiss hospitals has addressed the issue of quality of VTE prophylaxis. The effort was led by Christoph Kalka of Berne and is reported in the current issue of *Thrombosis and Haemostasis* (5). They focused on high-risk major orthopaedic or cancer surgery patients and achieved a remarkable rate of 96% in-hospital prophylaxis. I am not aware of any other study that can match these outstanding results for prophylaxis of high-risk hospitalised patients. Under current quality assessment guidelines, this accomplishment will receive universal praise. However, these investigators took the extra, important step of asking whether VTE prophylaxis was appropriately extended after hospital discharge. Orthopaedic surgery patients did

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receive outpatient preventive measures 77% of the time, but only 23% of cancer surgery patients received outpatient prophylaxis.

These findings indicate that quality initiatives for VTE prophylaxis must dig deeper than solely determining the rates of in-hospital prophylaxis. These Swiss investigators have discovered a finding that is certainly widespread. There is inadequate attention to the continuum of care from hospital to skilled nursing facility to home. VTE prophylaxis, in many cases, should not stop at the moment of hospital discharge. In fact, discharge orders should include VTE prophylaxis when high risk persists. Kalka's paper makes us pause and consider what is the best way to integrate extended prophylaxis into the hospital discharge orders.

We do know that alerting the responsible physician when his or her newly hospitalised patient is at risk but not receiving preventive measures is effective in two ways. First, the rate of prophylaxis increases. Second, and more importantly, the rate of symptomatic DVT and PE decreases compared with patients in whom an alert is withheld.

There are two fundamental approaches to alerting the responsible physician. The first approach relies upon a hospital staff member paging the physician that his or her high-risk patient is not receiving VTE prophylaxis. This "human alert" can reduce symptomatic VTE by 20% over the ensuing three months (6). Here, 2,493 patients (82% on Medical Services) from 25 study sites were randomised to an intervention group (n=1,238), in which another hospital staff member alerted the responsible physician, or to the control group (n=1,255), in which no alert was issued. Patients whose physicians were alerted were more than twice as likely to receive VTE prophylaxis as control sub-

jects (46.0% vs. 20.6%; $p < 0.0001$). The symptomatic VTE rate 90 days after randomisation was lower in the intervention group (2.7% vs. 3.4%; hazard ratio, 0.79; 95% confidence interval, 0.50 to 1.25), though the difference did not achieve statistical significance.

The second approach relies upon computer-based decision support and medical informatics to screen for high risk patients, check whether they are receiving prophylaxis, and warn the responsible physician with an electronic, computerized alert that preventive measures have not been ordered. This latter approach appears more effective, resulting in a greater than 40% decrease in symptomatic VTE (7).

The Obama Administration is pushing hospitals and health care professionals to embrace computer technology as a means of improving the quality of health care. A fundamental problem is that only 1.5% of U.S. hospitals have a comprehensive electronic-records system (8). Computerised provider-order entry for medications has been implemented in only 17% of hospitals. The very low level of adoption of electronic health records in U.S. hospitals suggests that policy-makers face substantial obstacles to the achievement of health care performance goals that depend on health information technology.

Kalka's contribution reminds us to focus on the quality of VTE prophylaxis. The rate of prophylaxis among high-risk hospitalised patients is only the first step in assessing quality. As alert systems are developed, both human and electronic, parameters for choice of drug versus mechanical prophylaxis, specific drug and dose, and extension of prophylaxis beyond hospitalisation should be incorporated into new tools to measure quality.

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