Preventing DVT and PE in Hospitalized Patients: Improving a Successful Electronic Alert

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Summary. At Brigham and Women’s Hospital (BWH) in Boston, MA, we recently concluded a four year randomized, controlled study of the effect of electronic alerts on physician behavior in the prevention of deep vein thrombosis (DVT) or pulmonary embolism (PE). We found that the use of an electronic alert reduced the risk of DVT or PE at 90 days by 41\%\textsuperscript{,1,2} Upon review of the instances where the recommended prophylaxis was not accepted, we designed enhancements to the alert.

Background. The initial study was undertaken to increase the rate of prophylaxis use in patients who are at risk for DVT or PE, especially when hospitalized for other causes. We developed a program to detect which patients are at risk, then built a system to identify those patients, alert the physician, and offer the opportunity to order appropriate prophylaxis directly from the alert screen.

We defined risk according to a scoring system, assigning points according to the existence of eight factors: cancer (3), bed rest (1), major surgery (2), obesity (1), advanced age (1), prior VTE (3), hypercoagulability (3), and hormone replacement therapy/oral contraceptives (1). High risk was defined as a score of 4 or greater. All data needed for scoring are available in the computer system at BWH, allowing automated processing to be run behind the scenes. The program reviewed risk scores once daily. Those patients found to be at high risk, but who already had orders for preventive prophylaxis were excluded. The others were randomized to either a control or an intervention group.

Alerts were sent only once per patient per admission. Whom to alert was determined according to the assignment of coverage responsibility. The House Officer received the alert when he or she logged into the clinical system. The alert screen provided details of what factors caused the patient to be at high risk, and the opportunity to create the recommended orders directly from that screen.

Study Results. During the study period, 2506 patients were identified as eligible for the alert. Randomization placed 1255 into the intervention group, and 1251 to the control group. Follow-up reviews of patients was done at 90 days to determine whether the patient had developed DVT or PE; confirmation of each diagnosis was done by imaging tests. Final results were dramatic: control group patients had a greater than 8\% rate of symptomatic DVT or PE, while intervention group patients had an overall 41\% reduction in VTE.

The results of the study were sufficiently satisfying that we have turned off the randomization, and our alert now runs for all patients hospitalized at BWH. A multi-disciplinary group drawn from medical, pharmaceutical, and informatics departments convened to review the results of and design enhancements to the alert system. We identified two issues to be addressed: one, the House Staff ordered prophylaxis for only about one-third of the intervention group patients, and two, we did not provide a method for the physicians to indicate why they declined the alert. We hypothesize that many of them may fear a risk of increased bleeding with pharmacological measures.

Next Steps. We have developed an enhanced alert that makes several changes based on our review of the study. If no action is taken when the alert is presented, a new screen provides a list of reasons for declining the alert. We use an “opt-out” method on the final order template for mechanical prophylaxis, by preselecting TED stockings. Expanded educational information for the physician displays the results of the initial study, and provides a link to a VTE resource guide. The alerts are generated for the house staff at 8:30 am daily; if no response has been made in 24 hours, a text page is sent to the attending physician. The enhanced alert will be implemented at BWH in Spring 2006.

Conclusions. Input from multiple disciplines and attention to when and how alerts are presented will result in improved acceptance of the alert. Engaging the providers’ attention and feedback is necessary to provide a successful quality assurance process.

References