Quality assurance of venous thromboprophylaxis in a university hospital

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Background

Venous thromboembolism (VTE) is an important complication in hospitalised patients. Appropriate use of pharmacologic and mechanical prophylaxis reduces the risk of VTE to less than 50% without inducing major bleeding. However, several studies on VTE prevention have shown considerable underuse of prophylaxis and emphasize the importance of quality assurance. Introduction of clinical information systems with computerised physician order entry (CPOE) reduces communication errors and offers novel opportunities for quality improvements by computer-based clinical decision support.

Methods

CPOE was introduced 2006 at the University Hospital Zurich (USZ) in three wards for all orders of medication and care and is now used hospital-wide for all in-patients except in the intensive care unit. In order to improve the rate of thromboprophylaxis an electronic alert system (eAlerts) has been developed. The eAlert reminds the physician to consider ordering prophylaxis if no such orders have been placed six hours after patient admission. The alert button appears in the electronic chart and links to guidelines. Data for analysis of VTE orders were extracted from the clinical database. Cases with a length of stay of <24h in the admission ward were excluded.

Results

National assessment
In a Swiss survey published in 2005 less than half of the hospitalised medical patients at risk were receiving VTE prophylaxis, including 44% at the USZ.

Intervention assessment
Evaluation of eAlerts introduced in a pilot ward showed good compliance of the physicians, resulting in higher rates of appropriate prophylaxis. The prophylaxis rate on this ward averaged 43% before (2006/07) and 67% during the study period (2007/08), whereas no significant increases were observed in the two control wards in which CPOE was used without eAlerts. The rate of prophylaxis remained high after the end of the pilot study (73%, 2009), despite cessation of specific continuing medical education.

Actual situation
CPOE had been implemented hospital-wide permitting detailed analysis of prophylaxis orders in 2010 in 27,940 cases (21,324 patients) treated in 27 clinics. The rate of prophylaxis in ten surgical clinics was higher (mean of 79.3%; range 52.8–95.8%) and more often included both pharmacological and mechanical prophylaxes (34.7%) as compared to 12 medical clinics with an average prophylaxis rate of 58.1% (range 41.2–80.5%), including 8.7% combined prophylaxes (p <0.0001). In particular, a significantly higher use of compression stockings was observed in surgical (41.8%) compared to medical (10.4%) clinics (p <0.0001). Orders for surgical patients were placed more frequently before admission (51.5%) as compared to patients treated in internal medicine (5.2%, p <0.0001), reflecting different frequencies of scheduled admissions.

Next step
In order to expand and evaluate the eAlerts on a hospital-wide scale in the year 2011 a clinical protocol for a randomized controlled trial has been developed and submitted. The concept of a stepwise roll-out of the system has been recently endorsed by the ethical committee and the medical director of the hospital. The project disclosed the absence of hospital-wide guidelines and urged the establishment of guidelines for preventing VTE and their linkage to the clinical information system.

Discussion

The heterogeneity of prophylaxis observed between the clinics primarily reflects the differences in patient populations, diagnoses and procedures applied. However, un-
der use of prophylaxis may still be a problem, as suggested by the substantial impact of the eAlerts on the rate of appropriate prophylaxis. Quality assurance programmes established in industry can also be applied to improving medical services. These methods are based on Shewhart’s cycles of plan/do/check/act. Quantitatively assessing the effectiveness of each cycle is of great importance in this iterative approach. Thus, controlled clinical studies have been included in the ongoing effort to improve thromboprophylaxis at our institution.

Computerised decision support reduces risks and decreases rates of accidents and casualties in most business areas, e.g., in air traffic. Health care also offers great potential as most information on patients is now becoming digitally available in clinical databases. Specific electronic reminders and warnings may promote more consistent adherence to evidence-based guidelines. In conclusion, VTE prophylaxis can be improved by eAlerts. Computer-based clinical decision support will increasingly contribute to better and safer care.