Improving the effectiveness and efficiency of coagulation testing

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Highlights

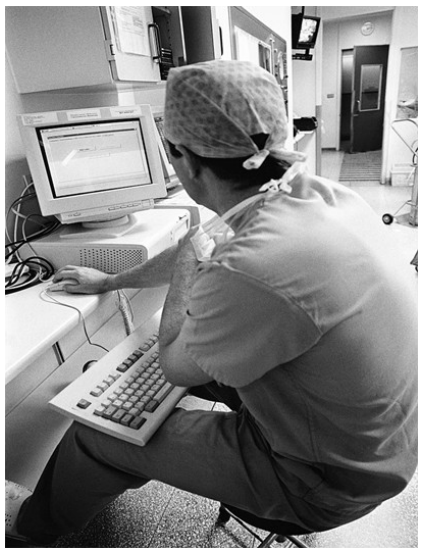
- Effective pathology services require timely communication of patient-related information between the laboratory and clinicians.
- The introduction of a structured screen as part of a Computerised Provider Order Entry (CPOE) system in 2006 prompted clinicians to provide patient-related information about heparin or warfarin treatment. This resulted in a significant increase in the proportion of tests providing the necessary information for aPTT (from 3% to 3.9%) and for PT/INR (1.9% to 2.6%) when compared to the previous hand-written system.
- CPOE was also associated with a significant fall in laboratory turnaround times of 9 minutes for aPTT and 7 minutes for PT/INR tests.

Well designed electronic screen formats and decision support prompts can have a positive impact on the contribution pathology services make to the quality of patient care.

Background

Computerised Provider Order Entry (CPOE) systems with their advanced information management and decision-support structures provide an important platform for enhancing the contribution of pathology services to quality patient care. For many pathology tests, the provision of accurate and timely patient information is critical to the choice of test, its interpretation and follow up. In Haematology laboratories, activated Partial Thromboplastin Time (aPTT) or Prothrombin Time (PT)/ International Normalized Ratio (INR) tests, screen patients for bleeding tendency.

The results of these tests are rendered abnormal (at variance with a normal pathophysiological state) if the patient is on an anti-coagulant treatment of heparin or warfarin. On paper-based laboratory requests, the ordering clinician is expected to notify the laboratories usually through a hand-written notation that the patient is “On Warfarin” or “On Heparin.” Matching this information with a test result explains the appearance of an abnormal finding and prevents the series of laboratory validation procedures which are triggered by an abnormal finding. These validation processes include the resubmission of the sample for further tests and review until a test result is verified and available. They also include a series of safe practice guidelines to ensure the immediate and direct notification of the appropriate person responsible for taking action in response to an abnormal result.



Methods

The aim of this study was to measure the impact of a CPOE system on the frequency with which clinicians notify the Haematology laboratories about patients on heparin or warfarin treatment when ordering aPTT or PT/INR, and the subsequent impact on turnaround time.

The study was undertaken at a large teaching hospital in Sydney, Australia. Data relating to the provision of aPPT and PT/INR tests were extracted for the period 1 August—30 September 2005 (before electronic ordering was implemented) and compared for the same period for each year up to 2008. Statistical analysis compared the percentage of requests before and after implementation.

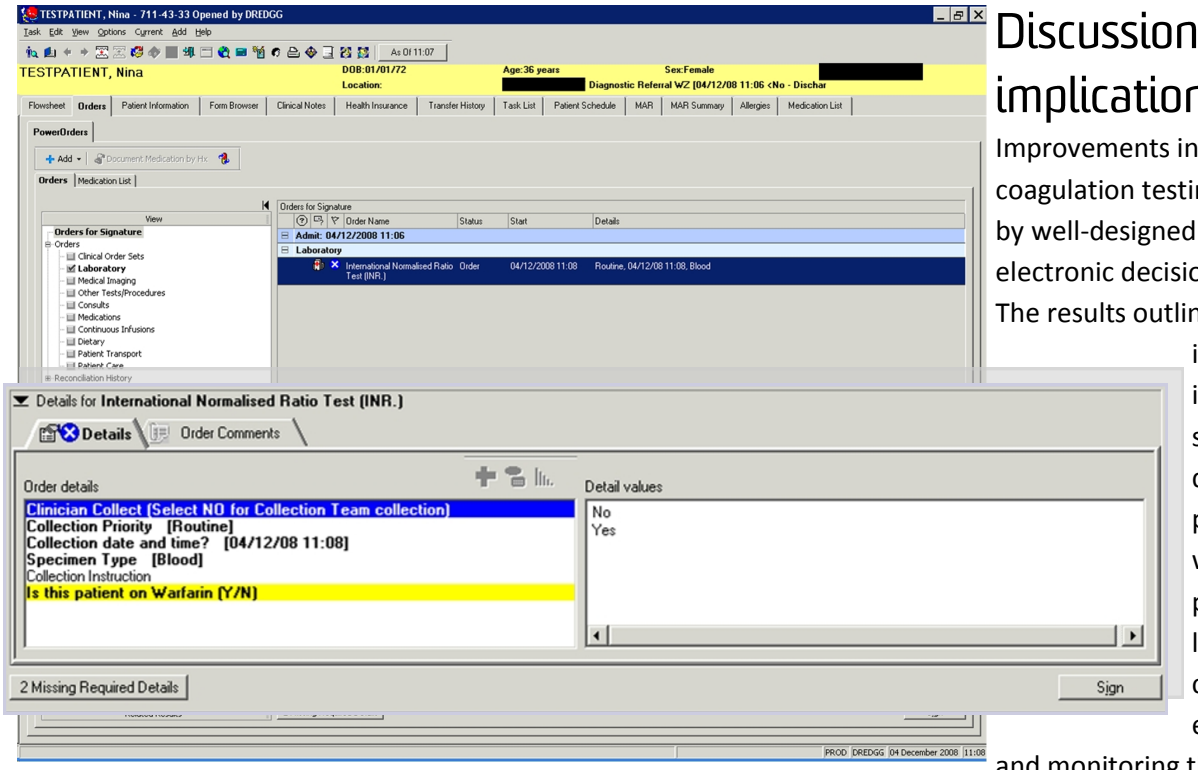


Figure 1 Screen shot extract demonstrating decision support prompt

After the introduction of the Cerner Corporation MIllenium Powerchart system (version 2004.01), information about patients' warfarin or heparin status was mandated as part of the test ordering procedure in a free text field as illustrated in the figure below. If physicians entered a "yes" response to the question it would trigger an automatic adjustment which made it unnecessary to undertake further confirmation and validation procedures. As this was a free text field, the automatic response was only triggered when a "yes" response was recognised. In situations where the physician may have entered the equivalent of a "yes" response, eg, "on hep," laboratory staff were required to make the decision that the validation procedures did not need to proceed.

Results

By 2008 the percentage of aPTT tests with information about heparin status had increased from 3% of aPTT tests (n=253) in 2005 to 3.9% (n=393) in 2008 (P<.001). During the same period for PT/INR tests the percentage of requests with warfarin status included increased from 1.9% of all PT/INR tests (n=161) in 2005 to 2.6% of all PT/INR tests (n=282) in 2008 (P=.009). CPOE was also associated with a significant fall in laboratory turnaround times by 9 minutes for aPTT and 7 minutes for PT/INR tests.

Discussion and implications for practice

Improvements in the efficiency of coagulation testing can be achieved by well-designed screen formats and electronic decision support prompts. The results outlined in this paper also indicate that the implementation and sustainability of decision support is part of a hospital-wide process in which pathology laboratories have a crucial role to play in enhancing the design, and monitoring the relative merits of, different electronic support features.

Further information

This summary is based upon the following published paper which presents full details of the research and is the correct citation for this information.

Andrew Georgiou, Stephen Lang, David Rosenfeld, Johanna I Westbrook. **The use of Computerized Provider Order Entry to Improve the Effectiveness and Efficiency of Coagulation Testing.** Archives of Pathology Laboratory Medicine 2011; 135: 495-498

Acknowledgements and partners

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This Series is designed to highlight findings from recent published studies or provide summaries of important work in progress. Where a published study is referenced this should be used as the primary citation for the information provided.

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