

Improving the investigation of suspected deep vein thrombosis in the Emergency Department

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Abstract

Deep vein thrombosis is an important medical condition that requires treatment to prevent further complications. However, diagnosing deep vein thrombosis is not straightforward because its symptoms can mimic a number of alternative diagnoses - often leading to unnecessary investigation. The latest NICE guidance published in June 2012 provides a clear evidence-based approach to diagnosis which helps to minimise this potential loss of valuable time and resources.

It was recognised that the Emergency Department was unaware of the latest guidance and demonstrated that it was often over and inadequately investigating suspected deep vein thromboses, unnecessarily using resources and putting patients at risk. To address this, a new investigation pathway and proforma were introduced into the department. It was placed onto the Trust website and incorporated into the departmental induction for new staff and trainees.

Following the introduction of these changes, a re-audit demonstrated that the department's investigation of deep vein thrombosis improved significantly. In addition to increased adherence to the latest guidelines and improved documentation there was a 21% reduction in the total number of ultrasound scans performed indicating a significant impact upon both the department and patient care.

Problem

The investigation of deep vein thrombosis (DVT) is often carried out incorrectly despite there now being very clear, evidence-based guidelines from the National Institute for Health and Care Excellence (NICE) utilising the two-level Wells' score. (1) Previous guidance has been based upon a more complicated three-level Wells' Score for risk stratification (2); as a result this has led to confusion among doctors in the Emergency Department regarding the correct approach to investigating suspected DVT. Both adherence to the latest guidelines and documentation was poor and there was a tendency for patients to proceed directly to ultrasound scan for investigation regardless of their presentation. This resulted in an unnecessary waste of valuable resources for busy Emergency and Radiology Departments and often led to patients being investigated inadequately and receiving differing standards of care.

Background

Deep vein thrombosis is a form of venous thromboembolic disease in which a blood clot forms in one or more of the deep veins, most commonly in the legs or pelvis. A DVT can dislodge and travel in the blood to the lungs causing a pulmonary embolus. This results in an obstruction to the lungs' blood supply, which can be a cause of significant morbidity and mortality.

The symptoms of a DVT are relatively non-specific: swelling, pain, redness and warmth in the affected limb. As a result many different and often less serious conditions could be considered a suspected DVT and require further evaluation.

The modes of investigating a suspected DVT beyond clinical examination are the D-Dimer blood test and proximal venous ultrasound scanning. The objective diagnosis depends upon ultrasound imaging. However, due to the cost and the high number of negative tests occurring for the above reasons, predictive scoring systems were developed which allow the diagnosis to be excluded in some patients without the need for imaging. The most commonly used scoring system is the Wells' Score. This uses information from the history and clinical examination to give a pre-test probability which then guides further investigation.

The NICE guidelines for venous thromboembolic disease were updated in June 2012 and provide a structured pathway for investigating DVT based upon the Wells' Score. Previous guidance has been based upon a three-level Wells' Score for risk stratification, classifying patients as Low, Moderate and High risk. The most recent guidelines utilise a simplified two-level Wells' Score which predicts patients to be 'Likely' or 'Unlikely' to have a DVT and has a higher threshold for ultrasound imaging. By not following these guidelines significant variation can occur in the approach to these patients, resulting in both increased costs and inadequate investigation.

Baseline Measurement

To determine the scale of the problem all cases of suspected DVT over a six week period were examined. The documentation for these clinical encounters, the details of the investigation requests made, and their results were reviewed. Over this six week period, only 9% of patients had a Wells' Score recorded and 71% of patients had an ultrasound scan requested in the first instance.

Overall, only 55% of cases were fully investigated according to the latest guidelines, often omitting D-Dimer blood tests and follow up investigation. Where Wells' Scores were not recorded, the notes were reviewed to identify the indications for the approach taken and an 'Estimated Wells' Score' calculated; the approach taken matched the documentation in only 40% of cases.

For further illustration, the method for calculating a two-level Wells' Score is demonstrated in the attached table.

See supplementary file: ds2270.docx - "How to calculate a two-level Wells' Score."

Design

The underlying causes for these shortcomings were discussed with both senior staff and other team members and a number of contributing factors identified. In the busy Emergency Department environment, staff often found that locating and consulting the guidelines to score patients accurately was too time-consuming. It also emerged that the guidelines currently available on the Trust Intranet had yet to be updated. Further, many were unaware of the latest guidance, which simplifies the investigation of DVT considerably. It was felt that previous guidance which utilised the more complicated three-level scoring system and lower thresholds for investigation often led to patients requiring imaging regardless of their presentation and so clinicians had adopted this as part of their routine approach to these cases.

To overcome these issues, an investigation proforma was designed which set out the latest guidance in a clear and concise format. This was stored in a clearly marked and regularly re-stocked location in the centre of the department and notices were circulated to all staff members to inform them of the update. The Trust Intranet was also updated with the proforma and the latest guidelines. Finally, details of the updated pathway were incorporated into the induction for new staff members.

Strategy

The strategy for implementing these changes followed 'The Model for Improvement' PDSA cycle approach (Plan, Do, Study, Act).

PDSA Cycle 1: In combination with the baseline results, the latest guidelines and a draft proforma were presented to the Emergency Department consultants at a local audit meeting. This was met with approval and suggestions were made to improve the proforma's clarity and aesthetics.

PDSA Cycle 2: The re-designed draft proforma was presented to the department as part of local teaching on DVT. Further feedback was received regarding its design and suggestions were made to improve its overall usefulness. As a result details of DVT management and the 'Out of Hours' approach were included.

PDSA Cycle 3: The proforma was trialled with several clinicians using example clinical cases and received entirely positive

feedback.

PDSA Cycle 4: The finalised proforma was discussed with the local Haematology Department and approved without further modifications being considered necessary.

PDSA Cycle 5: The proforma was rolled out to the department, which coincided with an update to the Trust Intranet. A modified version of the earlier teaching session was incorporated into the staff induction for clinicians.

Results

Post-intervention measurement was carried out over a six week period for comparison consistency. The documentation of Wells' Scores improved over five-fold from being recorded in only 9% of cases to 46%. Furthermore in those cases where Wells' Scores were not recorded, the approach taken matched the 'Estimated Wells' Score' from the documentation in 87% of cases (previously 40%). Where patients had previously been investigated incompletely, this percentage was reduced from 45% to 12%. Finally, over the monitored period the number of patients receiving ultrasound scans in the first instance fell by 25% and the total number of ultrasound scans performed decreased by 21%.

Lessons and Limitations

A number of lessons were learnt from this project. Active and busy departments are not necessarily aware of the latest guidance and often depend upon the initiative of their team to introduce these improvements. The introduction of these changes requires a systematic and thorough approach which goes beyond the simple creation of a new document or pathway since it takes a significant amount of promotion and re-education to raise awareness sufficiently to make an impact. The regular rotation of medical staff through different departments must also be taken into account when raising awareness and the ability to achieve this may be limited somewhat by the high numbers of temporary staff currently found in some departments and specialties such as Emergency Medicine.

Quality of documentation is also key to allowing performance to be reviewed and improved upon and was a limiting factor in this project. This may well represent a wider issue with increasing time pressures in busy departments.

Proformas are a valuable tool to promote a uniform approach to combat these challenges where investigation pathways exist, but they must be clear and concise. They require promotion and accessibility to raise awareness and ensure their regular and continued use.

Conclusion

The introduction of the latest guidelines through the described intervention has had a significant impact upon the department and its patients. Fewer ultrasound scans are being performed both in

the first instance and overall resulting in significant time and monetary savings for busy Emergency and Radiology Departments. Documentation has also improved substantially, although this could benefit from further action in the future. Finally, patient care has benefited with cases of suspected deep vein thrombosis now investigated more thoroughly and consistently according to the latest evidence-based guidance.

References

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Declaration of interests

Nothing to declare.

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