

# Venous thromboembolism (VTE) risk assessment and prophylaxis in acute orthopaedic admissions: improving compliance with national guidelines

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## Abstract

"Each year over 25,000 people die from Venous Thromboembolism (VTE) contracted in hospital. This is more than the combined total of deaths from breast cancer, AIDS and traffic accidents". (1) Orthopaedic patients are at particular risk of VTE. In 2011, the project team carried out an audit into compliance with national VTE assessment guidelines on all acute trauma and orthopaedic admissions during a two week period at a District General Hospital. The study demonstrated that compliance was initially low, but showed a large improvement following the implementation of simple measures. The measures included: asking consultants to remind junior doctors, putting posters up in the trauma doctors office, asking nursing staff to check for a VTE assessment on admission to the ward, and putting reminders on the patient name board. The project team subsequently recommended an alteration to the hospital's computer system to incorporate a check of VTE assessment and prophylaxis. A second assessment using the same methodology sought to assess whether the previous improvements were sustained and the impact of this computer system alteration. Overall, compliance with national VTE guidance improved further.

## Problem

In recent years the issue of venous thromboembolism (VTE) prophylaxis among hospitalised inpatients has become a major issue. It has attracted much political and medical attention through reports such as the House of Commons Health Committee report which stated that over 25,000 people died in hospital each year from VTE contracted in hospital, which is more than the combined deaths from breast cancer, AIDS and traffic accidents. (1) This issue is even more compelling due to the fact that preventative measures exist which may reduce these deaths from occurring. However, these measures also carry risks, in particular an increased risk of bleeding. National guidance therefore states that all patients should receive an assessment balancing the risks and benefits of prescription of thromboprophylaxis. In order to drive improvements in this area, VTE assessment is linked in the UK to a financial payment that a trust will receive if they VTE assess 95% of their patients. (2) Therefore this represents not only a key medical issue, but also a financial one.

## Background

Venous thrombosis is when a blood clot forms within a vein. These blood clots can occur in either the deep or the superficial veins of the body. However, it is clots within the deep venous system (deep venous thrombosis-DVTs) which are most concerning due to the risk of pulmonary embolus (PE), where part of the clot breaks off and travels to the lungs, restricting gas exchange within that area. DVTs frequently occur in the deep veins of the legs, where they may be asymptomatic or may cause pain and swelling of the affected leg. Long term they can lead to post-thrombotic syndrome, which results in considerable morbidity from chronic pain and swelling of the leg. Risk factors for VTE are well recognised and include surgery (especially pelvic or orthopaedic), immobility,

malignancy, hormone replacement therapy or the oral contraceptive pill, inherited thrombophilias and, obesity. (1) (3)

Orthopaedic patients have a particularly high risk of DVT. Without appropriate prophylaxis, 45-51% of orthopaedic patients will develop a DVT (1) and 10-20% will develop a proximal DVT, which carries a higher risk of PE. 4-10% will develop a clinically recognised PE and in 0.2-5% of patients this will be fatal (4). Evidence of DVT has also been found in up to 58% of major trauma patients. (5) Importantly, effective methods for preventing many of these DVTs and PEs do exist. (6) These methods exist in the form of mechanical means (anti-thromboembolism stockings-TEDs and foot pumps) or pharmacological methods, (low molecular weight heparin (LMWH) is most common). Both the House of Commons report into VTE and the NICE guidance makes it clear that all hospital patients need to have their VTE risk assessed and appropriate prophylaxis prescribed.

## Baseline Measurement

A baseline assessment was carried out of all new trauma and orthopaedic admissions over a two week period. In the days following admission, the drug chart and notes of these patients were analysed and a proforma used to collect data on whether the patient had been assessed for VTE prophylaxis (either using the correct trust form or informally in the notes) and whether VTE prophylaxis had been prescribed. All new admissions should have been clerked using either a trauma protocol form or a fractured neck of femur protocol form, both of which contain copies of the trust VTE assessment tool.

This assessment indicated that overall only 57.5% of new admissions were fully compliant with guidelines, which meant that they had both had a VTE assessment and been prescribed appropriate prophylaxis. In another 42%, appropriate prophylaxis

was being prescribed on the drug chart but with no record of an assessment having been carried out. This suggested that the problem lay mainly with patients not receiving an assessment of VTE risk rather than not being given the appropriate prophylaxis.

Analysing these results further, there was a discrepancy between trauma and fractured neck of femur admissions, with trauma admissions being less likely to have a record of a VTE assessment. Trust protocol states that those identified at being at higher risk of VTE should be prescribed both pharmacological methods of prophylaxis (LMWH) and a mechanical method (TEDs or foot pumps) unless there are contraindications. Assessing the prescription of prophylaxis also identified very poor prescription of mechanical methods, with only 57.5% having TEDs prescribed and 12.5% having foot pumps prescribed, with no record of a contraindication to suggest that these would be inappropriate.

## Design

Our results indicated that overall all patients were being prescribed pharmacological prophylaxis appropriately. However, there was a problem with recording a VTE assessment and with prescribing mechanical prophylaxis. The lower rates of VTE assessments for trauma patients than fractured neck of femur patients probably reflected the younger age group of this population, with an assumption being made that they were less likely to need any VTE prophylaxis. This potentially put patients at risk. Without an assessment, patients who warranted prophylaxis may have been missed out, and others where the risks outweighed the benefits may have been prescribed it inappropriately.

It is the responsibility of the admitting doctor (usually a junior doctor) to complete this VTE assessment, therefore the project team decided to target this group for intervention. The junior doctors working in orthopaedics change every few months, meaning that they may have been unaware of the policies and importance of VTE assessment and that younger patients are also still at risk of VTE. They may also have been unaware that TEDs and foot pumps, although mechanical devices, should still be prescribed to remind them to be used and to also ensure that they are not given to those with contraindications.

A variety of simple education and reminder strategies were therefore put in place. Posters were put up in the trauma and orthopaedic office where the daily handovers are held, and Consultants were informed of the results of the audit and asked to remind juniors to complete the VTE assessments. Nursing staff were also asked to check whether a patient had received a VTE assessment on arrival in the ward and if not, to write a reminder in the notes and on the ward whiteboard. As a long term reminder strategy, the project team also suggested that the hospital computer system (Patient Management System, PMS), where admitted patients are recorded and from which handover lists are generated, was altered to include a reminder to complete the VTE assessment whenever a new patient is admitted. This would hopefully reduce the need for repeated reminders and education talks whenever the doctors rotate around jobs.

## Strategy

In cycle 1 the simple strategies of asking consultants to remind junior doctors, putting posters up in the trauma office and enlisting the help of the nurses to remind doctors when a patient had not had a VTE assessment were implemented. As orthopaedic patients are located not only on the orthopaedic wards, but also on outlying wards of other specialties, it was anticipated that the strategies of asking nursing staff to remind doctors would be less effective on these outlying wards as they have less daily contact with the junior doctors. This theory proved to be correct, although there were only small numbers affected, and the strategy of asking nursing staff to remind doctors was only implemented in the core orthopaedic wards.

Whilst the above interventions were implemented, discussions started between the haematology department and IT department to alter the hospital computer system to include a reminder. However, this was a time consuming process and the change was not implemented during cycle 1.

During cycle 2 the suggested change to the hospital computer system was implemented. This meant that whenever a new patient was admitted onto the computer, the admitting doctor would have to state whether a VTE assessment had been carried out and what prophylaxis had been prescribed. As the VTE assessment itself was not being computerised, the doctor was still having to fill in a paper VTE form and then record on the computer system the outcome of this assessment. The idea of this is that it would serve as a reminder to ensure that the VTE assessment was completed and appropriate prophylaxis prescribed.

## Results

In cycle 1, a reassessment of compliance with the national guidelines was carried out after the initial reminder strategies were implemented. This showed that these had been very successful. There had been large increases in the full compliance with VTE assessment and prophylaxis guidelines. In particular, the percentage fully compliant with the guideline (VTE assessment and appropriate prophylaxis prescribed) increased from 57.5% to 87.2%. (Table 1) This was associated with a large decrease in the percentage being partially compliant (meaning appropriate prophylaxis prescribed, but with no record of a VTE assessment), indicating that the reminder strategies had successfully increased the number of VTE assessments being carried out.

The identified problem with trauma patients being less likely to receive a VTE assessment also showed improvements, with an increase from 65% to 85% of trauma protocols having a completed VTE assessment. (Table 2) Appropriate prescription of LMWH also increased from 79.5% to 88.2%. (Table 3) However, there remained a problem with prophylaxis of mechanical methods, with decreases in prescriptions of both TEDs and foot pumps. (Table 3)

A second assessment was carried out approximately two months after a change to the hospital computer system. This change meant

that the admitting doctor had to state whether a VTE assessment had been completed and what prophylaxis had been prescribed before the patient could be admitted onto the computer system. The results of this showed that there had been continued improvements with overall compliance with national guidelines, so that 90% of newly admitted patients were now fully compliant. (Table 1) Appropriate prescription of LMWH had also remained high so that 33 out of 34 patients (where LMWH prescription was appropriate) had it correctly prescribed. However, prescription of mechanical methods of prophylaxis remained low. (Table 3)

In order to investigate the impact of the change to the hospital computer system (PMS), a comparison was made between the actual drug chart prescription, and what had been recorded on the computer. 38 of the 40 patients were 'admitted' onto PMS. Of these 38, 21 (55.3%) had the correct VTE prophylaxis entered onto the hospital computer system. (Table 4) The large majority of discrepancies were due to failure to prescribe thrombo-embolic stockings on drug charts, despite noting their necessity on both assessment form and computer system. This therefore probably reflects the continuing problems with encouraging prescription of these mechanical methods. (Table 4)

See supplementary file: ds2057.xlsx - "submission tables"

## Lessons and Limitations

In this quality improvement project, simple interventions have proved highly effective at improving compliance with national guidelines on VTE assessment and prophylaxis. However it has proved highly difficult to change prescribing behaviour so that mechanical methods of prophylaxis such as TEDs and foot pumps are prescribed. Rates of prescription of these have remained stubbornly at approximately 50%, despite reminders and a change to the computer system, and despite dramatic improvements in all other areas investigated. This may be due to ingrained attitudes that such mechanical methods do not need prescription on a drug chart, as they are not 'drugs'. However, there remains good rationale for insisting on prescription of these means. It reminds staff to ensure that they are being used and means that they should only be given to those where they are not contraindicated.

The project results also give lessons about the usefulness of computer systems. The change was implemented in the hope that it would serve as a reminder to ensure that doctors performed a VTE assessment and prescribed prophylaxis appropriately on admission. Rates of assessment and prophylaxis continued to increase. This suggests that it has had a role as a reminder in increasing and maintaining compliance with the guideline. However, the data entered onto the computer system often did not correlate with what had actually been prescribed. This was particularly the case with respect to manual methods and highlights the problem with using a system which is only partially computerised. Doctors are being asked to complete the paper assessment, and then record the results on the computer when the patient is admitted, which may not be done at exactly the same time. A discord therefore arises between the two processes, which may not be carried out at the same time and can result in errors in the data being inputted into

the computer. This shows that for future quality improvement projects seeking to utilise computers, careful thought needs to be given to the logistics in order to ensure that the change is effective. For this quality improvement project in particular, a change allowing the whole of the VTE assessment (and ideally the ability to prescribe prophylaxis) to be computerised would likely have brought better results.

Although this project's sample size is small (approximately 40 patients per cycle), the sample represents all of the patients admitted acutely over a two week period to a District General Hospital, and so is likely to be representative of acute orthopaedic admissions to this hospital. It may not, however, be generalizable to elective admissions, where there may be fewer pressures on the system and more time to complete assessments (for example at pre-operative assessment clinics).

## Conclusion

Substantial improvements have been shown in VTE assessment and prophylaxis following implementation of simple interventions. However, there remains a major problem with prescription of mechanical prophylaxis. The alteration to the computer system has helped to maintain these improvements, however the expected improvement in prescription of mechanical prophylaxis has not been achieved.

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## Declaration of interests

Nothing to declare.

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