

# Risk assessment and prophylaxis of venous thromboembolism in surgical inpatients: improving adherence to national guidelines

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## Abstract

In Europe, venous thromboembolism (VTE) is the third most common cause of vascular death after myocardial infarction and stroke. It is especially common during and after hospitalisation for surgery and acute medical illness though many other risk factors have now been identified. VTE is often preventable with judicious use of preventative measures in the form of thromboprophylaxis and mechanical antiembolism stockings. In 2014, a study was undertaken across all surgical wards at a teaching hospital in London to assess compliance to national guidelines for VTE risk assessment and subsequent institution of protective measures.

The initial results demonstrated that performance could be improved in terms of meeting the national target of assessing 95% of surgical inpatients for risk of VTE at admission, prescribing anti-embolism stockings, ensuring that they are correctly worn, and reassessing patients 24 hours later. Utilising a multidisciplinary team approach, simple interventions were put in place such as e-mail reminders, posters, and senior input during ward rounds. Three subsequent measurements demonstrated that sustained improvement was achieved with the national guideline of 95% VTE risk assessment met. Improved performance was noted across all parameters considered, highlighting that simple intervention with all team members involved can improve patient safety and care.

## Problem

Venous thromboembolism (VTE) poses a significant threat to the health of those admitted to hospital. However, this potentially life-threatening complication is preventable in many cases with diligent use of prophylactic measures. In 2005, the UK Department of Health reported that 25,000 deaths occurred yearly due to hospital-acquired VTE.[1] VTE is one of the "four harms" measured as part of the NHS safety thermometer selected by the Department of Health's Quality Innovation Productivity and Prevention (QIPP) safe care programme.[2]

National guidelines state that all patients are to be assessed for risk of VTE on admission and at 24 hours.[3] A combination of pharmacological and mechanical prophylaxis should be offered providing absence of contraindications. VTE risk assessment has been promoted through monetary incentives paid to the trust if 95% of surgical inpatients are assessed. We aimed to ascertain whether this target was being attained at our local hospital and to improve the use of combined pharmacological and mechanical thromboprophylaxis.

## Background

A thrombus or blood clot that originates in the lower limbs or pelvic circulation, termed deep vein thrombosis (DVT), may propagate to the lungs and cause blockage of a blood vessel. The resulting condition, pulmonary embolism (PE), is potentially life threatening, and accounts for 12% of deaths annually in Europe. They also cause considerable long term morbidity, including chronic pain and swelling of the legs. Risk factors for VTE include prolonged

immobility during and after surgery, major trauma, malignancy, inherited thrombophilias, old age, and obesity.[4]

Surgical inpatients are at particular risk of developing VTE. Data from eight prospective studies estimate the total rate of DVT after hip fracture surgery to be 50%, in the absence of thromboprophylaxis.[5] Mechanical compression stockings and pharmacological agents in the form of low molecular weight heparins (LMWHs) are therapies that reduce the risk of VTE. Despite the use of routine prophylaxis, VTE remains a significant risk, occurring in almost 3% of patients undergoing orthopaedic surgery.[6] Interestingly, a Cochrane review considering VTE prophylaxis in surgical patients demonstrated a 75% reduction in the incidence of VTE when using these prophylactic measures in combination compared to pharmacological methods alone.[7]

Our project aimed to improve the rate of VTE assessment and prophylaxis. This included assessment on admission and at 24 hours, the prescription and appropriate use of mechanical and pharmacological VTE prophylaxis across the surgical wards at St George's University Hospitals NHS Foundation Trust.

## Baseline measurement

All surgical inpatients were considered to ascertain the level of adherence to VTE prophylaxis guidelines. Drug charts were reviewed for VTE risk assessment on admission and reassessment 24 hours later. We evaluated the completeness of the proforma, recording whether a date, time and signature were present. We also recorded whether mechanical and pharmacological prophylaxis had been formally prescribed and if any contraindications were present. Finally, we checked if antiembolism stockings were being worn, and

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if so, whether they were being used correctly, worn on both legs and pulled up to below the knee.

Eighty nine patients (45 males) were evaluated consecutively on a single day. Eighty two patients (92%) were VTE assessed on admission; the date was recorded correctly on all forms, the time in 90.2% and 97.6% were signed. VTE reassessment was repeated at 24 hours in only 32.9% of patients.

Of the 82 patients in whom VTE risk assessment had been undertaken, pharmacological VTE prophylaxis was used appropriately in 81/82 (98.8%); six out of seven patients not prescribed a LMWH had a documented contraindication.

Twenty seven out of 82 were prescribed antiembolism stockings; contraindications such as extensive bandages were present in five out of 55, and one patient was utilising a floaton pump. Therefore, appropriate prescription of mechanical prophylaxis was calculated to be only 40.2%. Fourteen out of 55 patients not prescribed antiembolism stockings were in fact wearing them, reflecting the initiative of the nursing staff. Antiembolism stockings were worn incorrectly in 10 out of 44 patients.

At weekly intervals, two more baseline measurements were undertaken with the aim of generating 'snapshot' data. The findings were very similar; 59/70 and 69/76 had been VTE assessed at admission with 31% and 33% at 24 hours, respectively. The appropriate prescription of dalteparin was perfect at both time points. However, mechanical thromboprophylaxis was only prescribed in 36% and 43%, respectively.

We arranged for an informal e-mail to be sent to the junior doctors reminding them of the importance of considering VTE assessment and prophylaxis in all surgical admissions. Reassessment a week later demonstrated similar results; 55/68 VTE assessed at admission and just 35% assessed 24 hours later. Dalteparin was prescribed appropriately in all but one case but antiembolism stocking prescription remained disappointing at 41%.

### Design

The initial findings were disseminated and discussed at a meeting attended by a wide range of clinical staff including nurses, junior doctors, registrars, and consultants. This provided an excellent forum to highlight the issues and exchange ideas with the aim of improving performance across the surgical wards. It became evident that there was a lack of awareness among some staff members of the importance of comprehensive VTE risk assessment and timely institution of prophylactic measures as per national guidance. These aspects were discussed in detail and all team members were engaged. The project team also highlighted areas where performance was particularly poor, namely the low rate of reassessment of VTE risk at 24 hours and the paucity of prescriptions for antiembolism stockings. There was unanimous agreement that improvement needed to be made, achievable only with active involvement of all staff involved in delivering patient care.

The project team also conducted individual meetings with the responsible senior sisters and consultants as well as the nurses and doctors working on the wards on a day to day basis. It was apparent that all members of the team were highly motivated to improve overall performance. It was agreed that simple interventions that were all easy to implement would be a constructive first step to in an attempt to improve compliance with the national guidelines. Indeed, senior clinicians reported that following the initial presentation and proceeding informal discussions, they had already observed an increased awareness of staff translating into more patients being assessed and given suitable prophylaxis.

### Strategy

Following approval from the sisters and consultants leading each ward, posters were put up in the doctor's rooms and at the nurse stations to provide a constant reminder to consider VTE risk and prophylaxis in every surgical inpatient. Email messages were sent to the junior doctors on the ward detailing the procedure of completing the VTE risk assessment proforma and the requirement to repeat it 24 hours post admission.

Registrars and consultants were asked to remind their teams on each ward round. Nurses were asked to check whether antiembolism stockings had been prescribed and applied to patients, and where appropriate, to flag this up with the junior doctors. Additionally, all members of the team were encouraged to check that the stockings were being worn correctly and educate patients appropriately, thereby improving their compliance.

### Results

The surgical wards were reassessed approximately one month later, measuring the same parameters as those in the baseline measurement.

PDSA cycle 1: Eighty four consecutive patients (40 males) were studied. The VTE risk assessment rate was slightly higher at 96.4% (81/84) with all forms signed and dated appropriately. The time was missing in five out of 84 forms (6%). VTE risk reassessment was repeated at 24 hours in 77.3% of patients, markedly higher than baseline which was under 33%. Pharmacological VTE prophylaxis was prescribed appropriately in all cases, with documented contraindications in 4/84 patients. Antiembolism stockings were formally prescribed in 45 cases, with contraindications present in 12 patients. This equated to appropriate prescribing of mechanical prophylaxis in 67.9%, a noticeable improvement from the baseline of 40%. Once again, the initiative of individual staff members meant that 10 out of 27 patients not prescribed antiembolism stockings were in fact wearing them. Antiembolism stockings were worn incorrectly in 4 out of 55 patients, representing improvement from the baseline.

The results were presented at departmental meeting with emphasis placed on the universal improvement in all parameters evaluated. The next challenge was to sustain this improvement in the long

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term.

PDSA cycle 2: We repeated the measurement three months later. Seventy six patients were included in the cycle, of whom 36 were male. The rate of VTE risk assessment remained above the national target at 97.3% (74/76). The reassessment of VTE risk after 24 hours reduced to 64.4%, though almost twice as high as the baseline rate. Appropriate use of dalteparin was present in all but a solitary case, and the correct prescription of antiembolism stockings, though lower than cycle 1, was still higher than the baseline at 55.2%. The prophylactic VTE stockings were worn incorrectly in 14.5% of patients, once again reflecting improvement from the baseline result.

After further discussion with healthcare professionals on the wards, it was identified that in some cases, despite the prescription of antiembolism stockings by the junior doctors and correct application of them by the nurses on the ward, patients were taking them off, and either not wearing them again or putting them on incorrectly. It was decided to survey the patients on the ward to assess their understanding of the importance of the antiembolism stockings in the hope that increased awareness may improve compliance in wearing them correctly.

PDSA cycle 3: This cycle was conducted one month later. Seventy three patients were considered of which 40 were male. VTE risk assessment was above the national target at 98.6% (72/73) and reassessment at 24 hours was 63.9% (46/72). All patients had been prescribed dalteparin appropriately and of the patients where antiembolism stockings were indicated, formal prescription had been undertaken in 54.2% (39/72). We observed incorrect application or the removal of the mechanical thromboprophylaxis in almost 20% of patients. We surveyed these 14 patients to assess their understanding of importance of the stockings and their reasons for not wearing them. Five of the 14 patients were unaware of the reason the stockings needed to be worn, six did not appreciate the potential sequelae of suffering from VTE and five simply forgot to put them back on. All of the patients cited discomfort as a significant reason for removing them soon after they had been applied. After a sensitive discussion with these 14 patients, all were willing to wear the stockings, despite the unavoidable discomfort and inconvenience.

### Lessons and limitations

This project has been a very interesting and useful experience. It has emphasised the importance of a multidisciplinary approach and that patient care can be enhanced when the full complement of staff are actively engaged and involved in the process. Maintaining sustained improvement in the long term poses the greatest challenge but is achievable. Indeed, although there was a reduction in some parameters between cycle 1 and 2, the standards in all aspects of VTE assessment and administration of prophylaxis remained above the baseline. The regular arrival of new staff on the wards, particularly junior doctors, poses a significant challenge to maintaining these standards though it should be achievable with effective inductions and communication of the protocol.

The formal prescription of mechanical thromboprophylaxis proved to be the most difficult parameter to improve. This is likely a reflection of the contrasting prescribing habits of surgical and medical wards in different hospitals. For example, at our Trust, antiembolism stockings are not written up on the drug charts for medical patients. This may contribute to confusion as staff rotate between different departments. Consistency within hospitals or even nationally may well result in better quality care, with more patients receiving mechanical prophylaxis. Nevertheless, our final project cycle demonstrated that engaging with patients and explaining to them the importance of VTE prophylaxis has the potential to improve compliance and patient safety, as demonstrated in our final cycle.

The main limitation of our project is the relatively small number of patients studied in each cycle, given the single centre nature of the work. However, the design was appropriate to quantify and improve our local practice with comparison made to the national standard.

### Conclusion

Simple and easy to implement interventions can result in significantly improved performance in VTE risk assessment and prompt initiation of suitable prophylactic measures. The national standard of 95% of surgical patients being formally assessed for VTE risk is achievable.

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### Declaration of interests

Nothing to declare.

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## Ethical approval

Local authorities considered this an improvement study with no deviation from local policy in patient care so formal ethical approval was not required.