Thromboprophylaxis

Thromboprophylaxis

Preventing thrombosis with prophylaxis is a topical issue in modern medicine. As we described in the last VERITY report, the publication of the House of Commons Health Committee Enquiry on *The Prevention of Venous Thromboembolism in Hospitalised Patients* [1] in 2005 precipitated the Department of Health to form an independent expert working group to look at raising awareness of the incidence of VTE, to review what guidance is available and how best practice and awareness of VTE should be communicated widely within the NHS (see page 120). The report of the independent expert working group on the prevention of venous thromboembolism in hospitalised patients was recently published in full by the Chief Medical Officer, Sir Liam Donaldson [2]. In addition, the long-awaited NICE guideline on reducing the risk of VTE in inpatients undergoing surgery was also published in late April [3].

The independent expert working group report highlights the fact that, although the risk factors associated with the development of VTE such as surgery, acute medical illness and certain predisposing risk factors are well characterised, risk assessment and the provision of appropriate preventative measures are not applied in routine clinical medicine. The report identifies VTE as a patient safety issue and the expert group recommends that the Healthcare Commission looks to seek conformity with this good practice guidance and signal that it intends to include VTE as part of its annual inspection guidance. This shift in emphasis to regarding VTE as a patient safety issue will have a profound effect on the way VTE prevention is perceived within the healthcare sector.

VERITY and thromboprophylaxis

The VERITY registry offers us an unique opportunity to characterise the histories of patients presenting with symptomatic VTE. In the last report we saw that patients with VTE also often had a history of recent surgery, especially orthopaedic surgery; the VERITY data also indicated that these patients also reported a recent history of acute medical illness relatively frequently.

After the last report, we attempted to improve and simplify the whole VERITY experience for the front-line user by simplifying the case-report form. At the same time, we used that opportunity to refine the questions asked, particularly in relation to medical and surgical illness and the provision of thromboprophylaxis, to improve the quality and relevance of the data collected. The results from some of the new questions are presented in this chapter. We have attempted to characterise in more detail the medical and surgical histories of patients with VTE and the relationship with thromboprophylaxis provision, reflecting the different questions that are now asked on the VERITY case report form.

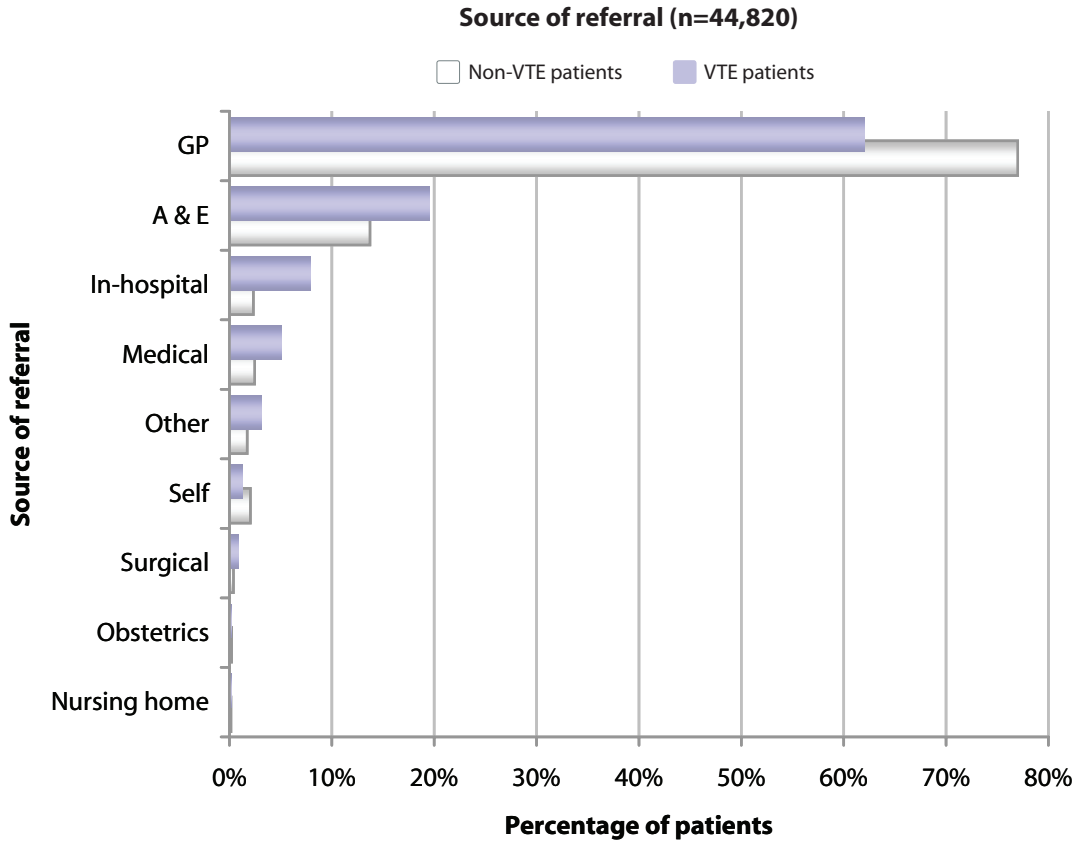
As an aide to your practice, we also include the guidance provided by the expert working group and NICE linked to the VERITY findings.

Practice point

The VTE expert group recommends improvement of public and professional understanding of VTE at a national level, through improved communication of information to patients and the public, accompanied by improved and coordinated programmes of professional education [2].

Source of referral

The vast majority of patients are referred with suspected VTE from their GP. More than 60% of those with a confirmed VTE come *via* GP referral, as opposed to almost 80% of those patients who are eventually shown not to have VTE. For in-hospital referrals, including referral from A&E, medical and surgical units, the proportion of patients confirmed with VTE is higher. These findings are as expected, with GPs clearly more likely to refer patients with a view to excluding VTE. There are few referrals for VTE from medical and surgical wards, and virtually none from obstetric wards or nursing homes.



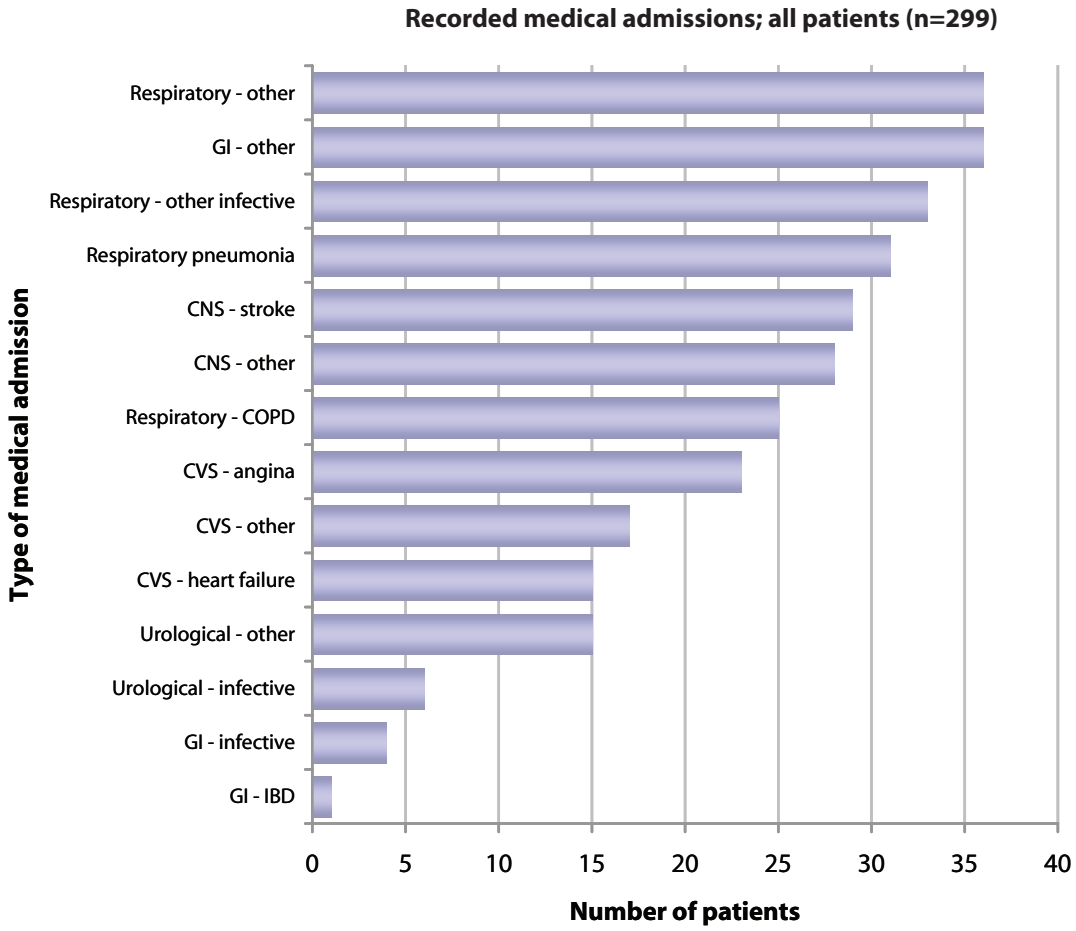
Practice point

The VTE expert group recommends a documented **mandatory VTE risk assessment** of every hospitalised patient on admission [2].

Focus on patients with a medical inpatient history

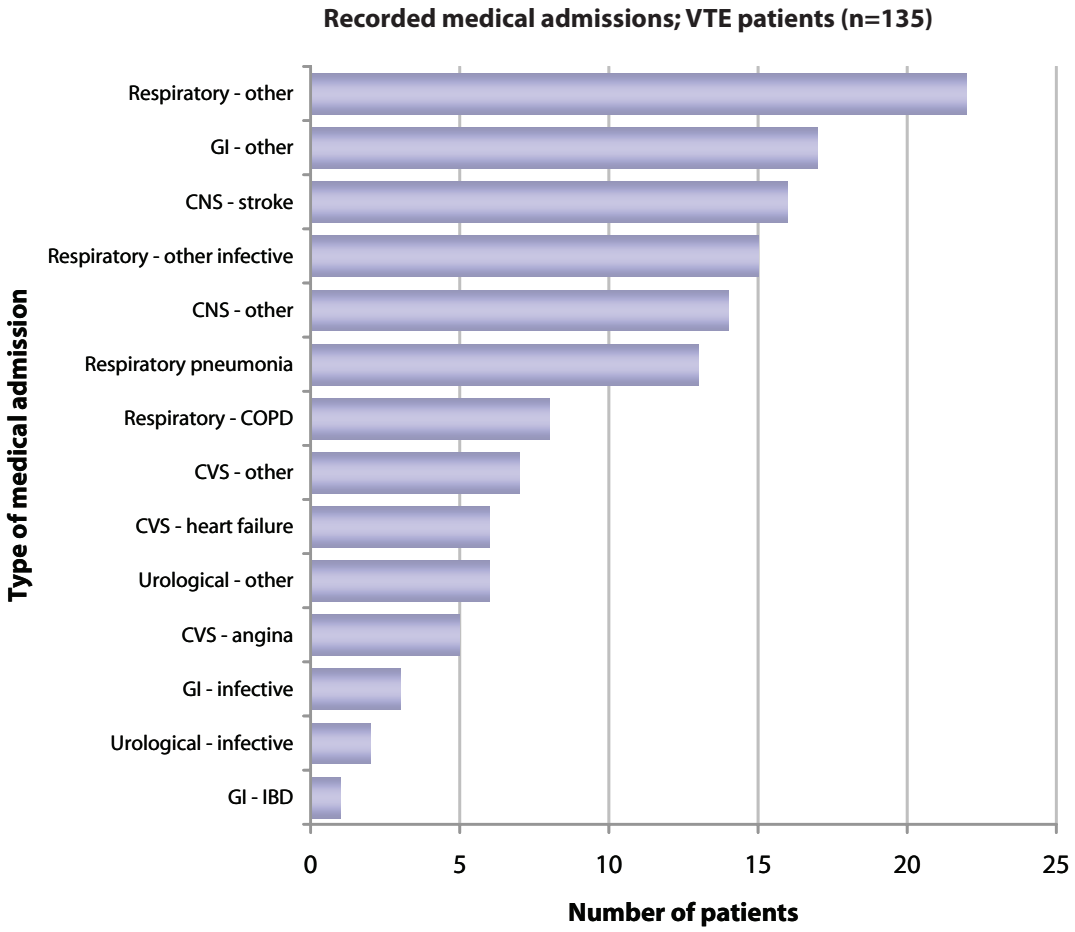
Fatal venous thromboembolic events occur more frequently in medical than surgical patients. In a 25-year analysis of fatal PE conducted at King's College, London, the majority of PE-related deaths occurred in the non-surgical population and the level of venographically-detected DVT remained unchanged over 15 years in non-surgical patients, despite a significant fall seen in surgical patients [4]. We know that the risk of VTE in acute medical inpatients is a clinical concern and equally as important as in surgical inpatients. Acutely ill medical inpatients that have been enrolled in large, randomized, placebo-controlled studies had rates of distal DVT of about 10% and of proximal DVT of about 5%, placing them at moderate to high risk of VTE according to accepted levels of risk [5, 6, 7]. At-risk medical patients should be identified and appropriately targeted for thromboprophylaxis implementation.

Of the 639 patients with a medical inpatient history, the reason for hospital admission was reported in around half the cases (n=338). One of the reasons recorded for admission – musculoskeletal – is a general term that does not identify a medical illness and has not been presented (n=39). As we can see in the graph, there are a wide variety of reasons for admission, the most common overall being respiratory problems, in particular infection and pneumonia.



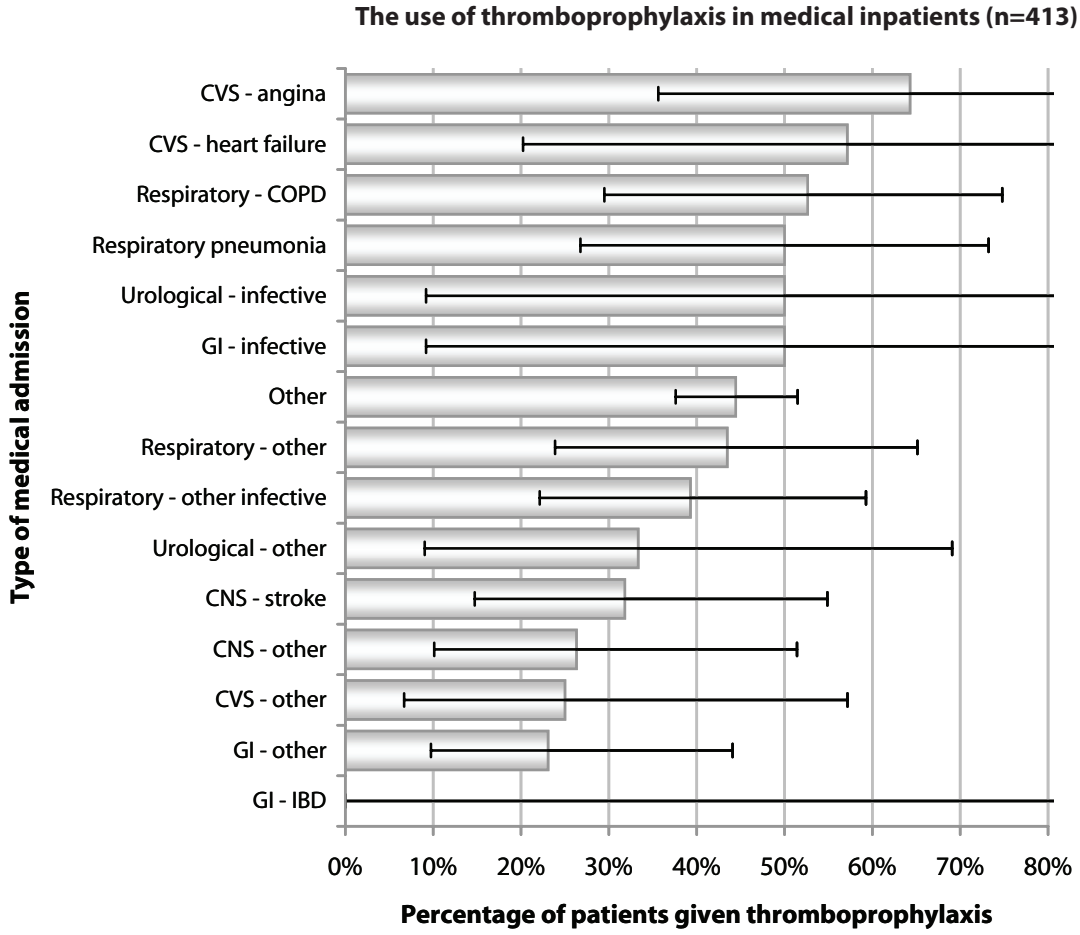
Medical inpatient history for VTE patients

Of the 639 patients with a medical inpatient history, 43% were confirmed with VTE. Admissions for respiratory problems, GI-related illnesses and CNS events such as stroke were associated with relatively high numbers of cases with symptomatic VTE.



Thromboprophylaxis in patients with a medical inpatient history

Of the 639 patients with a medical inpatient history, we know if the patient received, or did not receive, thromboprophylaxis in 69% of cases (n=439). The highest levels of thromboprophylaxis provision were reported in cardiac patients, including those with heart failure. A relatively high proportion of patients with respiratory problems, such as COPD and pneumonia, received thromboprophylaxis. Levels were relatively low in stroke patients and patients with other CNS problems. This is understandable and reflects the fact that although stroke patients are at risk of VTE, there are different opinions and policies across hospitals on preventing DVT in stroke patients.

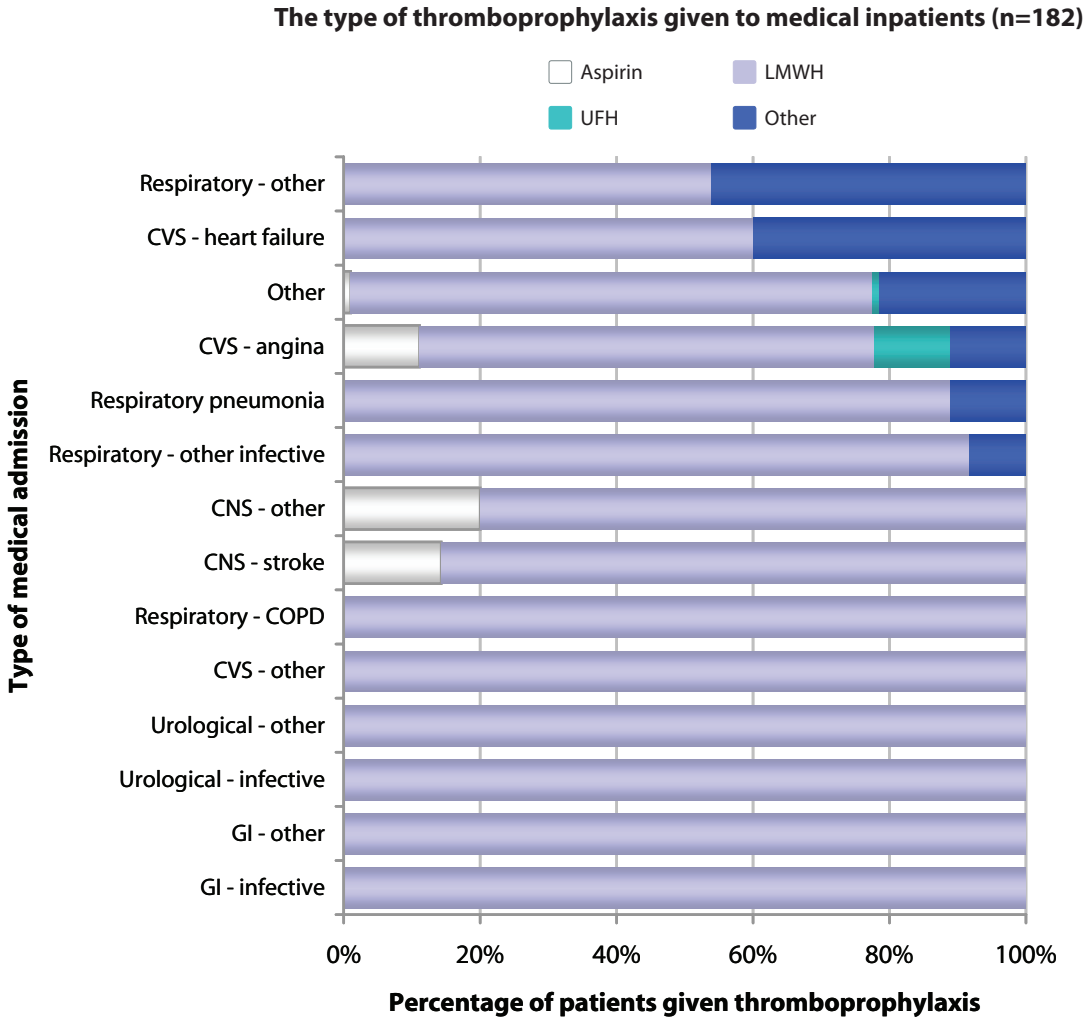


Practice point

Thromboprophylaxis strategy: the VTE expert group recommends that all medical patients should, as part of a mandatory risk assessment, be considered for thromboprophylaxis measures; in particular, patients likely to be in hospital for longer than four days and with reduced mobility, with either severe heart failure, respiratory failure (due either to exacerbation of chronic lung disease or pneumonia), acute infection, inflammatory illness or cancer (with additional risk factors for VTE) should be considered for the following regime: heparins (both unfractionated and low molecular-weight forms) are effective preventive treatments. Low-molecular-weight heparins are the preferred prophylactic method; aspirin is not recommended for thromboprophylaxis in medical patients; mechanical methods of prophylaxis have not to date been appropriately evaluated in acutely ill medical patients, and thus are not recommended at present [2].

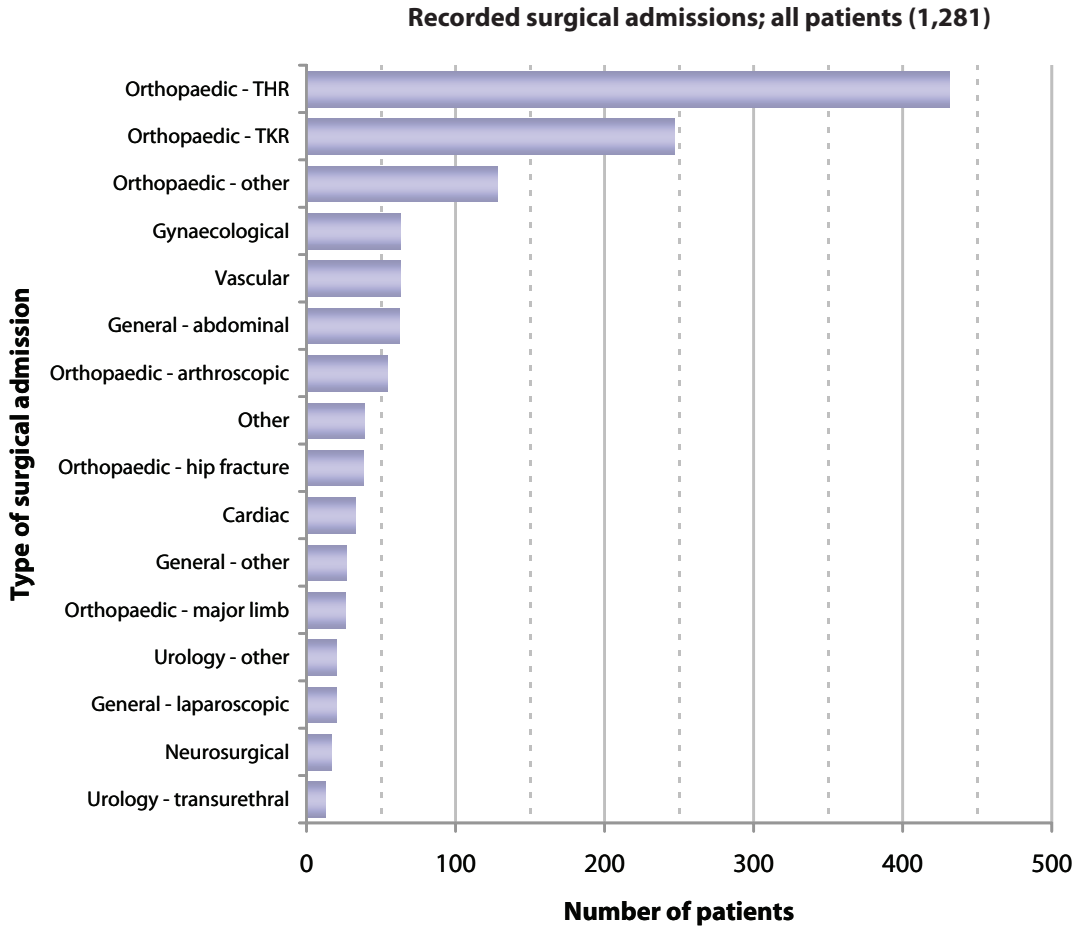
Pharmacological thromboprophylaxis in patients with a medical inpatient history

Of 439 patients with a medical inpatient history for whom thromboprophylaxis was recorded, 194 cases (44%) received thromboprophylaxis. The breakdown of the type of thromboprophylaxis is shown below. The majority of thromboprophylaxis given is LMWH; there is only very low-level use of aspirin or UFH. In respiratory and heart failure patients, another form of thromboprophylaxis was used.



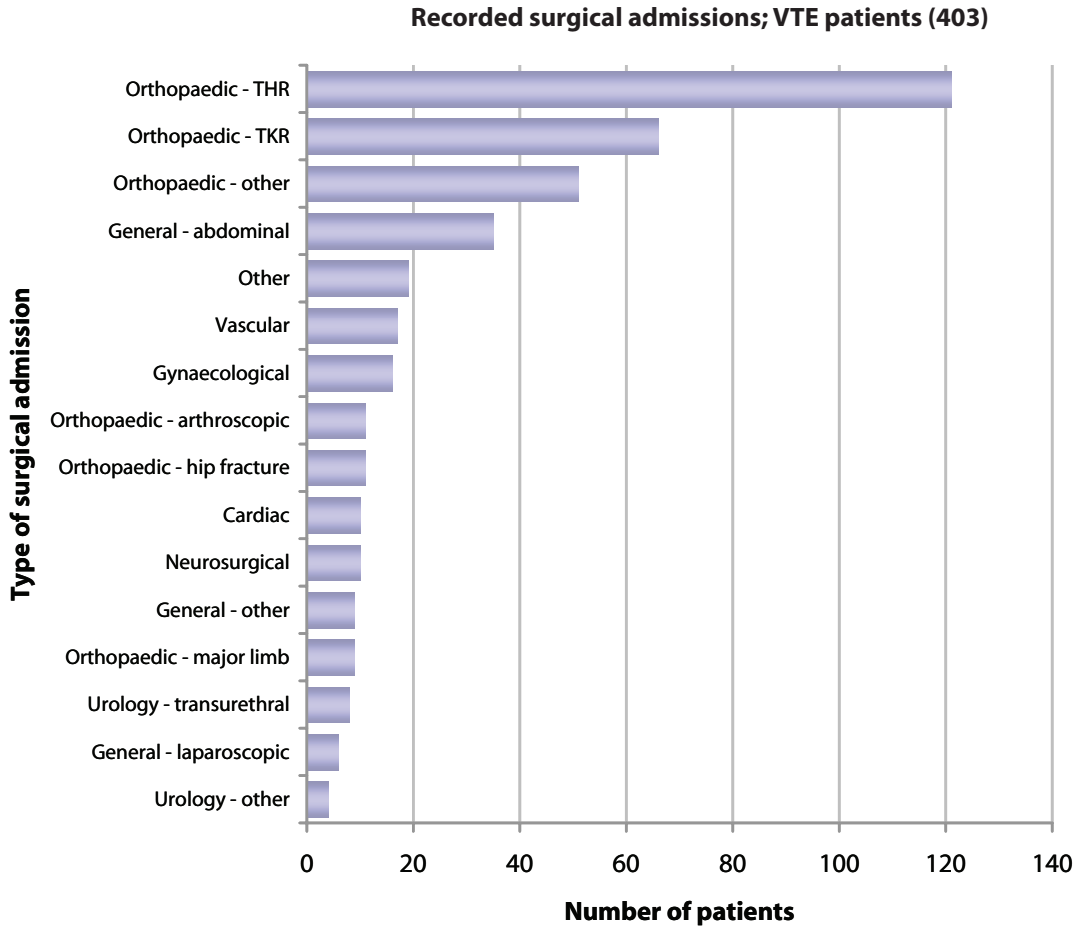
Focus on patients with a surgical inpatient history

Of the 1,281 patients with a surgical inpatient history, the reason for hospital admission was reported in more than 96% of cases. As we can see in the graph, the vast majority of patients with suspected VTE and a history of recent stay in hospital for surgery have been admitted under the orthopaedic specialty. Abdominal, gynaecological and vascular surgical admission make up the second largest group of patients.



Surgical inpatient history for VTE patients

Of the 1,281 surgery patients, 31% had confirmed VTE (n=403). In this graph, it is clear that patients with a recent history of orthopaedic surgery make up by far the largest group of VTE patients with a recent history of admission for surgery: around 60% of all cases of confirmed VTE. Hospital admissions for abdominal, gynaecological and vascular surgery were also well represented in this group.



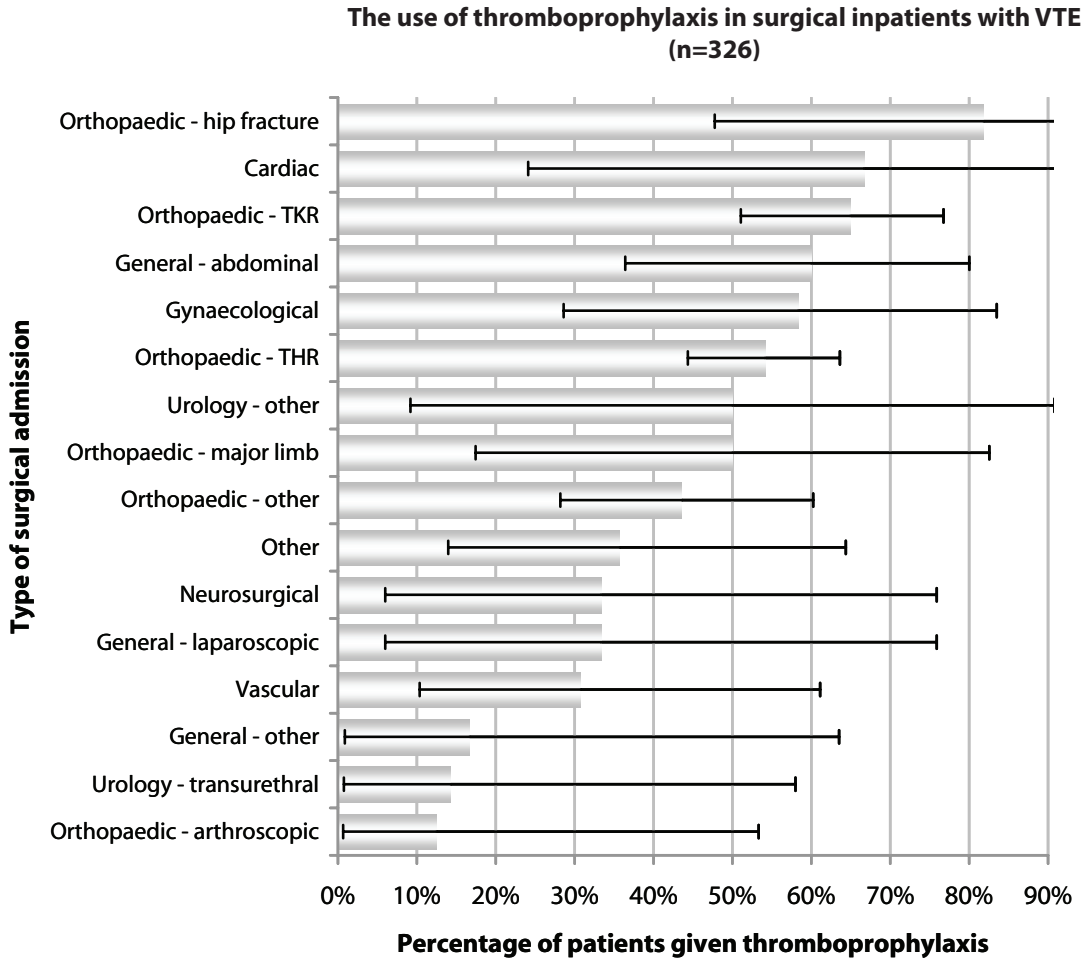
Practice point

To reduce the risk of VTE for all inpatient surgical procedures, the NICE clinical guideline suggests:

- Assess patients for individual risk factors for VTE; advise patients to consider stopping combined oral contraceptives 4 weeks before elective surgery; inform patients that immobility associated with continuous travel of more than 3 hours in the 4 weeks before or after surgery may increase the risk of VTE.
- Before surgery, give verbal and written information on the risks of VTE and effectiveness of prophylaxis (mechanical and pharmacological).
- As part of each patient's discharge plan, give verbal and written information on the signs and symptoms of DVT and PE, correct use of prophylaxis at home, and implications of not using prophylaxis correctly.

Thromboprophylaxis in patients with a surgical inpatient history

Of the 1,281 surgery patients, we know if the patient received, or did not receive, thromboprophylaxis in a quarter of cases (n=326). Overall, levels of thromboprophylaxis were quite high, with abdominal, gynaecological and orthopaedic surgery all around the 60% level. The highest levels of thromboprophylaxis provision were described in hip fracture patients (>80% of cases). Levels were low in general surgery described as *other* and arthroscopic and transurethral surgery.



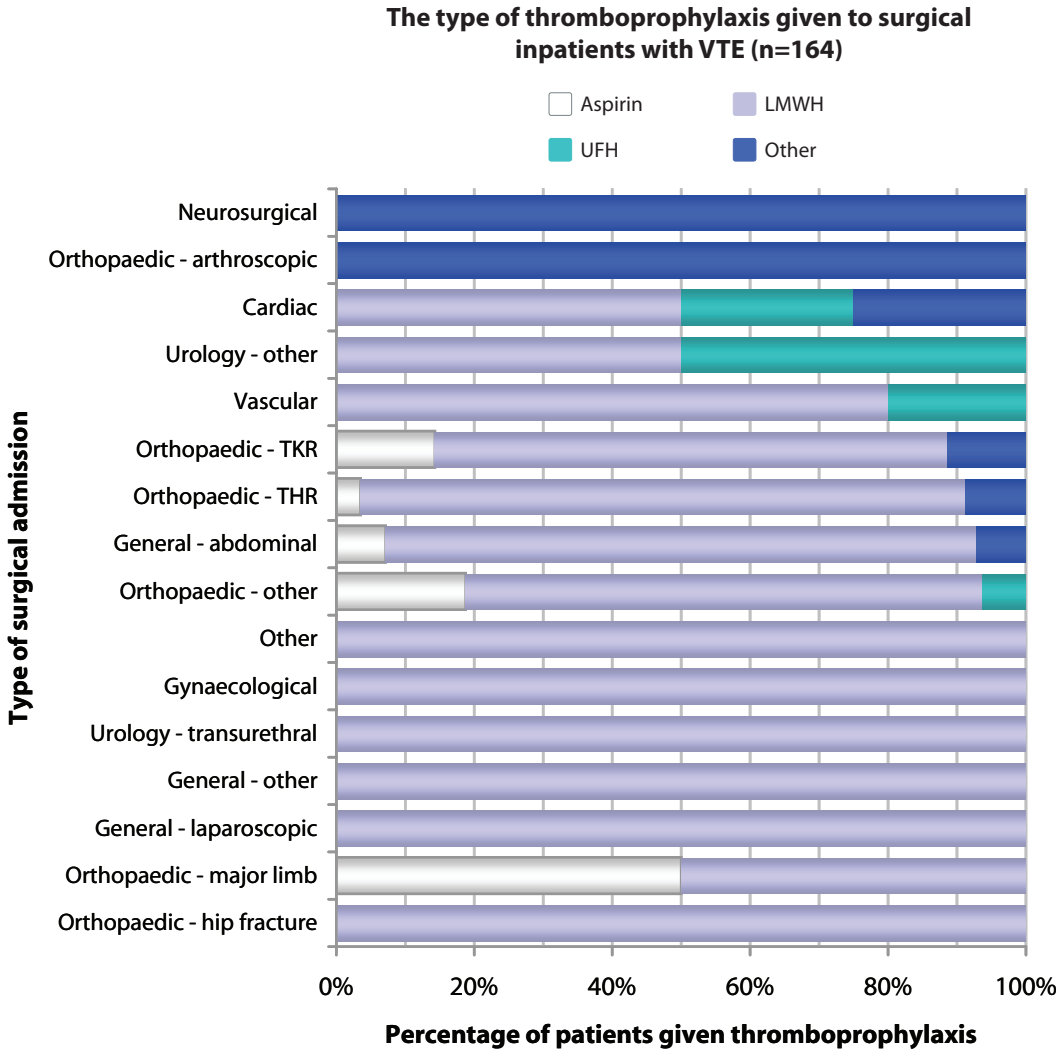
Practice point

The NICE clinical guideline recommends, in addition to mechanical prophylaxis, patients at increased risk of VTE because they have additional factors and patients having orthopaedic surgery should be offered low molecular weight heparin (LMWH). Fondaparinux, within its licensed indications, may be used as an alternative to LMWH. Patients having hip replacement surgery with one or more risk factors for VTE should have their LMWH or fondaparinux therapy continued for 4 weeks after surgery.

The VTE expert group recommends that intermediate-risk surgical patients or those with concomitant medical conditions should, as part of a mandatory risk assessment, be considered for the following thromboprophylaxis measures: graduated compression stockings combined with heparins (both unfractionated and low molecular weight forms); aspirin is not recommended for thromboprophylaxis in intermediate-risk surgical patients.

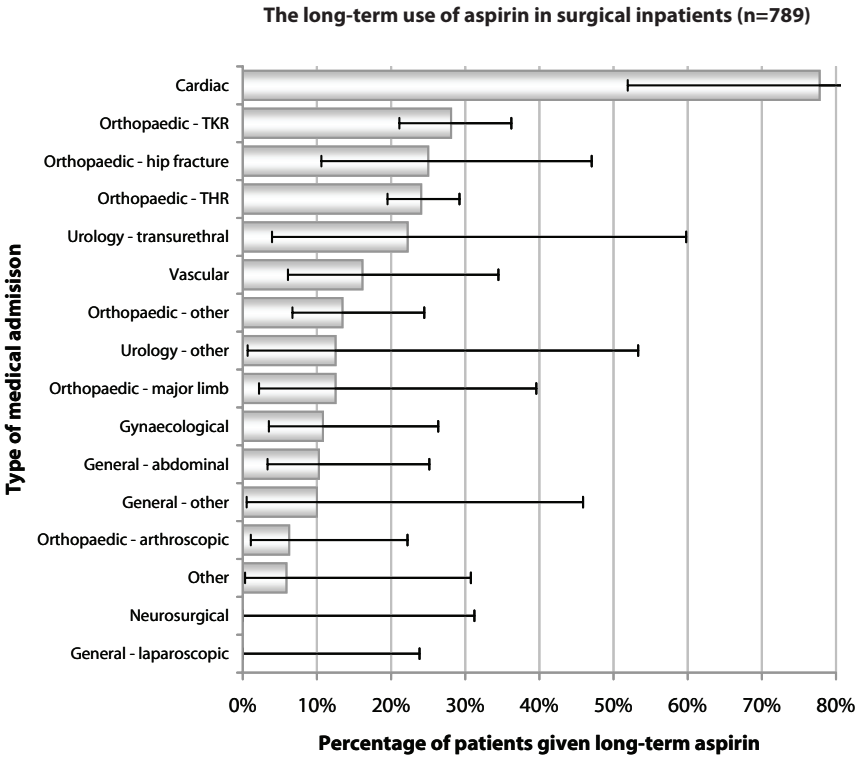
Pharmacological thromboprophylaxis in patients with a surgical inpatient history

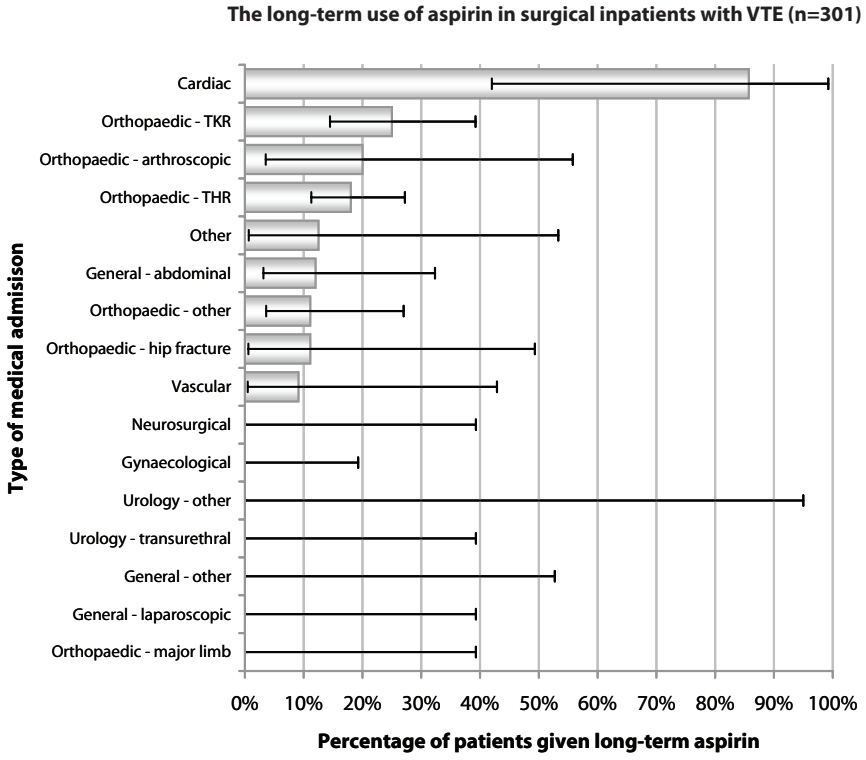
For the 326 patients with a surgical inpatient history for whom thromboprophylaxis status is known, about half (164 cases) received pharmacological thromboprophylaxis. The breakdown of the type of thromboprophylaxis is shown below; the majority of thromboprophylaxis given is LMWH. Notable exceptions are the use of aspirin in orthopaedic patients, the exclusive use of other forms of thromboprophylaxis in neurosurgery and arthroscopy and the use of UFH in urology and cardiac cases.



Long-term aspirin use in patients with a surgical inpatient history

Aspirin usage is marked in cardiac surgery patients; this is expected and follows cardiology guidelines that show the benefit of aspirin in preventing adverse outcomes in patients under cardiac care. There is long-term aspirin use in orthopaedic patients, both in all patients (upper graph) and those with VTE (lower graph), most likely reflecting, at least partially, long-term treatment for atherosclerotic disease in the elderly orthopaedic population.



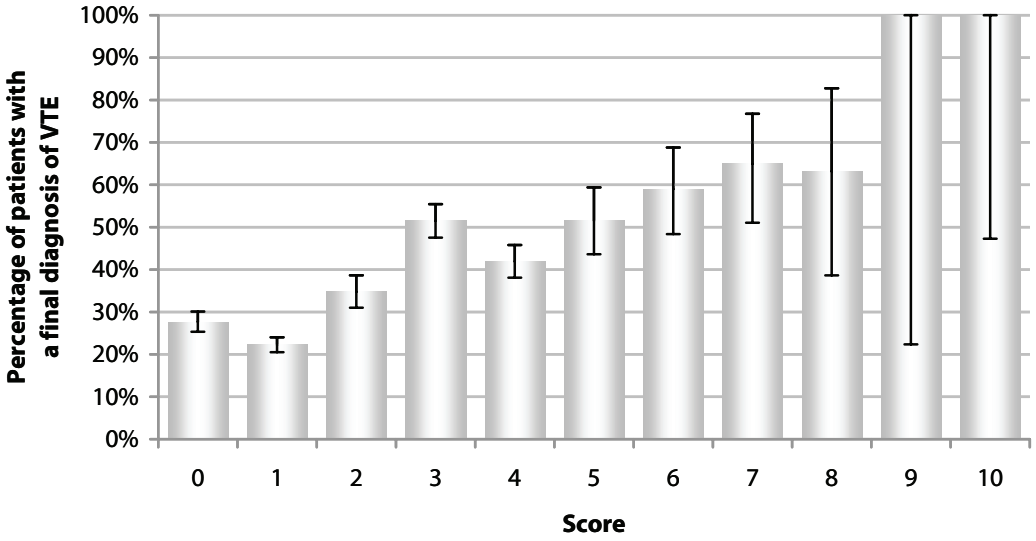


Risk assessment for VTE

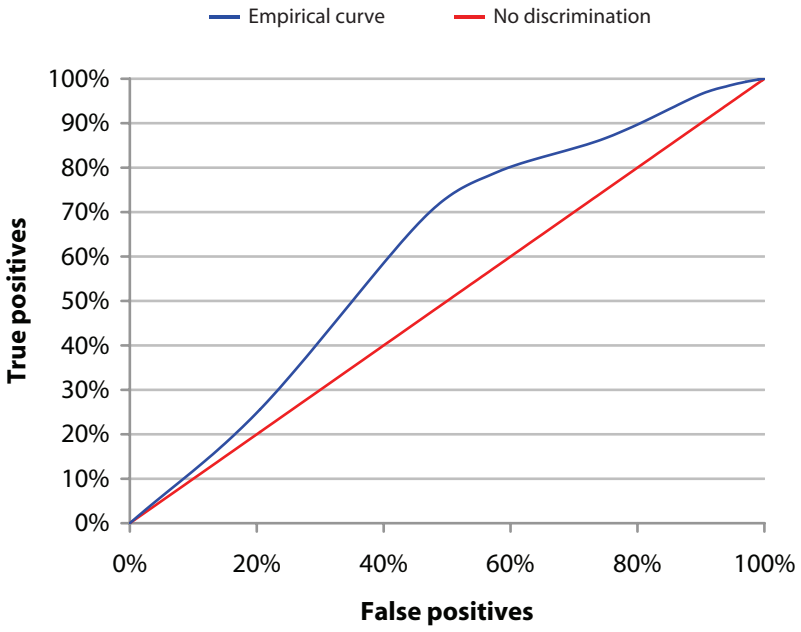
In the last report, we described the application of a VTE risk score to VERITY data based on eight principal risk factors, previously validated and shown to improve patient outcome [8]. Each risk factor was weighted according to a point scale. An increased risk of VTE was defined as a cumulative risk score of at least 4. In a previous randomised study, a computer alert using the risk score reduced the risk of VTE at 90 days by >40%.

For this report the data below have been updated, and we have performed a Receiver Operating Characteristic curve analysis (ROC) to determine how good the score is at discriminating between patients who do and do have a final diagnosis of VTE. The ROC curve analysis suggests that the score is not a very good discriminator, and therefore more analysis has been initiated in an attempt to develop a valid risk assessment score for VTE.

Final diagnosis and weighted risk score (n=5,841)



Receiver Operating Characteristic curve for the weighted risk score predicting a diagnosis of VTE (n=5,841; ROC area =0.611)



Independent expert working group on the prevention of venous thromboembolism

The VTE expert group report was published in late April and for the first time provides a framework for the management of VTE in the UK.

The framework was based on a review of the existing guidelines on the treatment and prevention of VTE that are considered to represent best practice and on a review of a huge volume of evidence relating to the natural history, pathophysiology, diagnosis, screening, and appropriateness of surrogate end points and prevention of VTE. The advice is structured in two sections:

- **Thromboprophylaxis strategy**, outlined as Practice points in this chapter
- **Systems, processes and knowledge base**, provided in full below:

The VTE expert group recommends:

1. A documented mandatory VTE risk assessment of every hospitalised patient on admission.
2. This VTE risk assessment be embedded within the Clinical Negligence Scheme for Trusts (CNST).
3. Improvement of public & professional understanding of VTE at a national level, through improved communication of information to patients and the public, accompanied by improved & coordinated programmes of professional education.
4. Establishment of VTE demonstration centres with an expanded role addressing demonstration of best practice, in order to inform development of comparable local systems in care networks and institutions. Such VTE demonstration centres would work together to develop a national risk assessment strategy, local quality control measures, audit of local practice, and would provide centralised educational material to support local educational programmes (*e.g.* working with the National Centre for Anticoagulation Training).
5. Core standards be set by the Department of Health for the NHS and independent sector in order to ensure that there is ultimately 100% compliance with the requirement for risk assessment of each and every adult admitted to hospital in England. These should be articulated in Standards for Better Health for the NHS and in Independent health care: national minimum standards.
    a. Compliance with such standards be monitored by the Healthcare Commission through its assessment and inspection procedures. This would form part of an institution's self-assessment, with a separate analysis by the Healthcare Commission to test the validity of these responses.
    b. The Department of Health refers responsible healthcare institutions that have no protocols for mandatory assessment and documentation, or have incomplete implementation of risk assessment, to the new expanded local thrombosis demonstration centres for further discussion and advice regarding best practice.
6. Evaluation of the impact on patients and the public of any future VTE strategy and associated implementation, including:
    a. The development of a systematic approach to ensuring compliance with national quality assurance standards.
    b. A communication strategy to promote better understanding.
    c. A refinement of VTE-related health outcome measures (better VTE *metrics*).
    d. Improvement in public and patient awareness and provision of guidelines about VTE risk (to include development of the existing VTE web pages on the Department's website at www.dh.gov.uk/vte).

NICE clinical guideline on reducing the risk of VTE in inpatients undergoing surgery

The NICE clinical guideline was published in late April and provides thromboprophylaxis advice for inpatients undergoing surgery. To reduce the risk of VTE in all surgical specialities, the main recommendations of the guideline are:

- Patients should be assessed to identify their risk factors for developing VTE.
- Healthcare professionals should give patients verbal and written information, before surgery, about the risks of VTE and the effectiveness of prophylaxis.
- Inpatients having surgery should be offered thigh-length graduated compression / anti-embolism stockings from the time of admission to hospital unless contraindicated (for example, in patients with established peripheral arterial disease or diabetic neuropathy). If thigh-length stockings are inappropriate for a particular patient for reasons of compliance or fit, knee-length stockings may be used as a suitable alternative.
- The stocking compression profile should be equivalent to the Sigel profile, and approximately 18 mmHg at the ankle, 14 mmHg at the mid-calf and 8 mmHg at the upper thigh.
- Patients using graduated compression / anti-embolism stockings should be shown how to wear them correctly by healthcare professionals trained in the use of that product. Stocking use should be monitored and assistance provided if they are not being worn correctly.
- Intermittent pneumatic compression or foot impulse devices may be used as alternatives or in addition to graduated compression / anti-embolism stockings while surgical patients are in hospital.
- In addition to mechanical prophylaxis, patients at increased risk of VTE because they have individual risk factors and patients having orthopaedic surgery should be offered LMWH. Fondaparinux, within its licensed indications, may be used as an alternative to LMWH.
- LMWH or fondaparinux therapy should be continued for four weeks after hip fracture surgery.
- Regional anaesthesia reduces the risk of VTE compared with general anaesthesia. Its suitability for an individual patient and procedure should be considered, along with the patient's preferences, in addition to any other planned method of thromboprophylaxis.
- Healthcare professionals should encourage patients to mobilise as soon as possible after surgery.

The risk factors for VTE identified by NICE are:

- Active cancer or cancer treatment
- Active heart or respiratory failure
- Acute medical illness
- Age over 60 years
- Antiphospholipid syndrome
- Behcet's disease
- Central venous catheter *in situ*
- Continuous travel of more than three hours approximately four weeks before or after surgery
- Immobility *e.g.*, paralysis or leg in plaster
- Inflammatory bowel disease *e.g.*, Crohn's disease or ulcerative colitis
- Myelproliferative disease
- Nephrotic syndrome
- Obesity (body mass index ≥30 kg m^{-2})
- Paraproteinaemia
- Paroxysmal nocturnal haemaglobinuria
- Personal or family history of VTE
- Pregnancy or *puerperium*
- Recent myocardial infarction or stroke
- Severe infection
- Use of oral contraceptives or hormonal replacement therapy
- Inherited thrombophilias *e.g.*
  - high levels of coagulation factors (*e.g.*, Factor VIII)
  - hyperhomocysteinaemia
  - Low activated protein C resistance (*e.g.*, Factor V Leiden)
  - Protein C, S and antithrombin deficiencies
  - Prothrombin 2021A gene mutation

Conclusions

The change in the data fields that was introduced in 2005 has impacted positively on the thromboprophylaxis data now available. The question previously recorded on medical in-patient / immobility was too general and no detailed thromboprophylaxis provision was recorded. Now a broader range of information is recorded in the CRF about patients' recent medical history, in particular recent hospitalisation, specific medical illnesses and details of thromboprophylaxis are recorded. Reviewing the VERITY thromboprophylaxis findings this year gives an important insight into current practice.

Specific medical illnesses and surgical procedures, such as infectious respiratory disorders, stroke and orthopaedic procedures, accounted for the largest numbers of patients with confirmed VTE. Orthopaedic hip and knee surgery had the highest absolute numbers of patients with VTE; VTE was found in few patients with hip fracture, which may partially reflect the finding that these patients were associated with the highest level of thromboprophylaxis usage. Reviewing the thromboprophylaxis provision in medical patients with major illnesses, rates were highest in patients with heart failure and lowest in patients with stroke.

Identifying patients at risk of VTE

It is clear from the VTE expert working group's report and from the NICE guidelines that introducing a compulsory VTE risk assessment programme for all patients on admission to hospital is a key advance, but what is currently missing is a firm recommendation and agreed approach on how to formally assess risk. The CMO has therefore established a national VTE implementation working group to develop a national risk assessment tool and provide leadership both within the NHS and the wider healthcare sector in order to assess what needs to be done to ensure that a VTE risk assessment of every patient on admission to hospital becomes a reality.

Future developments

The move to compulsory VTE risk assessment by next year will place hospitals under the spotlight and appropriate thromboprophylaxis provision will become a key parameter to assess for audit and clinical governance reasons. VERITY will remain an important resource for you, and the national risk assessment tool will be built into the VERITY CRF and outcomes reported, positioning VERITY as the national venous thromboembolism registry.

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