Venous thromboembolism is a condition that can be minimised when nurses take the lead with patient education to ensure they better adhere to treatment.

Using patient education to reduce risk of VTE

In this article...

- Signs and symptoms of venous thromboembolism (VTE)
- Risk factors for VTE
- How to enable patients to optimise self-care to prevent VTE

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Certain patients are at risk of venous thromboembolism, such as those who may be immobile after having had surgery. Venous thromboembolism is the term used to describe the formation of blood clots in the veins known as deep vein thrombosis and pulmonary embolism. This article discusses the importance of VTE prevention, and highlights how nurses can increase patients’ understanding of the condition and improve adherence with preventive treatment. By understanding the fundamental aspects of VTE prevention, nurses will be more confident in discussing this issue with patients. A variety of preventive methods are examined, including mobilisation, hydration, the use of anti-embolism stockings and anticoagulant medicines.

Deep vein thrombosis (DVT) and pulmonary embolism are significant causes of hospital-related morbidity and mortality (Spencer et al, 2008). However, evidence shows that much can be done to prevent the development of VTE and guidelines are available to ensure best practice (National Institute for Health and Care Excellence, 2010a). Venous thromboembolism (VTE) is the term used to describe the formation of blood clots in the veins, which results in DVT (usually in the deep veins of the leg or, occasionally, in the arm) and pulmonary embolism (where a clot breaks free and travels to the lungs). Box 1 outlines the common risk factors for VTE. Its prevention is a patient safety issue and all nurses should:

- Understand the condition;
- Follow the relevant guidelines to help to minimise the number of VTE events.

Nurses should also have the knowledge and confidence to explain VTE to patients, as well as emphasising the importance of prevention.

In the hospital where I work a recent survey discovered that nurses believed they had sufficient knowledge to educate patients about VTE; however, a separate survey of patients found that 50% did not know the signs and symptoms of VTE. This is significant, as up to 40% of hospital-related VTE events (any VTE during admission or within 90 days of discharge) in the trust occur after discharge.

Current literature demonstrates that while nurses are aware that patients are at risk of VTE, some do not feel fully confident in explaining the risks, signs and preventive treatment to patients (McFarland et al, 2014; Exter et al, 2013). Similarly, knowledge of VTE in the general population who have not had recent contact with healthcare services also appears to be low (Boulton et al, 2015).

Sometimes, nurses’ lack of confidence can be a barrier to effective education so the aim of this article is to increase confidence by revising basic knowledge, as well as suggesting how information about VTE can be conveyed to patients using simple language.

Bridging the gap

How do nurses close the gap between their own knowledge of VTE and that of
patients? NICE quality standards state that all patients should receive verbal and written information about VTE on admission and discharge (NICE, 2010b). However, while emergency admissions, admission during labour or a busy ward environment can make it difficult to educate patients, a creative approach can help to overcome these factors. For example, nurses on an elective surgical ward may be able to provide information on VTE shortly before admission in a pre-assessment clinic; alternatively, in the case of patients who are confused, information could be provided once they have recovered or be given to carers on discharge.

Information can also be adapted to different learning styles by providing oral and written formats to ensure patients retain as much information as possible.

**What is VTE?**

As mentioned, VTE is an umbrella term for DVT and pulmonary embolism. The blood clots seen in DVT are composed of platelets, red blood cells and fibrin. They can be a few centimetres long in one vein or affect multiple deep veins along the whole length of the limb. Clots can partially or completely occlude the vein.

If part of a DVT breaks off, it can travel to the lungs via the heart and cause a pulmonary embolism. Up to 30% of patients with a DVT also have a pulmonary embolism without symptoms (Stein et al, 2010).

**Signs and symptoms**

If a patient has DVT, the following symptoms can present in the affected limb:

- Pain
- Swelling
- Heat
- Erythema

Long-term complications known as post-thrombotic syndrome can occur due to damage to the valves in the veins resulting in venous incompetence. Post-thrombotic syndrome can be a debilitating and painful condition characterised by swelling, pain and a feeling of heaviness in the limb (Kearon, 2003).

Since a high proportion of patients have a pulmonary embolism as well as DVT, all those with a suspected DVT should be asked whether they have any symptoms of pulmonary embolism. Pulmonary embolisms are often characterised by a sudden onset of chest symptoms such as breathlessness, low oxygen saturation levels and chest pain, while some patients may cough up blood. Initially, the heart will try to pump blood even when the thrombus is causing an obstruction in the lungs and, depending on the size of the clot, this can strain the heart or cause heart failure with resulting collapse and cardiac arrest.

**Risk factors for VTE**

Identifying risk factors for VTE helps to identify strategies that can reduce this risk. There are three main categories of risk when considering VTE events and hospitalisation:

- **Stationary blood in the veins;**
- **Conditions that make the blood ‘sticky’;**
- **Venous trauma.**

These are based on Virchow’s triad developed in 1846 which established the three contributing factors (MacLellan and Fletcher, 2007).

**Stationary blood in the veins**

Many patients are at risk of blood clotting due to immobility. When blood is not moving, it becomes more viscous (thicker) and clots more quickly.

Many people are aware of the risk of developing blood clots when flying due to long periods of immobility. In a review by Ayrail and Al-Khaffaf (2006) it was noted that, while the incidence of VTE in the general population was estimated to be 1-2 per 1,000 people per year, the rate of VTE in relation to flying long haul could be zero in healthy persons but up to 5.8% in those with pre-existing risk factors. This would include diabetes, hypertension and cardiac failure.

Flying or not, any prolonged immobility can increase the risk of blood clots. When a person is immobile, the veins dilate, becoming wider and causing blood flow to slow down. The contraction of the calf muscles when walking, which normally aids venous return, does not occur as often when someone is immobile – explaining this to patients may help them work out how to reduce their own risk of VTE.

**Conditions that make the blood “sticky”**

The normal response to a break in the skin such as a cut or abrasion is the formation of a scab. This is essentially a clot – a mass of platelets and fibrin that covers the wound site to protect it while it heals.

Clots are initiated by coagulation factors in the blood in response to injury. The site of injury itself will clot but the coagulation factors in the blood continue to circulate throughout the rest of the body.

When combined with risk factors such as immobility, the opportunity for a clot to develop elsewhere in the body is increased, leading to platelets and fibrin forming a clot within a vein rather than over the site of an injury. This can also be seen during pregnancy, for example, when clotting hormones are elevated to prevent excessive bleeding during delivery; while this process is needed, pulmonary embolism is currently the leading cause of direct maternal death in the UK (Knight et al, 2014).

The combined oral contraceptive pill is linked to an increased rate of VTE – the baseline of 4 per 10,000 per year in women who do not take the pill rises to 7-10 in those who do. This should take into account the increased risk of VTE - 20-30 per 10,000 women per year – in those who become pregnant (Bateson et al, 2016).

Genetic predisposition can also be a factor – in the UK, 10% of the population has a genetic condition called factor V

**Pregnancy, varicose veins, hip and knee surgery, or any prolonged immobility due to illness can lead to blood stasis in the veins, increasing the likelihood of clot formation. Nurses can work with patients to help them understand that movement of the legs can increase blood flow and reduce the risk of VTE rather than their depending on prescribed medications to do so.**

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Genetic predisposition can also be a factor – in the UK, 10% of the population has a genetic condition called factor V
Leiden, which causes their blood to clot more quickly than in others. Many do not know they have the condition and it often only comes to light when they are tested after developing a blood clot without an obvious cause. For those with factor V Leiden and without a VTE, preventive treatment is not indicated so blood relatives of people with a VTE are not routinely screened for the condition.

Dehydration is often linked to increased VTE risk, increasing the blood viscosity and contributing to the clotting process. Obesity is also a factor, particularly in people under 40 years old (Stein et al, 2005).

The effect of cancer on clotting mechanisms also predisposes a person to VTE. In a large study of over 35,000 people with the condition, 6,000 had a cancer diagnosis and this group was more likely to die from a pulmonary embolism than those without cancer (Gussoni et al, 2013).

Venous trauma
Trauma and surgery can cause a break in the blood vessel wall and expose the underlying collagen. Platelets adhere to this collagen and the blood begins to coagulate. A lack of movement due to pain or rehabilitation after surgery further multiplies the risk of VTE development in post-operative patients, while the intravascular catheters used in emergency and long-term care are also associated with an increased risk of upper limb DVT (Winters et al, 2015).

Preventing VTE
All patients should be assessed for their risk of VTE on admission to hospital (NICE, 2010b). Risk assessment is performed differently in each hospital but is usually carried out alongside prescribing medications and uses a nationally agreed set of risk factors. If the risk is deemed to be high, action needs to be taken.

The nature of the methods used to prevent VTE (see below) means patient participation is crucial. Adherence to treatment is increased if patients know why they are being asked to perform a particular task so nurses should explain the relevant treatment options, including the benefits, risks and potential consequences (NICE, 2012).

Mobilisation
Mobilisation is not something that can be prescribed and therefore requires full patient engagement. If patients are fully informed about immobility as a risk factor, it should be easy for them to understand that keeping the blood flowing properly will reduce the likelihood of DVT formation. While some patients will be able to take a regular walk, many will be less able to mobilise; however, this does not mean there is nothing they can do. For example, those who cannot get out of bed could perhaps wiggle their toes or move their feet up and down periodically (Fig 1). Both exercises are simple methods of increasing blood flow in the deep veins of the leg.

Pain, fear of falling and forgetfulness are just a few reasons a patient might not want, or be able to, mobilise. Questions the nurse needs to consider are:

» Is the patient able to move at all?
» How does the patient’s health affect their mobility?

Each patient will have a different barrier to mobilisation and nurses need to work with them to overcome these.

Hydration
Up to 11% of hospital patients are dehydrated, and this risk increases when patients have a stroke, to prevent VTE. A sleeve is wrapped around the leg and inflated on a regular cycle (every 2-3 minutes) to compress the muscles and enhance blood flow in the veins. IPC aims to mimic the action of walking and has been shown to reduce VTE events (Dennis et al, 2013), although most IPC sleeves are only suitable for immobile patients. IPC can also be used where the patient weight loss and oedema to alter the size of their limbs.

Studies have shown that thigh-length stockings are more effective at reducing the risk of DVT formation compared with knee-length stockings (Dennis et al, 2010); however, this evidence was not strong and so it is important to apply the length of stocking with which the patient is comfortable as this will enhance adherence.

In my experience, common reasons for non-adherence with anti-embolism stockings include poor fit, the stockings being too hot or the patient disliking the colour. In light of the strong opinions patients sometimes have, nurses should ensure patients understand why the stockings have been recommended so they can make an informed decision about what they want; this will help improve adherence.

Intermittent pneumatic compression (IPC) is another method of mechanical prophylaxis, which is mainly used in surgical patients and those who have had a stroke, to prevent VTE. A sleeve is wrapped around the leg and inflated on a regular cycle (every 2-3 minutes) to compress the muscles and enhance blood flow in the veins. IPC aims to mimic the action of walking and has been shown to reduce VTE events (Dennis et al, 2013), although most IPC sleeves are only suitable for immobile patients. IPC can also be used where the patient weight loss and oedema to alter the size of their limbs.

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Pharmacological prevention
The use of low molecular-weight heparin (LMWH) to prevent VTE is widespread in medical and surgical patients who are deemed high risk. Heparin interrupts the formation of fibrin leading to a reduction in the ability of the blood to clot. LMWH is usually given once a day as a subcutaneous injection, with the dose depending on the patient’s body weight and renal function. For patients whose renal function is impaired, unfractionated heparin can be used, as it is less dependent on the kidneys for excretion from the body.

There is a small risk of heparin-induced thrombocytopenia associated with the use of heparin. This is an immune response characterised by a drop in platelet count and is due to platelets clumping together leading to the potential for thrombosis or a lack of ability to stop bleeding in the capillaries, which causes small purple bruises. The patient’s platelet count should be checked 4–7 days after starting heparin.

Educating patients to inject thromboprophylaxis on discharge
Nurses often have to teach patients to self-administer LMWH as it is commonly prescribed as a take-home medicine for extended prophylaxis. Teaching can start as soon as the patient is well enough to self-inject on the ward. Providing encouragement before discharge is essential to ensure patients are confident to self-inject and manage their medications and treatment independently. Telling them why they need LMWH – including the risk factors – is just as important as explaining how the injection works. Patients should also be advised not to rub the injected area as this will increase bruising. Patient information booklets can often be obtained from manufacturers of heparin to help nurses teach patients.

A new generation of oral anticoagulants known as direct oral anticoagulants are also becoming more widely used; however, only rivaroxaban is currently licensed for VTE prophylaxis in elective hip and knee replacement surgery.

Conclusion
Hospitalisation increases the risk of morbidity and mortality of VTE but there is a gap between nurses’ knowledge of how to reduce VTE and the effective education of patients. This may lead to ineffective prevention of VTE as patients are less engaged in their own care due to a lack of understanding about the condition. To reduce the likelihood of patients developing VTE, nurses need to take an individualised approach to patient education to increase adherence to treatment.

On a wider level, different hospital areas need to address any barriers to providing information about VTE – this may include nurses not knowing where leaflets on VTE are located or there being no specific pathway for the provision of information, such as in admission packs or with discharge information.

Nurses are ideally placed to identify barriers to effective VTE prevention strategies and develop actions to make a positive change in their particular clinical area. Considering the areas covered in this article, nurses can identify where there might be a gap in practice, assess through consultation or audit the extent of the problem and formulate an improvement plan with the multidisciplinary team. Successful change could lead to safer care and improved health outcomes.

References
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