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Deep vein thrombosis: clinical nursing management



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Aims and intended learning outcomes

The aim of this article is to enhance your knowledge of the clinical nursing management of deep vein thrombosis (DVT).

After reading this article you should be able to:

- Differentiate the three categories of predisposing factors in the formation of a DVT using Virchow's (1846) triad classification (Fig. 1).
- Identify clinical signs and symptoms of DVT.
- Discuss DVT diagnostic investigations used within clinical nursing practice.
- Identify those patients who might be at risk of developing a DVT.
- Describe the use of anticoagulant therapy.
- Describe a research-based DVT risk assessment tool.
- Prepare a patient-teaching session that can be used for a patient with DVT, prior to discharge from hospital.

Introduction

Deep vein thrombosis, the formation of a thrombus in one of the deep veins of the body, is the single most preventable thrombo-embolic disorder, and is asymptomatic in many cases. DVT risk assessment tools can provide systematic data on which to base nursing care plans. Structured patient teaching and the attainment of an optimum safe lifestyle are paramount. Responsibilities and promotion of self-care strategies are integral to the respective intra-

collaborative roles of patients with DVT, their families and the healthcare professionals who provide hospital and home outreach services.

DVT poses a threat to many hospitalised patients (Grace 1993); medical and surgical patients can be at risk up to six weeks post-discharge (Scurr *et al* 1988). Research showed that 24 per cent of all patients with DVT died of a pulmonary embolism (PE) within seven days of having an operation (Sandler and Martin 1989). Conversely, 45 per cent of DVTs arise on the day of operation (Nicolaidis and Gordon-Smith 1975). It is estimated that only one in nine cases of DVT is clinically proven (Turner and Turner 1982). DVT can lead to the fatal complication of PE, estimated to cause 33,600 deaths a year (Ishak and Morley 1981) and is thought to be responsible for 10 per cent of all hospital deaths (Sandler and Martin 1989). It should be acknowledged that DVT is usually preventable within collaborative DVT care pathways (Cheater 1996), and practitioners can use a recommended protocol within professional nursing practice (ECS 1997, NIH 1986). Such DVT prophylaxis protocols can be examined and used in combination with DVT risk assessment tools.

Predisposing factors to DVT

The formation of a DVT can be due to one or a combination of three predisposing factors, known as Virchow's triad (Fig. 1). Several conditions can contribute to the factors identified.

in brief

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Summary

The occurrence of a deep vein thrombosis is potentially life threatening and rapid assessment and treatment are essential to prevent development of a pulmonary embolism. Prophylaxis and risk assessment are important aspects of DVT management.

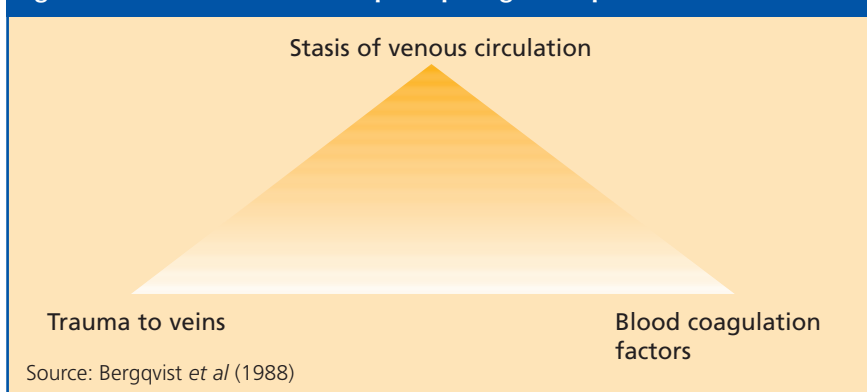
Key words

- Patient assessment
- Vascular disorders

These key words are based on subject headings from the British Nursing Index. This article has been subject to double-blind review.



Fig. 1. Virchow's triad of factors predisposing to deep vein thrombosis



Trauma Localised trauma and direct vascular damage caused by, for example, surgical procedures, intravenous (IV) injection or therapeutic interventions might cause serious endothelial damage to veins and vein dilation, which predisposes to DVT formation (Arcelus *et al* 1991). Patients undergoing total hip replacement (THR) might be placed at high risk due to twisting of the femoral vein during surgery (Fitzgerald 1997). Patients receiving multiple IV injections/infusion medication therapy, as in chemotherapy and systemic antibiotics, might be at increased risk (Hoyt 1991).

Blood coagulation factors Hypercoagulation – due to blood dyscrasia, dehydration, malignancy or oral contraceptives – has the potential to alter normal blood haemostasis mechanisms (Sartwell and Stolley 1982). Research has shown that women who take contraceptives and smoke double their risk to DVT (Fahey 1988).

Stasis of venous circulation Circulatory problems can be caused by bed rest, frailty and immobility in older patients, cardiovascular disorders and post-operative immobilisation (Arcelus *et al* 1991). Long-haul flights are thought to predispose to thrombi formation due to restricted mobility, but recent research indicates that the risk might be due to the reduced air pressure in airplanes (Bendz *et al* 2000). Patients who are obese or immobile are at high risk of developing venous circulatory problems. Immobility can deprive the deep veins of the lower limbs of the pumping action of the calf muscles (calf muscle pump), leading to stasis of venous blood, particularly behind the valve cusps of deep veins, which can predispose to thrombus formation.

Formation of a DVT

DVTs often originate around the venous valve cusp site, leading to a reduced blood flow and

thus stasis of venous blood in the affected vein. Localised blood coagulation ensues, with a thrombus composed of erythrocytes, thrombocytes and fibrin. The thrombocytes and fibrin can detach and travel to the lungs, forming a pulmonary embolism (Clark and Kumar 1994).

A DVT can develop in any deep veins, but will develop in the lower limbs in an estimated 60 per cent of cases (Fig. 2) (Love 1990a); there is a higher incidence in the left leg than in the right (Havig 1977).

In the venous circuit of the lower limbs, the most likely site of a DVT is in the deep leg veins (60 per cent of cases), with other sites including the femoral veins (22 per cent) and popliteal veins (7.8 per cent) (Love 1990a, Tyco Healthcare).

TIME OUT 1

Think about DVT patients you have nursed and explain the potential predisposing factors of the DVT episode using information from your reading. Looking at Figure 2, which lower limb veins are prone to DVT formation?



Signs and symptoms of DVT

There are up to six signs and symptoms that might demonstrate a DVT episode (Box 1). However, it should be acknowledged that in up to 50 per cent of cases, there are few or no significant physical abnormalities or clinical signs to be detected (Barnes *et al* 1978, Turner and Turner 1982). If signs are present, any resolution of the DVT might be demonstrated by a reduction in signs and symptoms.

Abnormal swelling of the affected limb This can be due to localised oedema resulting from:

- Thrombosis occlusion of the affected deep vein, which impedes venous blood return and can also affect the efficiency of collateral venous drainage.
- Capillary damage, causing leakage of intravascular fluid into the surrounding tissues (extravasation), distal to the thrombosis site. Bilateral baseline limb-girth measurements should be performed daily, and form an important part of ongoing patient monitoring.

Warmth of affected limb In some cases, the affected limb feels warm to the touch. This might be due to localised venous congestion and accumulation of tissue metabolites in the affected limb (Clark and Kumar 1994).

Localised pain Lower limb pain might be

Box 1. Signs and symptoms of deep vein thrombosis

- Abnormal swelling of affected limb
- Warmth of affected limb
- Localised tenderness and pain
- Dilation of veins
- Colour changes of affected limb
- Pyrexia

(Game 1989)

experienced in the calf muscle region during dorsiflexion movements of the foot – this is referred to as a diagnostic positive Homan's sign. Localised symptoms are commonly due to oedema in the tissues surrounding the site of thrombophlebitis (inflammation of vein where clot is present). Pain is not always present, for example, in cases where there is a small sized thrombus with few localised inflammatory activities (Game 1989). However, in cases of iliofemoral vein thrombosis, extreme pain can present (Clark and Kumar 1994).

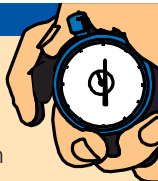
Dilation of veins Due to the venous thrombus occlusion of the respective vein, a distal dilatation of veins might occur as a result of systemic and peripheral venous circulatory-stasis obstruction (Tortora and Anagnostakos 1996).

Colour changes of the leg Initially, as a result of the venous thrombosis, pallor of the leg might be the only indicator. In other cases, a peripheral skin erythema (redness) of the affected limb occurs immediately over the DVT site, which might be due to the superficial thrombophlebitis (Hinchliff 1996).

Pyrexia A systemic increase in body temperature to 39-40°C can be caused by the accumulation of tissue metabolites at the site of the thrombosis formation, and intravascular thrombophlebitis occurs (Brooker 1998, Marieb 1998).

TIME OUT 2

Reflect on a patient you have nursed recently with a confirmed clinical diagnosis of DVT. Did he or she present with any of the described signs and symptoms? Given what you know about DVT clinical presentation, list five significant indicators that would demonstrate the resolution of a DVT. Reflect on your list and discuss this with a colleague.

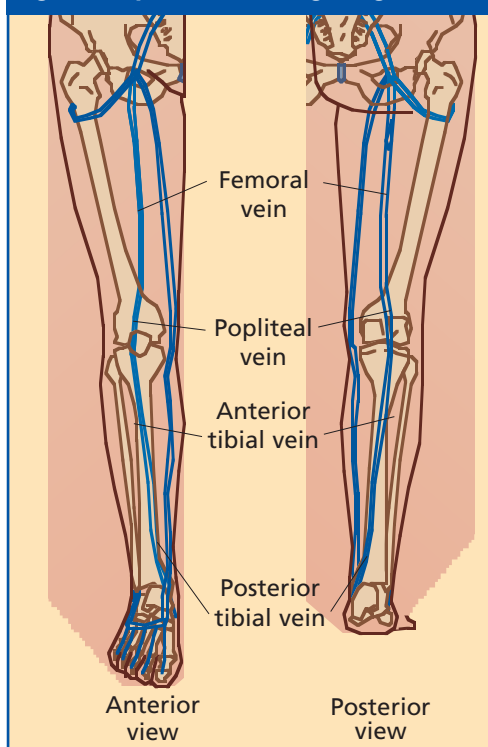


Asymptomatic In 50 per cent of cases the DVT has no initial observable symptoms and, of patients with a PE, up to 75 per cent might have no sign of a preceding DVT (Clark and Kumar 1994, Sandler and Martin 1989). As it is estimated that only one in nine cases will present clinically, all patients who are identified to be at risk should be carefully assessed, examined and monitored (Turner and Turner 1982).

Specific diagnostic assessment

Clinical diagnosis might be confirmed by the following techniques:

Fig. 2. Deep veins of the right leg



Venometer The Venometer test is quick to carry out and aims to reduce time between the potential DVT presentation and confirmed diagnosis. A portable venometer machine can be used at the patient's bedside, which has a pneumatic leg (thigh) cuff attached to measure venous drainage.

Ultrasound Doppler testing This measures venous flow by placing a Doppler probe over veins, and the procedure can be performed with the patient standing. This test is useful for differentiating between a DVT and muscle strain or haematoma (Lewis and Collier 1992).

Venography This can detect a thrombus using a radiopaque intravenous (IV) injection technique via the dorsal foot vein. It is suggested that many below-knee thrombi can be detected only by venography (Clark and Kumar 1994).

Plethysmography This detects any obstruction to the venous flow of blood from the leg. Results are recorded before, during and after exercise using a pneumatic cuff applied to the patient's femoral region (Hodder 1994). In cases of DVT, there will be significantly less volume of venous return than in the non-affected limb (Smeltzer and Base 1996).

Radioactive fibrinogen scanning This test can be performed to define the location of a clot and any subsequent secondary emboli. Radioactive fibrinogen is administered intravenously and in patients who develop a DVT, it will be

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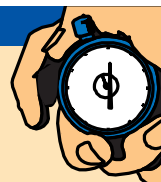
transformed into fibrin. Daily leg scanning is performed to monitor the DVT episode (Lewis and Collier 1992, Smeltzer and Base 1996).

Haematology screening There are numerous haematology screening methods that detect the fibrin degradation product, D-dimer, which is released into the circulation during a DVT episode (O'Shaughnessy and Thomas 1999). One such technique that is often used in A&E only requires a fingerprick specimen.

Some researchers demonstrate the D-dimer estimation to be the 'gold standard' screening technique for all DVT patients (Turkstra *et al* 1998). However, it should be noted that raised levels of D-dimer do occur during the mechanisms of active fibrinolysis, and might not be specific to all DVT episodes (O'Shaughnessy and Thomas 1999). Raised D-dimer levels can indicate the presence of DVT/PE in patients up to the age of 40, but the test can be less specific in older patients (O'Shaughnessy and Thomas 1999). D-dimer has a high negative-predictive value, and could reduce the need for further investigations by 75 per cent, leading to an earlier hospital discharge for the patient (O'Shaughnessy *et al* 1998).

TIME OUT 3

Which of the diagnostic techniques presented are used within your area of practice to confirm potential DVT cases? List the types of D-dimer haematology testing used in your area of practice, discuss with a colleague, and refer to any clinical audits being undertaken in relation to haematology screening.



High-risk DVT groups

Significant factors relating to age, weight, gender, health, illness and lifestyle, alongside trauma and surgical intervention, might place a patient at high risk of developing a DVT (Autar 1996). All patients who experience DVT are at risk of potential acute and chronic complications. Systemic protective responses, termed acute phase reaction (APR), are provoked in response to trauma/blood vessel damage such as might occur in DVT (Lowe 1979). Anticoagulant prophylaxis should help to reduce the severity and duration of the APR post-operatively (Love 1990a). Special attention is focused on the blood-clotting inhibitor antithrombin III and the fibrinolytic agent plasmin.

The responses that occur during the APR episode with formation of a DVT, and the exten-

sion of the thrombus, must be considered in respect of two potential sites of lower limb venous circuit (Walker and Davidson 1985):

- At the blood vessel wall site of trauma or disease.
- Wherever venous blood flow has become turbulent, such as pooling of blood around the vein valve cusps, within which blood flow is already retarded.

The defective blood flow prevents the dispersal of newly developed fibrin, and this prevents clotting enzymes coming into contact with circulating inhibitors and clearance via the liver (Gitel *et al* 1979). In the turbulent blood flow, aggregation of thrombocytes increases, predisposing to thrombus formation. Unfortunately, once vein valve cusps become structurally damaged, they are unable to prevent retrograde venous blood flow, which might predispose to varicose veins and pooling of blood between damaged and healthy valve cusps. Even a single episode of DVT might cause irreversible damage to the vessel wall and valve cusp structure, predisposing to a potential recurrence of DVT (Smeltzer and Base 1996). Furthermore, venous leg ulcers can arise between ten and 15 years after the initial episode (Lowe 1979).

Therapeutic interventions

A tripartite regimen of prophylaxis should include subcutaneous heparin (short-term prescription), anti-embolism stockings and specific pre- and post-operative physiotherapy for surgical cases. Specific regimens for medical cases might include subcutaneous heparin (five days) and oral warfarin anticoagulation (long-term prescription), anti-embolism stockings and specific physiotherapy exercise programmes.

Research supports the advantages of early anticoagulation programmes following medical assessment and diagnosis of DVT, reducing the risk of PE to less than 1 per cent (Levine *et al* 1996). It must be acknowledged that while a clinical improvement of DVT does occur, the achievement of a complete clot breakdown via the natural fibrinolytic system occurs at a very low rate, as anticoagulants have no pharmacological action in lysing existing thrombi (Haslett *et al* 1999).

The cumulative incidence of recurrent DVT as a result of a single DVT episode is 5 per cent after three years and 30 per cent after eight years (Prandoni *et al* 1996). The patient with a DVT has the added risk of developing post-phlebotic syndrome (PPS). This chronic disorder occurs as a consequence of previous venous damage and

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circulatory disruption. Chronic venous circuit damage includes venous valve incompetence due to thrombosis, and a slow endogenous fibrinolysis preceding venous hypertension. The potential of incomplete clot lysis and development of venous vascular reflux is also well recognised (Havig 1977). PPS presents as a brown discolouration of the lower limb with localised redness, stasis-dermatitis and hollow ulceration occurring over the medial and lateral malleoli. While the disease-free period of PPS can be more than 20 years, reported cases rate at 30 per cent with a previous history of DVT (Havig 1977).

Anticoagulant therapy

Heparin therapy promotes the action of antithrombin and factor III, which inhibits factor X and XI in anticoagulant doses. It also slows the clotting time by inhibition of prothrombin-thrombin, and further prevents fibrinogen to fibrin conversion (Brooker 1998, Downie *et al* 1999, Rang *et al* 1995).

In conjunction with heparin, oral anticoagulant therapy is initiated, using warfarin as a first choice anticoagulant. Phenindione oral anticoagulant should be used if the patient is allergic to warfarin (BNF 2000). Warfarin inhibits the vitamin K-dependent clotting factors and some naturally occurring proteins C and S (anticoagulants). Warfarin therapy should be overlapped with heparin therapy for four to five days.

Initial therapeutic doses, such as 10mg warfarin per day, might be given for two days, with subsequent doses adjusted according to the international normalised ratio (INR).

For DVT patients receiving anticoagulant therapy, an INR in the range 2.5-3.0 is desirable unless the patient has experienced a recent thrombosis. Treatment is usually maintained for approximately three to six months (BNF 2000, Fennerty *et al* 1988, Pout *et al* 1999).

However, in cases of recurrent thromboembolic episodes, a more prolonged or lifelong therapy might be advocated (BNF 2000, Downie *et al* 1999).

Criteria for receiving anticoagulant therapy

Following medical assessment and examination, potential DVT patients are referred for Doppler ultrasound scanning and haematological investigations. Patients with a negative or equivocal scan result and negative D-dimer test are discharged back to the GP for further management.

Patients with a positive scan and D-dimer result will be screened using exclusion criteria to see if they are suitable to receive the prescribed therapeutic anticoagulant regimen.

TIME OUT 4

Within your trust, is a formalised clinical assessment protocol used? What are the commonly used anticoagulant regimens within your own nursing practice? What exclusion criteria for anticoagulant prescription are in use in your hospital trust protocol/policy? Do you think these should be amended in any way?



Anticoagulant therapeutic regimens Traditional regimens dictated the use of IV standardised or unfractionated heparin (UFH) regimen for 48 hours, with an initial loading dose of an oral anticoagulant, such as warfarin. However, surveys and audits of heparin therapy have since deemed UFH to be inappropriate as it could prolong the activated partial thromboplastin time, which is the most widely applied laboratory technique for therapeutic monitoring of heparin (Mattison *et al* 1996, O'Shaughnessy *et al* 1998).

More recently, low molecular weight heparin (LMWH) has been a successful treatment for DVT (O'Shaughnessy and Thomas 1999). This has been demonstrated to be a safe and effective treatment for cases of proximal DVT (Levine *et al* 1996). It has the added benefit for the patient of early discharge – patients on LMWH undergo a mean of 1.1 day's hospital care. They can then receive specialised supervised care at home for five to seven days. Standardised hospital treatment using UFH requires patients to spend some 6.5 days in hospital (Levine *et al* 1996). Researchers indicate that LMWH has a longer half life, better bioavailability, can be administered as a fixed or weight-related dose via daily subcutaneous injection, and has a more predictable anticoagulant response (BNF 2000, Rang *et al* 1995, Trounce and Gould 1990).

Patient information

Nurses are well placed to care for patients with DVT, provide patient education and initiate strategies for optimum health promotion activities (Lowry 1995). Providing written formalised information helps to reinforce verbal information given during nurse-patient or doctor-patient discussions, leading to increased patient compliance (Arthur 1995). DVT patients require a wide range of information, covering the clinical condition, therapeutic treatments

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Box 2. Thrombosis risk factor assessment tool

- Demographic data of patient: to include age and gender
- Health status: previous medical history of DVT or PE (= 3 factors), cardiovascular, chronic respiratory disease
- Circulatory stasis: bed rest period 72 hours, obesity (20 per cent of ideal body weight), leg oedema, ulceration and localised circulatory stasis
- Trauma to blood vessels: pelvic surgery, genitourinary surgery, orthopaedic, total hip prosthesis, long bone/pelvic fractures, history of general major surgery
- Blood clotting factors: hypercoagulable states, inflammatory bowel disease, pregnancy/post partum (<1 month) hormone therapy

Box 3. Autar DVT risk assessment factors

- Age-specific group
- Build and body mass index (BMI)
- Mobility
- Trauma risk factors
- Surgical interventions
- Specific risk category
- High-risk diseases

Box 4. Autar DVT assessment risk categories

Score	Risk
<6	No risk
>10	Low risk (<10 per cent)
11-14	Moderate risk (11-40 per cent)
>15	High risk (>41 per cent)

(Adapted from Autar 1996)

and lifestyle changes to reduce alcohol consumption and smoking and increase physical exercise. Specialist anticoagulant and nurse-led DVT treatment services can provide written patient advice on DVT, as well as access to 24-hour telephone helplines (Brown *et al* 1998, Mackie 1996, Pout *et al* 1999).

Patient information about anticoagulant therapy, covering safe administration, self-assessment and uptake of monitoring services, is provided during structured patient teaching/discussion sessions (Brown *et al* 1998, DoH 1992, Pout *et al* 1999). Additional written information is provided, to reinforce patient education, using in-service literature and the Department of Health's anticoagulant patient record booklet (DoH 1998).

Management of DVT cases

Within specialist nursing practice, the DVT clinical care pathway (Cheater 1996, Wilson 1997) allows multi-professional agency, collaborative care programmes to include specific regimens of DVT prophylaxis. Specified programmes can be offered to DVT patients to provide nursing care management that can be assessed, planned, implemented and evaluated by the physician, pharmacist, physiotherapist and specialist nurse practitioner, in partnership with the patient and his or her family (Basford and Slevin 1995, DoH 1992).

Physiotherapy

It is paramount that DVT collaborative care programmes include the physiotherapist to encourage specific ambulatory regimes. For each patient, an initial assessment begins with discussion and observation of the patient's actual and achievable ambulation capacity:

- Independent walking activity (achieved by patient).

- Active walking exercises (ten times hourly). Walking activities will significantly help to reduce deficits in venous blood flow by activating skeletal calf muscle pumps. It is also important to make optimum use of the respiratory system (respiratory pumps), to encourage specified breathing mechanisms and to initiate collaborative skeletal and respiratory pump exercises (Love 1990b).

Nurse's role: risk assessment

The prevention of DVT is important and can be achieved by comprehensive DVT risk assessment undertaken on admission, followed by the most

appropriate form of prophylaxis. Two DVT patient risk assessment tools are available:

- Thrombosis risk factor (TRF) assessment tool for medical and surgical patients (Arcelus *et al* 1991, Caprini *et al* 1991).

- The Autar (1996) DVT risk assessment scale.

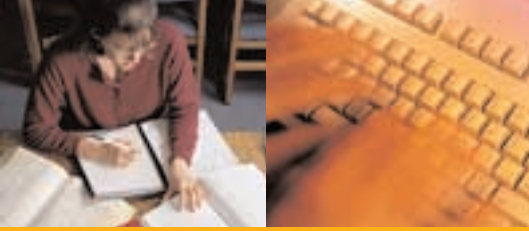
Thrombosis risk factor (TRF) DVT assessment tool

The TRF assessment tool is specific to medical and surgical patients, with some inclusion of specialist medical disorders, orthopaedic, gynaecology and surgical risk factors. Within UK hospital trusts, DVT specialist practice case referrals are received from medical, surgical and specialist surgical arenas, into specialist DVT clinical care pathways (Brown *et al* 1998, Pout *et al* 1999). Nurse practitioners are well placed to implement preventive measures, since this coincides with the high dependency nursing regimens used for post-operative cases. Individual patient assessment can be undertaken using the TRF tool to identify demographic data, previous medical history and health status, inclusive of their clinical condition on admission to hospital or during the TRF assessment activity (Box 2). The TRF tool can be used to identify the total number of risk factors pertaining to the patient.

Within the TRF tool, a DVT prophylaxis protocol is presented. Patients presenting with one or more factors are at risk of developing a DVT. Those who score two or more risk factors are placed in the moderate- to high-risk category and those with more than four factors identified are at high risk of developing a DVT. Prophylaxis is aimed at reducing the incidence of DVT, especially post-operatively (Caprini *et al* 1988). Graduated compression anti-embolism stockings and early ambulation are recommended for cases at all three levels of risk. Anticoagulant therapy is recommended for moderate to high-risk patients, consisting of heparin alone or heparin combined with warfarin, depending on whether the risk is moderate or high.

Autar DVT risk assessment scale The Autar DVT scale was devised in 1996, based on Virchow's (1846) triad of risk factors. This particular tool can be used for the nursing assessment of all patients at risk of DVT and comprises seven risk factors (Box 3) which are further subdivided. Each factor is given a score and the total is added up to find the category of risk of the patient being assessed (Box 4).

The summative total score provides a discriminative and predictive index to DVT, and while high-risk patients might be easily recognised, it is important to identify those who are at low to moderate risk, as they are often missed (Autar 1996).



While similarities between the TRF and the Autar risk assessment tools include age, body weight, mobility, surgery and specialist surgery, each tool has a unique and specific risk assessment and score category. The Autar scale places considerable emphasis on providing five sub-classified risk categories within the age, BMI, and mobility components. General surgery is also differentiated to include minor, major and emergency major procedures. Specialist surgery includes five categories.

A special risk category included in the Autar DVT scale illustrates the potential high risk of DVT in women who are receiving contraceptive therapy, or during pregnancy and the puerperium. Women aged 35-44 who are taking oral contraception have a 2.5 greater incidence of DVT compared to those aged 20-34 (Sartwell and Stolley 1982). With the Autar DVT scale, women aged 20-34 are assessed as score 1, and those aged 35-44 accrue a score of 2. While oestrogen levels are considerably reduced during the puerperium, they do remain higher than normal, leading to increased plasma concentration which results in an increased blood coagulability (Autar 1996). The pregnancy/puerperium group is assigned a score of 3.

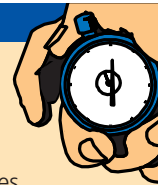
With reference to high-risk disease, the Autar DVT scale illustrates a definitive risk assessment assigned to each of ten high-risk disorders: ulcerative colitis, polycythaemia, sickle cell anaemia, haemolytic anaemia, chronic heart disease, myocardial infarction, malignancy, cerebral vascular accident (CVA), varicose veins and previous DVT. For patients with a confirmed DVT who have a history of previous DVT, the aggregate score assigns the patient into the immediate moderate-to high-risk category, depending on the number of risk factors present. Autar (1996) also highlights patient groups who are placed at high risk of having an increased blood 'thrombogenic mechanism' and who might succumb to a DVT.

As the focus of this article is the nursing management of confirmed DVT cases, information about external pneumatic compression (PC) garments has not been presented. But in both the Autar and the TRF tools, thromboprophylaxis components refer to intermittent or continuous mechanical systems (PC systems). In general, PC sleeve garments can be obtained as foot garments, knee length and thigh length, and work on the principle of aiding venous return and preventing venous stasis. PC garments are often used in conjunction with specified anticoagulant therapeutic regimens during perioperative care programmes for patients undergoing THR and total knee replacement (TKR) surgery.

In line with strategies of defensive documentation and the importance of records and record keeping (UKCC 1996), the Autar tool contains an assessment protocol illustrating the four categories of risk, and an individual patient scoring data component to be completed within 24 hours of the patient's admission. Nurses and physicians will need to evaluate collaboratively the extent to which the chosen assessment tool is applicable to their clinical nursing practice (Autar 1996, Cormack and Reynolds 1992). Within a 24-hour admission period, either of the chosen tools might be used by specialist nurse-led pre-operative assessment clinics or within DVT care pathways and all ward-based admission programmes (Smith 1992).

TIME OUT 5

Which DVT individualised patient risk assessment tool is used within your clinical practice? Explain the advantages and disadvantages of the specified tool used.



Anti-embolism stockings

In line with evidence-based nursing practice, anti-embolism stockings are used widely in the UK for all low-risk patients and are combined with other prophylaxis for moderate- and high-risk groups. Graduated compression stockings are designed to achieve a pressure gradient, with pressure increasing from the ankle to the thigh. The sequential compression profile of the stocking is aimed to mimic the deep leg vein calf muscle pumps, to promote efficient and effective emptying of vein circuits and respective valvular systems without adverse effects on arterial circulation (Barnes *et al* 1978, Holford 1976).

The nurse's role in fitting anti-embolism stockings In conjunction with professional and clinical judgement, and the chosen risk assessment tools, practitioners also need to undertake specific holistic assessment strategies to ensure efficacy and safe wearing of the stockings (Box 5). It is necessary to include localised physical assessment of the lower limbs and systemic assessment of the patient's health status.

Accurate measurement and safe fitting of the stockings is of paramount importance to achieve optimum prophylaxis and patient compliance (Lowry 1995). Anti-embolism stockings are frequently available in knee-length, thigh-length and special thigh-length with waistbelt versions,

Box 5. Holistic assessment

Local assessment

- Skin lesions (lower limbs)
- Gangrene
- Recent vein ligation
- Localised limb oedema
- Recent skin graft (lower limbs)
- Limb deformity (it might not be possible to obtain an effective compression stocking in cases of extreme deformity)

Systemic assessment

- Ischaemia
- Vascular disorders
- Arteriosclerosis
- Chronic/congestive cardiac failure (CCF)
- Pulmonary oedema (where it occurs secondary to CCF, compression stockings might increase venous return and venous pressure)

(Adapted from Tyco Healthcare 1999)

- Mattison I *et al* (1996) Experience from outpatient treatment of deep vein thrombosis with low molecular heparin. *Blood Coagulation and Fibrinolysis*. 7, 399-406.
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and might be colour coded to distinguish between different types and sizes. Below-knee stockings are used for patients whose thigh circumference measures more than 33 inches (84cm), and for specific orthopaedic surgical procedures where the patient is to have wound incision above the popliteal joint, such as a femoral prosthesis or THR. Full-length stockings should be fitted in all other cases to achieve protection of the femoral vein. They must not be rolled down as this can cause a tourniquet effect of the femoral circulation and can predispose to a localised DVT.

TIME OUT 6

Which type of anti-embolism stocking is offered to patients with DVT in your workplace, and how many pairs are offered on prescription? Indicate the ways in which you would assess patients for their stockings, and compare your findings with the information in Box 5.




To encourage safe use and optimum patient compliance, it is important to demonstrate the correct fitting technique of the stocking. This should be supported by a follow-up discussion session, to elicit the do's and don'ts when wearing the stocking. Fitting guides on individual patient assessment, practical fitting, wearability, and maintenance are supplied with the stockings.

Conclusion

While clinical diagnosis of DVT is the role of the physician, nurses also have a role in primary prevention. Receiving patients into medical, general and specialist surgical settings requires formalised DVT patient risk assessments to be undertaken as an integral part of a revised admission assessment by nurse practitioners responsible for DVT cases and their direct clinical nursing programmes. Using patient risk assessment tools enables practitioners to undertake an in-depth patient history to establish the category of DVT risk on admission.

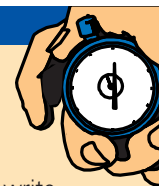
Within assessment, planning, implementation and evaluation of individualised patient care programmes, there is significant opportunity for practitioners to undertake formal and structured patient teaching activities (Arthur 1995, Lowry 1995). It is the nurse's role to inform, teach and advise patients in relation to anticoagulant medications, physiotherapy exercises and the practical wearability of anti-embolism stockings.

Patients need to be actively involved in health promotion activities, including self-assessment (Orem 1995), review and maintenance of lifestyle changes, medication regimens, dietary intake, smoking and alcohol consumption. Patients and nurse practitioners require formalised education about graduated compression stockings.

Health education should be an active and explicit nursing intervention. All patients are at risk of developing a DVT six weeks after discharge from hospital (Scurr *et al* 1988). It should be acknowledged that a history of DVT increases the likelihood of recurrence by 68 per cent (Hirsh and Hoak 1998). Innovative specialist nursing programmes promote the care pathway for confirmed DVT cases, whereby patients referred into home care/outreach programmes are discharged in less than two days of hospital admission (Levine *et al* 1996) 

TIME OUT 7

Now that you have completed the article, you might like to think about writing a practice profile. Guidelines to help you write and submit a profile are outlined on page 57.



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