

Venous Thromboembolism

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Key Messages

Venous thromboembolism (deep vein thrombosis or pulmonary embolism) can occur as a result of long periods of immobility associated with any form of travel.

The risk of venous thromboembolism (VTE) for most travellers is low. For a flight > 4 hours, in healthy individuals, the risk is estimated to be 1 in 6,000. The risk increases with longer duration of travel and with multiple flights within a short period. The risk of pulmonary embolism is much lower.

Some travellers are at increased risk e.g. older travellers, pregnant women, those with a previous history of VTE or recent surgery, those with certain blood clotting disorders, malignancy, certain heart conditions and those taking oestrogen containing medicines (see risk for travellers section).

To reduce the risk of VTE, travellers should regularly mobilise their legs (walk when possible or flex and extend the ankles to encourage blood flow from the lower legs).

Those at increased risk of VTE should seek advice from their health care provider and consider the use of properly fitted compression socks. Low molecular weight heparin therapy may also be recommended.

Overview

Venous thromboembolism (VTE) is term used to cover a spectrum of diseases from deep vein thrombosis (DVT) to pulmonary embolism (PE). VTE is the result of a blood clot (a thrombus) forming in a deep vein, usually in the lower leg.

Long periods of immobility can slow the blood flow from the lower legs which can result in pooling and coagulation (clotting). Reduced blood flow can be further compounded by pressure on the popliteal vein in the back of the knee, such as that caused by a seat during prolonged travel. A clot developing in the vein can occlude (block) the blood vessel and cause swelling of the affected limb.

A pulmonary embolus is caused by the blood clot dislodging from the vein and travelling to the lungs. This is a serious complication and can be life threatening [1].

VTE can occur as a result of periods of immobility, for example following surgery, but can also occur spontaneously in otherwise healthy persons.

VTE has been known to occur following long haul air travel and has been called 'economy class syndrome'; however this term is misleading as VTE has also been reported following car and train journeys. The preferred term is now travel related VTE or travellers' thrombosis.

Risk for travellers

The risk of VTE related to long periods of immobility has been known for many years [2, 3].

Studies from the World Health Organization Research into Global Hazards of Travel (WRIGHT) project on air travel and venous thromboembolism indicates that the risk of VTE approximately doubles after a long-haul flight (>4 hours) and also with other forms of travel where travellers are seated and immobile. The absolute risk of VTE for a flight > 4 hours, in healthy individuals, is estimated to be 1 in 6,000. The risk for travellers increases with the duration of the travel and with multiple flights within a short period [4].

In addition, particular risk factors for healthy young (mean age 35-40 years) travellers identified in the WRIGHT studies are:

- obesity
- extremes of height
- use of oestrogen containing oral contraceptives
- presence of prothombotic blood abnormalities (conditions where the blood is more prone to form clots) [3].

Several factors that increase the risk of VTE have been identified in certain groups or hospital settings [5-7]. These include:

- history of DVT or PE (or first degree relative with history of VTE)
- haematological hypercoaguable disorders (conditions where the blood is more prone to form clots e.g. Factor V Leiden deficiency, thrombocythaemia, antithrombin deficiency)
- pregnancy and women who have had a baby in the last 6 weeks
- malignancy (active cancer) or cancer treatment
- congestive cardiac failure or recent myocardial infarction (heart attack)
- recent surgery of more than 30 minutes duration, performed 4 weeks to 2 months ago
- oestrogen therapy (e.g. oral contraceptive pill, oestrogen receptor and hormone replacement therapies)
- older age (over 60 years)
- recent serious injury / trauma

- one or more significant medical conditions (for example heart disease, metabolic, endocrine or respiratory pathologies, acute infectious diseases, inflammatory conditions)
- varicose veins with phlebitis
- dehydration

The most severe form of VTE is pulmonary embolism. This has been estimated to occur in approximately 5 cases per million flights > 12 hours [8].

Signs and symptoms

A VTE can be asymptomatic (without symptoms), however, some persons may develop pain in the calf accompanied by swelling and redness. If the vein is completely occluded there may be a blue discoloration of the limb and severe oedema (swelling).

Pulmonary embolus (PE) is a serious complication and can be life threatening; sudden onset of dyspnoea (shortness of breath) is the most common clinical feature.

Diagnosis and treatment

A blood test (D-dimer) can be used to look for fragments of a blood clot in the blood stream. Ultrasound scans can also be used to detect clots in the deep veins of the leg. Guidance on diagnosis and management of DVT and PE are available from the [National Institute for Health and Care Excellence \(NICE\)](#) [9].

Once a VTE has been identified anticoagulation treatment with heparin and an oral anticoagulant such as warfarin is usually commenced. Anticoagulation therapy is usually continued for between 3-6 months, and patients are advised to wear a compression stocking on the affected limb for a period of time.

Preventing VTE

There are a number of measures that can be taken to reduce the risk of travel related VTE. All travellers intending to take long haul flights or other forms of travel where they will be seated or immobile for >4 hours should:

- walk around as much as is practical at regular intervals during the journey
- regularly flex and extend the ankles which will encourage blood flow from the lower legs
- avoid stowing hand luggage under the seat as it restricts movement
- avoid wearing constrictive clothing around the waist or lower extremities

Compression socks

Travellers at an increased risk of VTE are advised to consider the use of properly fitted below knee

graduated compression socks providing 15 to 30mmHg of pressure at the ankle. These socks reduce the risk of symptomatic VTE [10,11] and also reduce swelling associated with long haul flights [10, 12, 13]. Furthermore, it has been shown that the risk of asymptomatic (symptomless) VTE is reduced in travellers using compression socks [4, 10]. Pregnant travellers on flights >4 hours should have graduated compression socks fitted [11, 13]. It is important for all travellers that compression socks are correctly measured and fit properly as poorly fitted socks can cause discomfort and at worse affect the blood circulation of the leg [14].

Low molecular weight heparin (LMWH)

The value of LMWH in the prevention of VTE in persons at higher risk of VTE is well established. However, its use in the prevention of travel related VTE is less clear. Most medical practitioners recommend the use of LMWH for travellers at high risk of developing VTE, for example a history of previous VTE or pulmonary embolus [8]. Pregnant travellers with additional risk factors may be advised to have LMWH whatever the duration of the flight [15, 16]. A suitable regimen of LMWH should be discussed with a haematologist, and the traveller or companion trained in its administration unless currently anticoagulated with oral medication such as warfarin.

Aspirin

There is good evidence that aspirin is useful in preventing arterial thrombosis, but it is **not recommended** for the prevention of venous thrombosis during travel. Aspirin does not reduce VTE in high risk patients [11, 17]. Furthermore a Cochrane review noted that approximately one patient in 40 taking low dose aspirin develop gastric irritation [18].

Due to insufficient evidence supporting the use of aspirin in travel related venous thrombosis, guidelines from the American College of Chest Physicians recommend against its use for VTE prevention associated with travel [6]. UK guidelines support the view that aspirin should not be used for the prevention of VTE in hospital patients [7] or travellers [8].

NOAC

The use of new oral anticoagulants (NOAC) for the prevention of traveller related thrombosis for those at higher risk has been not established [19,20]. Some guidance is available from Advisory Committee on Malaria Prevention [21].

Resources

- [British Medical Association Board of Science and Education, May 2004. The impact of flying on passenger health: a guide for health professionals.](#)
- [Cochrane systematic review, September 2016: Compression stockings for preventing deep vein thrombosis in airline passengers](#)
- [NICE guidelines, November 2015: Venous thromboembolic diseases: diagnosis.](#)

[management and thrombophilia testing](#)

- [WHO Research into Global Hazards of Travel \(WRIGHT\) project, 2007, final report of phase 1](#)

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