

## Travel-related venous thromboembolism

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### What is venous thromboembolism (VTE)?

Venous thromboembolism (VTE) refers to blood clots that form inside the veins, which are the blood vessels that return blood from the body to the heart. The most common types of VTE are deep vein thrombosis (DVT), or blood clots in the veins of the legs and occasionally the arms, and pulmonary embolism (PE), which occurs when blood clots in the leg (or rarely the arm) veins travel through the blood stream to the blood vessels in the lungs. VTE is a common but often under-recognized cardiovascular condition that can lead to significant medical complications (for more information on VTE, see the Vascular Disease Patient Information Page on deep vein thrombosis and pulmonary embolism<sup>1</sup>).

### Which travelers are at risk?

Air travel-related VTE is sometimes referred to as ‘traveler’s thrombosis’ or the ‘economy-class syndrome’. In general, the risk of VTE after air travel is low compared with other clear risk factors for VTE such as surgery (especially orthopedic surgery), hospitalization for medical illness, and cancer. Travel-related VTE is more likely to develop after airplane flights of 8 hours or longer or several shorter flights over a few days. Most people who develop a DVT or PE related to air travel have a history of previous blood clots or have additional risk factors such as recent hospitalization, surgery, trauma, cancer, smoking, pregnancy, or the use of oral contraceptives or hormone replacement therapy. The risk of blood clots increases with age and with being overweight or obese. Having other medical problems such as heart or lung disease can also increase the risk. There are also certain inherited or other acquired risk factors for blood clots known as the thrombophilias (for more information, see the Vascular Disease Patient Information Page on thrombophilia<sup>2</sup>).

Additional risk factors for an air travel-related VTE may include short stature (5’3” (160 cm) or less) and tall stature (6’2” (188 cm) or more), sitting in a window seat (because of the lower likelihood of getting up frequently during the flight), or sleeping for much of the flight.<sup>3</sup>

The highest risk of developing a blood clot after air travel occurs within the first 2 weeks of the trip, but the risk may extend for up to 8 weeks or more. People who take

long trips by car and bus also are at increased risk for VTE. As with air travel-related VTE, most patients who develop VTE after extended car travel have other risk factors.

### What are the signs and symptoms of VTE?

DVT is usually painful, causing throbbing or aching in the leg, swelling, and increased warmth. The affected leg may turn red or bluish-purple in color. At times, the veins on the leg become more prominent or visible and may be tender to touch. Symptoms of PE may include shortness of breath, chest pain, pain with breathing, a rapid heart rate, coughing up blood, light-headedness, fainting, or even sudden death.

### How is VTE diagnosed?

VTE is diagnosed using imaging studies such as ultrasound or a computed tomography (CT) scan. A blood test called the D-dimer is a very sensitive test and may be used in the emergency room as the first approach for certain patients suspected to have a DVT or PE. If this test is positive (abnormal) and symptoms suggest a blood clot, then imaging is performed. If this test is negative in appropriately selected patients, no further testing is performed. The test of choice to look for DVT is called a venous duplex ultrasound (or ‘Doppler’), which uses sound waves to generate pictures of the veins. To look for PE, a CT scan is usually the test of choice. CT scans use a series of X-rays to generate two-dimensional pictures of the lungs, blood vessels, and other structures in the chest. An intravenous (IV) line is placed prior to the CT scan, and during the scan, a contrast dye that highlights the blood vessels is injected into the IV line.

Patients who cannot undergo a CT scan because of allergy to contrast dye, or who have other medical conditions such as kidney disease, may instead have a test called a lung

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**Table 1.** Blood clot prevention strategies for air travelers.

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- Request an aisle seat
  - Exit-row and bulkhead seats offer more leg room
  - Walk around the cabin each hour when possible
  - Limit caffeinated beverages
  - Avoid alcohol
  - Do not smoke prior to travel
  - Stay well hydrated
  - Wear elastic compression stockings of 15–20 mmHg or stronger
- 

ventilation/perfusion or ‘V/Q’ scan, which uses inhaled and injected medications that are radioactively labeled to generate pictures of the lungs and blood vessels.

### How is VTE treated?

Anticoagulants, also known as blood thinners, are the mainstay of treatment of VTE unless the patient is at high risk for bleeding. Most patients can be treated as an out-patient with oral medications called direct-acting oral anticoagulants (DOACs), which have few food and drug interactions and are safer compared with older treatments for VTE (for more information on these medications, see the Vascular Disease Patient Information Page on DOACs<sup>2</sup>). Sometimes patients cannot take DOACs due to the cost or for certain medical reasons, in which case they may take injections of a short-acting medication called low-molecular-weight heparin overlapping for about a week with a longer-acting anticoagulant called warfarin, which is then continued longer-term. Warfarin requires blood monitoring and dose adjustment because of its variable effect from patient to patient based on the foods they eat, other medications they take, and their genetic makeup. Occasionally, patients with VTE are admitted to hospital for the first few days of treatment with IV heparin. The total length of treatment after air travel-related VTE should be determined in consultation with an expert in blood clotting conditions, but typically is for at least 3 months.

### How can VTE be prevented when traveling?

Not all air travelers need to undertake prevention strategies. For people who are at increased risk for developing a blood clot, recommendations to prevent VTE while traveling by air include: stretching or walking around the cabin once per hour if able (set an hourly alarm on the watch or phone), limiting caffeine products (coffee, tea, and colas), avoiding alcohol completely, not smoking prior to travel, and increasing intake of water to stay well hydrated (Table 1).

Sitting in an aisle seat makes it easier to walk frequently. Additionally, exit rows and bulkhead seats usually provide more leg room.

People at risk for travel-related VTE should wear elastic compression stockings of at least 15 to 20 mmHg strength. In addition to helping prevent blood clots from forming in

the legs, compression stockings can help with leg swelling that can occur when seated for long flights.

Other suggestions include: avoid wearing constrictive clothing, avoid sleeping in cramped spaces, keep the space underneath the seat in front of the traveler empty to allow for stretching the legs, and avoid sleeping aids or other sedating medications.

Performing in-seat exercises, including foot pumps to increase blood flow in the calf, ankle circles, knee-to-chest stretches, and shoulder and neck rolls, may be helpful (Figure 1). These and other exercises are often found in the back of the in-flight magazine.

For patients at high risk for developing travel-related VTE, a single preventive injection of a low-molecular-weight heparin or a dose of one of the DOACs before departure may be recommended by a physician.

### What about long car trips?

To prevent blood clots during car or bus trips longer than 4 hours, the traveler should ideally get out and walk around every hour or two. Wearing loose, comfortable clothing can also be helpful.

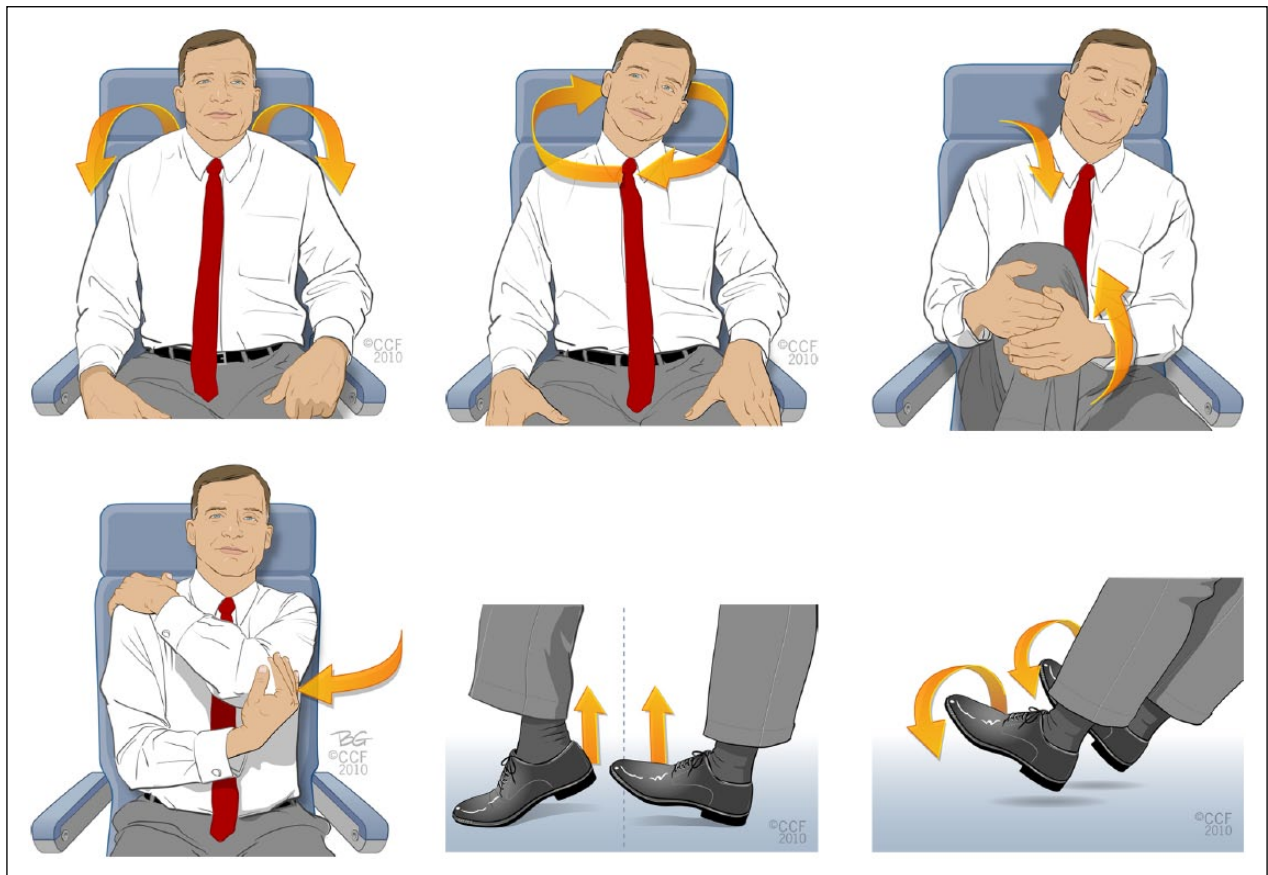
### Can patients with a prior blood clot travel?

Patients with recent blood clots should check with their doctor regarding whether they can fly safely. Most patients with a previously diagnosed VTE who are currently on an anticoagulant can fly safely without precautions other than continuing their medications. Patients being treated for VTE should ensure that they have an adequate supply of all medication carried on board, not in checked baggage, with a few extra doses in case travel is unexpectedly extended. It is particularly important that patients with VTE have enough anticoagulant medication because missing doses increases the risk of recurrent blood clots.

In general, all travelers should carry an updated list of all their medications (both prescription and over-the-counter) and their medical conditions, along with emergency contacts, their doctors’ telephone numbers, and insurance information.

### Summary

The chance of developing a blood clot is low after air travel compared with other conditions that lead to VTE, but all travelers should be aware of this risk and the symptoms associated with VTE. The threat appears to be higher in people with a history of DVT or PE and with certain other risk factors. Taking longer airplane trips or taking multiple flights in a short period of time also increases the VTE risk. Patients at risk for VTE should take preventive measures such as wearing compression stockings and staying well hydrated. Air travel-related VTE is treated with anticoagulant medications.



**Figure 1.** Air-travel exercises.

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