

DVT: Understanding and Preventing Deep Vein Thrombosis

By Jennifer Garr, RN, BSN
Manager of Medical Operations, MedAire, Inc.

When American journalist David Bloom traveled to Iraq in 2003 to cover the war, he assumed the artillery going off around him was going to be his biggest threat - not a medical condition exacerbated by extended travel and cramped work quarters.

Bloom, 39, died that same year from a pulmonary embolism caused by Deep Vein Thrombosis (DVT). This disease – sometimes a silent killer – occurs when people have certain risk factors, coupled with restricted mobility. In Bloom's case, long-haul flights, a genetic disposition to clots, dehydration and immobility in a cramped military tank created a deadly combination.

Physicians and nurses working at MedAire’s 24/7 MedLink Global Response Center have managed more than 500 DVT-related calls since 2004. The medical staff knows first-hand that a crewmember’s understanding of DVT, its signs, symptoms and preventative measures, can significantly reduce a passenger’s risk for death-related DVT.

What is DVT?

Deep vein thrombosis occurs when a blood clot – or *thrombus* – forms within a deep vein. The DVT can become dangerous if the clot blocks the blood vessel and stops the normal flow of blood. If the clot detaches, becoming an embolus, it can travel and further occlude a vessel in another area of the body such as the lungs.

In 2006, the MedLink Global Response Center evaluated 185 passengers during different phases of air travel in which the presenting symptoms and recent history of the passenger indicated the possible presence of a DVT. It is estimated that more than one in 1,000 people in the United States suffer from blood clots in the veins each year, which contributes to more than 60,000 deaths annually.¹

A DVT usually develops within a lower extremity, such as the thigh or calf and becomes dangerous if the clot obstructs the vessel and stops the normal flow of blood. The disease becomes life-threatening if it detaches - becoming an embolus - and obstructs a vessel in another area of the body, such as the lungs or brain.²

What Causes a DVT?

A DVT develops when one of the following factors is present:

- decrease in normal blood flow
- damage or injury to the vein
- increase in blood clotting
- predisposition to genetic and environmental risk factors

A decrease in normal blood flow is usually due to dysfunctional valves and/or inactive muscles in an extremity.

When the blood flows to the lower extremities, it depends on the muscles to contract and return the blood to the heart. For some people, inactivity - not walking or exercising - causes blood to pool in the legs. This situation can occur during periods of inactivity such as on long trips or immobility after surgery.²

Veins can also be damaged from an injury such as a burn or fracture and external pressure. When the valves are damaged, they will not return the blood to the heart – resulting in decreased blood flow. Swelling of the legs can also occur, and as blood pooling continues, the risk of developing blood clots rises.²

Increases in the blood clotting mechanisms are generally caused by blood disorders which increase the body's ability to form clots. This condition can be caused by certain medications such as hormones, or by medical conditions such as cancer.²

Multiple risk factors can also predispose someone to development of a DVT: age, previous history of blood clots, immobility and certain medical conditions such as congestive heart failure, severe obesity and history of heart attack. Individuals with a past history of DVT and individuals over the age of 40 have an increased risk for developing a DVT.²

Recent surgical procedures, such as orthopedic surgeries, which require a long period of rest also predispose the blood to clotting. Other immobility factors include inactivity from prolonged car or air travel.^{2,5}

DVT and Pulmonary Embolism Signs and Symptoms

Symptoms can be subtle, such as tenderness to the affected area, usually in the calf, or can be more evident, such as swelling, redness, pain and warm to the touch. Although these symptoms may not indicate a definitive DVT, medical evaluation is necessary, as one in every 100 people diagnosed with a DVT dies.⁵

If the DVT remains undetected and a piece of the clot breaks off, it will travel in the bloodstream, possibly becoming lodged in another area of the body. This dislodged clot can travel to the heart, causing a heart attack, or to the brain, causing a stroke. If the clot

becomes lodged in the lungs and blocks blood flow, it is known as a pulmonary embolism (PE).²

PE is the most severe complication of a DVT and can occur hours or days after the initial formation of the clot in the lower extremity. Usual symptoms of a PE include:

- chest pain
- shortness of breath
- sudden cough

Frequently, symptoms can be nonspecific, such as a cough and rapid heart rate, and can imitate other cardiac conditions, such as chest pain and shortness of breath.^{3,4} Each year approximately 600,000 people suffer from a PE, which has contributed or caused 200,000 deaths per year in the United States. Emergency treatment is required for this potentially fatal condition. However, with a proper diagnosis and therapy, the incidence of death is reduced from 30 percent to less than 10 percent.^{2,5}

DVT Considerations During Air Travel

The first reported case of a DVT resulting from long-haul air travel was in 1946 on a 14-hour flight from the United States (Boston, Mass.) to Venezuela.⁶ Although MedAire has been tracking the number of DVT-related incidents for its commercial airline clients and corporate clients, no cumulative statistics exist worldwide. What *is* traceable, however, is the increase in air travel since 1946.

Today more than a billion passengers travel by air each year – not including corporate fliers. They travel more frequently, they're older, and they take longer flights to more exotic locations. Corporate executives also participate in this trend and are often in the air multiple times a week, traveling on 10- to 15-hour flights across borders.

This extended duration and increased rate of flight has illustrated to medical professionals a clear need to train the public and crewmembers about the dangers of DVT.

Many factors contribute to the development of clots in individuals who partake in long-haul travel. Immobility, mixed with multiple risk factors, increase the incidence of developing these deadly clots. Traveling for more than four hours in any form increases the risk for DVT and complications.

When traveling for long durations, passengers should follow these important steps:

- wear loose-fitting clothes
- get up and move around the aircraft cabin every 2-3 hours
- exercise their feet and legs, by rotating the ankles, flexing the feet, and raising the legs while seated, every hour
- keep the body well-hydrated by limiting beverages that increase dehydration, such as coffee, soft drinks and alcohol
- avoid using hypnotic medications that can induce sleeping for long periods of time

- keep in mind that crossing the legs compresses the veins in the back of the legs, increasing susceptibility for developing a blood clot
- for those susceptible to blood clots, do not massage the legs, as this may dislodge a clot and cause further complications.^{3,5}

If passengers feel they are at an increased risk of developing a DVT, due to risk factors and immobility, they should seek medical advice prior to traveling. Preventative medications prescribed by their physicians, such as blood thinners, and devices like compression stockings may be prescribed for air travel.

Keep in mind that a DVT can occur up to 30 days after travel. Travelers should monitor for signs of leg swelling, cramping, tenderness or changes in skin color, even a month following travel.^{3,4,5}

Helping Passengers Understand DVT

Crewmembers may feel helpless identifying symptoms of DVT onboard the aircraft. However, awareness and recognition of seemingly benign symptoms reported by a passenger could mean the difference between life and death.

Consider, for instance, the healthy looking 41-year-old woman who is complaining of calf pain and shortness of breath. She then reports weakness and rapid heart rate, and shortly after is unable to focus or answer questions appropriately.

A quick response to a telemedicine provider, such as MedAire's 24/7 MedLink Global Response Center, allows the physician to ascertain that the passenger has been on recent prolonged flights and has had calf pain for the past two days. With a possible diagnosis of deep vein thrombosis and complication of pulmonary embolism, the flight is diverted to the nearest city for immediate medical evaluation.

The crewmember's ability to recognize the nature and seriousness of the complaints and to consult a medical professional might have saved this young woman's life.

References:

- 1) Summary of CDC April 2000 meeting on the factor V Leiden mutation. Centers for Disease Control, www.cdc.gov/ncbddd/hbd/clotting.htm, accessed February 28, 2007
- 2) Lewis, S., Heitkemper, M., Dirksen, S. Medical-Surgical Nursing, Chapter 36 Vascular Disorders, St. Louis, Missouri, USA: Mosby, 2000
- 3) Advice on travel-related DVT. Department of Health. www.dh.gov.uk accessed February 20, 2007.
- 4) International travel and health. World Health Organization. 2005 www.who.int accessed February 20, 2007.
- 5) Deep Vein Thrombosis Fact Sheet. Society of International Radiology. www.SIRweb.org Accessed February 26, 2007
- 6) Homans J., Thrombosis of the deep leg veins due to prolonged sitting. New England Journal of Medicine, 1954, 250;148-49.

Jennifer Garr, RN, BSN

As Manager of Medical Operations for MedAire's Global Services department, Ms. Garr has extensive experience in remote medical assistance, including critical medical evacuations, transport of passengers with special medical needs and repatriation of mortal remains.

Ms. Garr oversees MedAire's staff of Registered Nurse Case Managers at MedAire's Global Response Center in Tempe, Ariz.

In addition, she participates in the planning, development and implementation of current medical protocols and procedures for handling the wide variety of medical needs of travelers worldwide. Ms. Garr's background includes ICU, Emergency and Trauma Nursing; clinical, classroom and lab instruction for nursing students, business management, and IT support for Boeing's Commercial Airplane Group.

A graduate of Seattle Pacific University, Ms. Garr continues to practice in the emergency room and is a member of the Emergency Nurses Association.