

Health & Productivity MANAGEMENT

**A PRIMER ON DEEP VEIN THROMBOSIS
AND PULMONARY EMBOLISM**

**WHAT EVERY EMPLOYER SHOULD
KNOW ABOUT DVT**

**TOO HIGH A PRICE TO PAY:
REDUCING THE COSTS OF DVT**

**THE CLINICAL PICTURE:
A PROTOCOL FOR DVT PREVENTION
THAT SAVES LIVES**

MEET THE AUTHORS

Richard L. Nevins, MD

Rick Nevins is Chief Clinical Officer and VP, Research & Development of the Institute for Health and Productivity Management (IHPM). His areas of interest include the development of evidenced-based clinical care delivery systems for acute and chronic care management, and the use of predictive modeling to improve outcomes from healthcare delivery.



Nevins has more than 20 years experience improving healthcare delivery systems in the U.S. and other countries. While serving as Medical Director for National Health Enhancement Systems and as VP of Medical Affairs for HBO & Company and McKesson, he was responsible for clinical knowledge bases, and shared responsibility for software design for demand and disease management programs in several countries.

As a member of various committees of the Pan American Health Organization, World Health Organization, Caribbean Latin American Action, Americas' Healthnet, Center for Telemedicine Law, the InterAmerican Development Bank and URAC, he helped design, implement and enhance telecommunication and digital healthcare solutions in the U.S. and other countries. He is currently developing a network of 75 clinics that will be digitized and will offer services through a membership model.

Nevins co-developed one of the first telemedicine systems in Latin America and is currently designing telemedicine-equipped mobile healthcare clinics.

He is a Member of the Board of Governors and a former member of the Board of Directors of Medical Assistance Programs International, a Christian foundation that provides healthcare resources, education, essential medications and crisis relief globally.

He has served as Chief Medical Officer, Medical Director, Chief Information Officer and Chief Clinical Information Officer for several organizations. He speaks regularly at conferences and on radio regarding healthcare trends, healthcare economics, telecommunications and digital solutions for healthcare. Nevins has authored chapters on telemedicine and medical call center software and technology and serves as the Medical Advisor for an entrepreneur course at the University of Arizona.

Nevins graduated from the University of Oklahoma School of Medicine. Following an emergency medicine residency, he practised emergency and family medicine for 22 years. Since 1978 he has been a diplomat of the American Board of Family Practice and a Fellow of the American Academy of Family Physicians since 1981. He was a Clinical Instructor in Emergency Medicine and Family Practice for the University of Kansas School of Medicine for 10 years.

Jeremy J. Nobel, MD, MPH

Jeremy Nobel designs healthcare management and delivery systems that focus on cost and quality concerns. Working with employers, government, and other purchasers, as well as health plans and providers, he develops and evaluates computer-based information technology applications that coordinate critical



aspects of healthcare delivery, support optimal practice patterns, and improve patient satisfaction. His contributions to this field span 20 years, and include providing health policy insight to the Landmark Institute of Medicine 1991 study addressing the automated patient record, which helped launch the Electronic Health Record (EHR) movement.

Nobel's work specifically encompasses the use of technologies to better coordinate information flow between patients, providers, payers and purchasers, including electronic health records, personal health records, interactive websites, remote physiologic monitoring, hand-held devices, "smart" registries, and related software applications.

His recent activities have involved integration of emerging technology deployment, with personalized health insurance benefit design, to encourage user engagement and behavior change on the part of healthcare consumers, as well as innovative provider reimbursement models to encourage physician participation. In addition to working with payers and purchasers of care, much of his effort is focused on care delivery at the community level and in particular, the healthcare safety net, including homes and workplaces, community clinics, public health departments, the VA, and public hospitals.

He has consulted with several major corporations and foundations on the design and evaluation of effective health care management programs including Blue Cross/Blue Shield of Massachusetts, J&J, Mercer, HBOC, Chrysler, GM, Safeway, sanofi-aventis, Pfizer, GSK, Verizon, Hannaford Bros., Caremark, IBM, Medtronic, McKesson, Blue Shield of CA Foundation and the California Endowment. He is on the adjunct faculty of the Harvard School of Public Health where he teaches and does research on the health policy and management issues related to improving care delivery processes through better information management. He is also on the Board of Directors of DMAA.

Nobel is Board Certified in both Internal and Preventive Medicine, with Master's Degrees in Epidemiology and Health Policy from the Harvard School of Public Health. He graduated magna cum laude from Princeton University's Science and Human Affairs program. He received his medical education from the University of Pennsylvania, completing his internal medicine residency at the Beth Israel Hospital, Boston.

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At A Glance

More than two million people each year are estimated to develop deep vein thrombosis – blood clots in the deep veins of the legs or pelvis. Approximately 300,000 people die each year from pulmonary embolus – blood clots that break loose from deep vein thromboses and are carried by the blood to the heart and lungs. Deep vein thrombosis affects young and old, men and women, and people of all ethnic groups.



The total costs of deep vein thrombosis/pulmonary embolism (DVT/PE) are enormous – including the individual costs of illness, disability, pain, suffering and death, as well as the employer costs of medical care, absenteeism and lost productivity at work.

Effective September 2008, the Federal Centers for Medicare and Medicaid Services (CMS) established a new policy of not paying for healthcare costs resulting from preventable conditions. And CMS identified deep vein thrombosis/pulmonary embolism as just such a preventable event in hospitalized patients.

Commercial insurance carriers usually follow the lead of CMS, so employers could be caught in the middle between hospitals charging for services resulting from preventable events and insurance carriers refusing to pay these charges.

For these reasons, IHPM, under the leadership of its Chief Clinical Officer Dr. Rick Nevins working with Dr. Jeremy Nobel from the Harvard School of Public Health, has created this special issue on deep vein thrombosis and pulmonary embolism to raise awareness of this condition among employers, employees, health plans and physicians.

The first article, a “Primer on Deep Vein Thrombosis and Pulmonary Embolism,” provides definitions and details on risk factors, warning signs, diagnosis, treatment, and long-term consequences of DVT/PE. It also offers a one-page tear-out quiz to help individuals determine their risk for deep vein thrombosis.

The second article, “What Every Employer Should Know About DVT,” provides both basic information and special advice for employers – showing them how they can play an active role in helping to prevent deep vein thrombosis among their employees.

“Too High a Price to Pay,” the third article, addresses the serious economic impact of deep vein thrombosis. It presents the financial facts, including the total costs associated with both medical care and lost productivity in the work place.

The final article, “The Clinical Picture,” obviously is aimed at corporate medical directors and physicians, but also is intended for corporate human resource directors. Although DVT is a common and preventable condition, many physicians are not aware of either the risk factors or the prophylaxis. This article provides the evidence for establishing a DVT prevention program at a clinic, and offers a step-by-step guide for developing a protocol.


The information presented in this special issue of *Health & Productivity Management* will equip the reader to make informed, cost-effective decisions that can save lives – making it one of the most important publications IHPM has produced.

SEAN SULLIVAN, PRESIDENT & CEO, IHPM

A Primer

Deep vein thrombosis is a thief and a killer.

No one knows this better than Melanie Bloom. Her husband, David Bloom – a well-known NBC news correspondent embedded with U.S. troops in Iraq – was stolen from her on April 5, 2003 by pulmonary embolism (PE), a complication of deep vein thrombosis (DVT).

A family portrait of Melanie Bloom, her husband David Bloom, and their three daughters in a field of tall grass. David is standing in the back, wearing a white shirt and light-colored pants, with his arms around Melanie and the older daughter. Melanie is sitting in the middle, wearing a white shirt and light-colored pants, with her hands on the two younger daughters. The two younger daughters are sitting in front of her, one in a white dress and the other in a blue dress. The background is a field of tall grass with trees in the distance.

Melanie Bloom with her husband David and daughters.

on Deep Vein Thrombosis and Pulmonary Embolism

By Rick Nevins, MD

Melanie had never heard of DVT or PE. Since that time, she has learned the sad facts about the genetic factor that predisposed her husband to DVT and the conditions he experienced in Iraq, including prolonged immobility and dehydration, that greatly increased his risk.

Melanie converted her grief into a high-octane fuel that has fired a national campaign to increase awareness of DVT and PE. She has participated in high-profile interviews, speaking engagements, public service announcements and videos.

Many Americans, however, remain unaware of these conditions: their cause, symptoms, treatment, associated costs, and who is at risk. A recent survey by the American Public Health Association found that DVT was the least known of the diseases surveyed – less known even than colitis. Of the 25 percent of respondents who had heard of DVT, fewer than half knew any signs or symptoms of the condition and only one-quarter knew that it could be prevented. If these findings are extrapolated to the general population, we are faced with this alarming statistic: **only six percent of Americans know what DVT is and that it can be prevented.**¹

As an employer, human resource professional, company medical director, or clinician, you play an important role in the prevention and treatment of deep vein thrombosis (DVT) and pulmonary embolism (PE). It's time to do something about these debilitating, costly, and preventable conditions that affect almost three million Americans every year and kill more than AIDS and breast cancer combined.^{2,3} We hope this publication will help you learn more about DVT and PE, and the impact these conditions are having on your workplace or in your clinic, and prompt you to take action.

What are DVT and PE?

Blood clotting is a normal physiological process to prevent bleeding. Without it, every small cut would result in a life-threatening hemorrhage. We are most familiar with visible blood clots (think scabs) on the exterior of the body, but clots can form inside veins and arteries as well. Usually, the body is able to break down any clots that form. In certain abnormal circumstances, however, the body can't destroy a clot. This is usually due to a combination of factors, including constriction of blood flow, predisposition to blood clotting, and an injury to the blood vessel wall.

DVT occurs when a blood clot (thrombus) or multiple clots form in the deep veins of the body; unlike the “superficial veins” that lie close to the surface of the skin, “deep veins” are located close to bone and are surrounded by muscle. DVT usually occurs in the veins of the lower leg or calf, but clots can also form elsewhere in the body, like the pelvis and the large veins of the thigh and arms.

PE occurs when a clot (or part of a clot) breaks free and travels through the bloodstream to the heart and then the lungs. The clot can partially or completely block the flow of blood to these critical organs. These are not necessarily small clots. In some cases, the clots removed from individuals who died as a result of a PE are inches long and take on the rope-like shape of the vein in which they formed. A PE can be fatal if not diagnosed and treated immediately. Death from PE is often sudden. It usually is a direct result of untreated DVT.⁴

DVT and PE are sometimes discussed together under the broad label “venous thromboembolism” (VTE).

DVT usually occurs in the veins of the lower leg or calf, but clots also can form elsewhere in the body, like the pelvis and the large veins of the thighs and arms.

Who is at risk for DVT?

Population-based research and studies of hospital records have determined that more than 350,000 Americans are affected by DVT/PE each year. But because these diseases are often undiagnosed, the actual incidence rate is likely much higher. The Surgeon General, for example, estimates that as many as 600,000 cases of DVT/PE occur each year.⁵ The Coalition to Prevent DVT asserts that up to two million Americans are affected annually by these conditions and that up to 300,000 of those who develop PE each year will die.⁶

It is estimated that 2.8 million Americans experience DVT (either symptomatic or asymptomatic) or suffer from its long-term impacts (like swelling and pain) each year.⁷

The face of DVT reflects any diverse community: your neighborhood, your church, your workplace. While there may be certain individuals and groups at greater risk, DVT affects young and old, men and women, and people of all ethnic backgrounds: a 21-year-old college student who is taking the birth control pill; a major league baseball team manager; a young and successful broadcaster; a breast cancer survivor; a 28-year-old woman who has recently

miscarried following an automobile accident; or a 60-year-old marathon runner.⁸⁻¹³

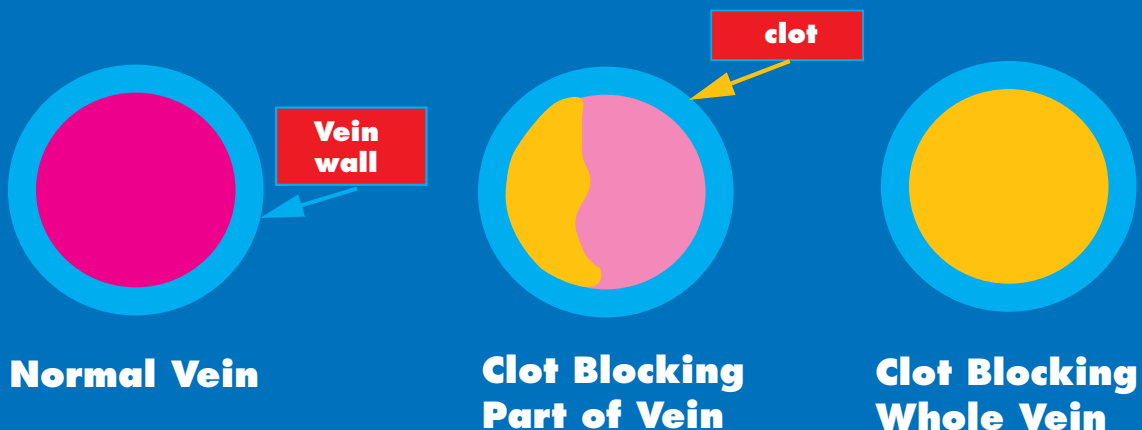
DVT was previously considered a condition that affected those in the “golden years”: retired folks, those over age 75, those who had experienced strokes, and individuals who had suffered a broken hip, pelvis or leg as a result of a fall. It was also associated most strongly with those who had been hospitalized. The new reality is that DVT affects many Americans who are in the prime of life: those aged 41-60, those who are pregnant or have recently given birth, and those who have had outpatient, elective, laparoscopic, and other minor surgeries.¹⁴

There are five key factors that put individuals at risk of developing DVT, with the first two being responsible for the majority of DVT/PE events.

First is **prolonged immobility**. Circulation in the body, particularly the legs, is negatively impacted by remaining in one position for extended periods of time. This can happen when an individual is confined to a bed as a result of an injury, surgery, or other cause. It can happen on long car, train or airplane trips. It can even happen to office workers who work extended days and eat lunch at their desks. Blood

What Is DVT?

- **Deep Vein Thrombosis (DVT) is a condition resulting from the formation of a blood clot inside a deep vein, commonly located in the calf or thigh**
- **DVT occurs when the blood clot either partially or completely blocks the flow of blood in the vein**



is more likely to clot when circulation is poor.

Second is **trauma**, which can result from an accident or surgery. An injury or operation often damages tissues, which are then more prone to blood clotting. Anesthesia increases the likelihood of blood pooling. Injuries and surgeries that require a hospital stay may also lead to prolonged immobility, compounding the risk of DVT. **According to the Surgeon General, hospitalization is the single most important risk factor for developing DVT/PE and PE is responsible for one out of 10 hospital deaths.¹⁵ In the absence of any preventive measures, 10 to 40 percent of medical and general surgery patients and 40 to 60 percent of major orthopedic surgery patients develop thrombosis.**

Third is **genetic predisposition**. Factor V Leiden, a genetic predisposition to abnormal blood clotting that affects three to eight percent of the general population, is the most common genetic risk factor for DVT. If there is a family history of DVT, genetic factors may be a cause.

Pre-existing health conditions, habits and lifestyle factors have also been linked to DVT. Two of these – smoking and obesity – show up on most “at risk” lists. Two other risk factors – taking the *birth control pill* or *post-menopausal hormone replacement therapy* – are related to the hormone estrogen which, even in low doses, appears to increase the likelihood that a woman will develop blood clots.

Pregnancy puts extra stress on the veins of the pelvis and legs, and a woman’s risk of developing DVT or PE is five times greater when she is pregnant, with the risk being even greater up to six weeks postpartum.¹⁶ *Dehydration* leads to sluggish blood, which is more prone to clotting. *Varicose veins*, while they are technically superficial veins, are more prone to clots that can migrate to deep veins and cause DVT. Health conditions such as *cancer* (current or past), *high blood pressure*, certain *cardiac, respiratory and inflammatory diseases, infections, diabetes*, and a *prior incidence of DVT are all risk factors*.

The last risk factor is **age**. Those over age 60 are considered at higher risk for DVT, although the condition can affect individuals at any age. According to the U.S. Food and Drug Administration, the risk of PE doubles every 10 years after age 60.¹⁷

As is the case with so many health conditions, risk factors are seldom seen in isolation. A woman who takes the birth control pill, is overweight, and has a genetic predisposition for a blood clotting disorder is at greater risk of DVT than a woman whose sole risk factor is that she takes oral contraceptives.¹⁸ A man who is recovering from a heart attack may not exercise regularly during his recuperation and may gain weight. The combination of heart disease, excess weight, and immobility can lead to a deadly PE.



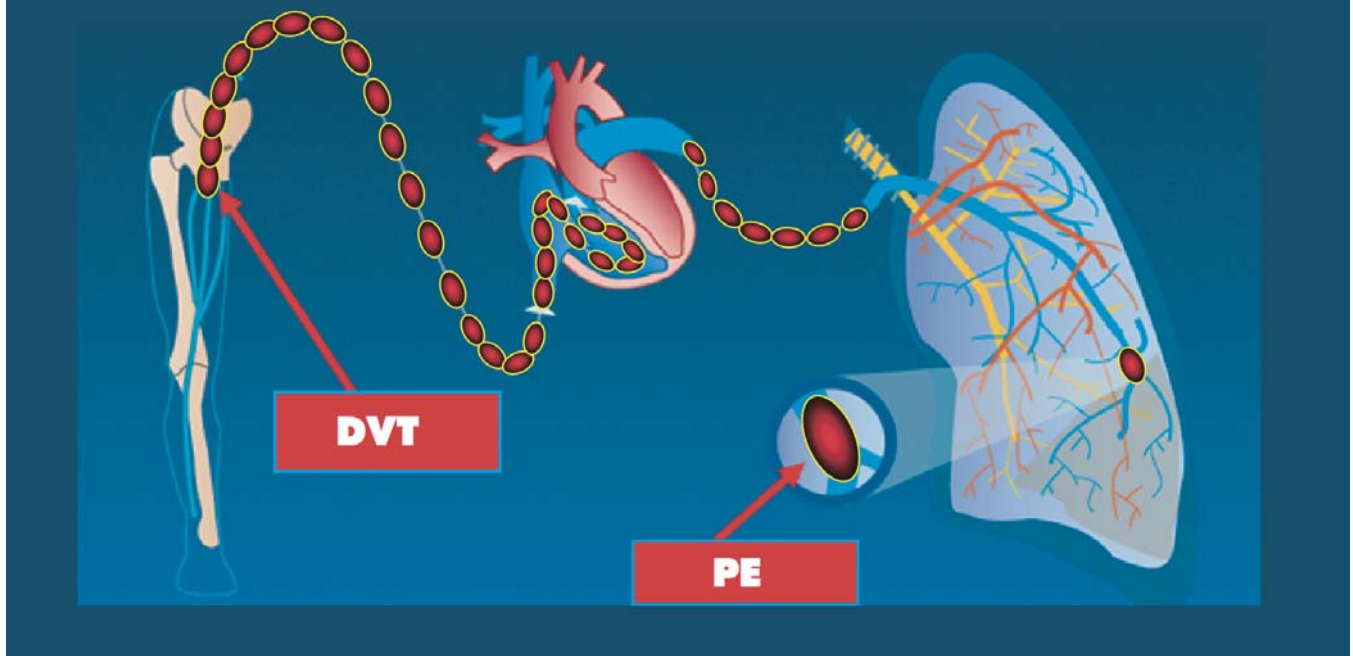
Risk Factors for DVT

- **Obesity**
- **Advanced age**
- **Smoking**
- **Dehydration**
- **Pregnancy**
- **High blood pressure**
- **Cancer**
- **Certain heart or respiratory diseases**
- **Post-menopausal hormone replacement therapy**
- **Birth control pills or other estrogen-based contraceptives**
- **Prior DVT**
- **Acute medical illness, including major surgery, with restricted mobility**
- **Hospitalization**
- **Restricted mobility due to long-distance travel**
- **Trauma**
- **Diabetes**
- **Varicose veins**
- **Infections and inflammatory diseases**

What are the warning signs?

While it’s important to know the warning signs of DVT, symptoms of the condition are absent in about 50 percent of cases.¹⁹ DVT symptoms are confined to the area where the

What Is DVT? What Is PE?



blood clot has formed and are a result of partial or complete blockage of circulation in the vein. The classic site-specific warning signs are:

- Pain, fullness, pressure, tightness (may be felt only when standing or walking)
- Cramping
- Swelling
- Tenderness
- Redness or discoloration of the skin
- Skin that is warm to the touch
- Symptoms that are initially discounted as a muscle pull.

If left untreated, DVT can lead to PE, when the clot breaks off and moves to the lungs. Eighty percent of pulmonary emboli occur without warning signs, and there is often no potential to resuscitate patients who experience PE.^{20,21} Sixty-seven percent of deaths from PE occur within 30 minutes.²² Typical symptoms of PE are:

- Shortness of breath
- Rapid heartbeat
- Sweating
- Feeling of anxiety
- Sharp chest pain (especially when breathing deeply)
- Low blood pressure
- Dizziness, fainting, or lightheadedness
- Fatigue

- Unconsciousness
- Coughing up blood

The signs and symptoms of DVT and PE can vary by individual and event. Some individuals may also experience uncommon symptoms such as back pain or wheezing.

Screening and Diagnosis

Screening is the first step in the treatment of DVT; a physician asks the patient a number of questions to determine past medical history – including family history – and current risk factors. In some cases a patient will be given a blood test to screen for one of the inherited blood clotting disorders that can cause DVT. The physician also will conduct a physical exam, including an investigation of any symptoms of DVT – e.g., redness, cramping, or pain in the patient's leg.

DVT is diagnosed by a number of tests. Ultrasound, which uses sound waves to create pictures of the inside of the body, can show whether blood is flowing well through the veins in the affected area.

A recent study published in the *Journal of the American Medical Association* reported that the tried and true two-point (duplex or compression) ultrasound was as good at detecting DVT as the newer, whole-leg, color-coded doppler ultrasound test.²³ A blood test – the D-dimer test – is a DVT diagnostic tool used to measure the amount of a particular substance that is released into the bloodstream when a blood

clot dissolves. If levels are high, the patient may have DVT. If ultrasound isn't able to clearly show blood flow, practitioners may inject dye into the patient's bloodstream and then take an x-ray. This invasive and rarely performed process, called a venogram or phlebogram, can show a vein blocked with a blood clot or whether blood flow is slow, which may indicate a blood clot. A venogram is helpful when DVT is severe and clot-dissolving therapies or surgical treatment are being considered. MRI and CT scans are infrequently used to diagnose DVT.

A PE can be diagnosed using a ventilation perfusion scan, which uses a radioactive substance to determine how well blood and oxygen are flowing to the heart and lungs.

Treatment

The treatment for DVT and PE can be both pharmacological (drug-based) and mechanical (based on movement of the affected area). Different anticoagulant (or blood-thinning) drugs are prescribed for different stages of treatment and for varying durations. These drugs don't dissolve clots, but they do stop existing clots from growing and help prevent new clots from forming. The body's natural systems will help dissolve existing clots to varying degrees over time. For those who have had two or more VTE events, drug treatment will likely be lifelong.

If an individual who has had DVT/PE can't take anti-clotting medication or if the medication does not appear

Busting Some DVT Myths

MYTH: "I'll know if I've got a blood clot."

FACT: Fifty percent of all individuals who have DVT show few or no symptoms. The first sign that something is wrong, in fact, may be the symptoms associated with a pulmonary embolism. Once you have these signs, it may be too late.

MYTH: "DVT is only a concern for older people."

FACT: If you consider being in your 20s or 30s "older," then you'd be right. Although DVT often affects those over 60, it can strike at any age. David Bloom was only 39 when he died of complications related to DVT. Pregnant women can be at risk for DVT. Young people with genetic predispositions to clotting problems are vulnerable, too.

MYTH: "If DVT was so important, I'd have heard of it before now."

FACT: Sometimes conditions that affect large numbers of people don't get the attention they deserve. It took the death of a high-profile and much-loved news correspondent to increase the national profile of DVT, and there's still more work to be done.

MYTH: "I never fly, so I don't have to worry."

FACT: Although DVT has been nicknamed "economy class syndrome" and staying immobile on long-haul flights is a risk factor for the condition, it's only one of many reasons to be concerned about DVT. Check out the "Risk Factors" listed on page 5. You'll see that all forms of travel can increase your risk of DVT and that there are many other risk factors that have nothing to do with planes.

MYTH: If DVT is common in hospitals, won't I be quickly diagnosed and taken care of?

FACT: Campaigns to increase awareness of DVT among health professionals, and an increasing recognition of DVT as a silent and preventable killer are causing family doctors and hospital staff to take more notice of the condition. However, up to half of DVT cases may not be diagnosed properly, and DVT-related pulmonary embolism is the most common cause of preventable hospital death.²⁶

to work, a filter – either temporary or permanent – may be inserted into the vena cava (a large vein in the abdomen) to prevent the passage of clots from the pelvis or legs to the lungs.

All individuals who have had DVT are encouraged to regularly wear prescription compression stockings, which help treat the symptoms of swelling and prevent skin changes that can occur over time from DVT-caused vein damage.

In rare instances, a physician may recommend using an intravenous agent that dissolves clots, called thrombolysis. A catheter with many tiny holes – much like a soaker hose – is threaded through the vein to the clot, and a clot-dissolving drug is injected slowly through the catheter. Sometimes a tiny vacuum cleaner is used to suck out the softened clot.

Roughly 30 percent of those who experience DVT will have a second episode within the next ten years.

Once the clot is gone, balloon angioplasty may be necessary to open the narrowed vein, but this is common only in the iliac veins, located in the pelvic area. With this approach, the patient will also need anticoagulant medication to prevent new clots from forming while the existing clot is being dissolved.

For a few patients who have valid reasons for clot removal but for whom clot-dissolving drugs cannot be used, extraction of the clot through a small incision at the groin – called a thrombectomy – may be recommended.

Both thrombolysis and thrombectomy are designed to remove the clot and restore the venous system to normal, but they involve additional risk and expense and are performed selectively by the appropriate vascular specialist. Clot removal by either technique is usually recommended only for major clots higher up in the leg, particularly in the case of active, healthy patients without any serious associated diseases.

What are the long-term effects of DVT?

PE and DVT are conditions that can kill. Because of the drastic consequences, particularly of PE, clinical attention and research tend to focus on the acute conditions and give less attention to the lifelong effects of a VTE event in the lucky ones who survive.

Two percent of the general population and 50 to 70 percent

of people who have experienced VTE are living with the effects, alternately referred to as “post-phlebotic syndrome,” “post-thrombotic syndrome,” and “chronic venous insufficiency.”²⁴ The condition develops as a result of the trauma to the deep vein that experienced the clot. In some cases the clot from the original event does not break down. In other cases, the body, in cleaning up the clot, creates scar tissue that itself blocks the vein. In still other cases, the valves in the vein may have been destroyed by the clot. In all cases, damaging pressure in the vein results in the vein failing to function. The blood that would normally flow through this major vein is now forced to move through smaller, peripheral veins.

Someone suffering from a mild form of post-thrombotic syndrome will experience chronic leg swelling, new varicose veins, discomfort, and skin discoloration. More serious and debilitating conditions are chronic skin ulcers on or near the ankles, pain, and the inability to stand for any extended period of time.

These symptoms have a significant negative effect on a person’s quality of life. They impact self-image, ability to work, and relationships. The fear of recurrence of DVT is a real and anxiety-producing aspect of daily

existence for those with post-thrombotic syndrome. Roughly 30 percent of those who experience DVT will have a second episode within the next ten years.²⁵

The symptoms of post-thrombotic syndrome may appear shortly after the initial DVT event or manifest up to 20 years later. They may be experienced by someone who is taking regular anticoagulant medication and is otherwise considered to be “successfully” coping with DVT. The problems can be diminished if the individual faithfully wears graduated compression stockings and elevates his or her legs periodically during the day.

Where do I go for more information?

There is a wealth of information on DVT/PE on the Internet. The Surgeon General’s Call to Action on DVT (<http://www.surgeongeneral.gov/library/calls/index.html>), released Sept. 15, 2008, provides background on the condition and advocates for changes at three levels: community, healthcare setting and government policy.

The website of the Coalition to Prevent DVTs (www.preventdvt.org) contains useful information on both the human and clinical aspects of DVT/PE, including a web-based tool to assess your risk, announcements of ongoing advocacy work, and “DVT Diaries” written by those who have experienced DVT/PE firsthand. **HIPM**

Are You at Risk for a DVT Blood Clot?

Find out if you or a loved one is at risk for Deep Vein Thrombosis (DVT) – a condition in which a blood clot can form in the deep veins of your legs.

Complete this form to help you evaluate if you or a loved one is at risk for DVT. Only a doctor can decide if you or a loved one are at risk for DVT blood clots.*

1. Check all statements that apply.
2. Add up the number of points shown for each of the checked statements to get the DVT risk factor score.
3. Share your completed form with your doctor or your loved one's doctor.

Name: _____

Add 5 points for each of the following statements that apply:

- Recent elective hip or knee joint replacement surgery
- Broken hip, pelvis, or leg within the last month
- Serious trauma within the last month (for example, a fall, broken bone, or car accident)
- Spinal cord injury resulting in paralysis within the last month

Add 3 points for each of the following statements that apply:

- Age 75 or over
- History of blood clots, either Deep Vein Thrombosis (DVT) or Pulmonary Embolism (PE)
- Family history of blood clots (thrombosis)‡
- Family history of blood-clotting disorders

Add 2 points for each of the following statements that apply:

- Age 60-74 years
- Cancer (current or previous)
- Recently had major surgery that lasted longer than 45 minutes
- Recent laparoscopic surgery that lasted longer than 45 minutes (surgery performed through a small incision with a lighted, tube-shaped instrument)
- Recently confined to bed rest for more than 72 hours
- Plaster cast that has kept you from moving your limb within the last month
- Tube in blood vessel in neck or chest that delivers blood or medicine directly to heart (also called central venous access)

What does the DVT risk factor mean?

Low risk (0-1 point) – you may not be at risk now, but it's a good idea to reassess your risk of DVT at regularly scheduled doctor visits or annual exams.

Moderate risk (2 points) – share your answers to this survey with your doctor at your next scheduled appointment so he or she can assess your risk of DVT.

High risk (3+ points) – because of your increased risk you should share your answers with your doctor so that he or she can assess your risk of DVT.

Date : _____

For women only: Add 1 point for each of the following statements that apply:

- Use of birth control or Hormone Replacement Therapy (HRT)
- Pregnant or had a baby within the last month

Add 1 point for each of the following statements that apply:

- Age 41-60 years
- Planning minor surgery in the near future
- Had major surgery within the last month
- Varicose veins
- A history of Inflammatory Bowel Disease (IBD) (for example, Crohn's disease or ulcerative colitis)
- Legs are currently swollen
- Overweight or obese
- Heart attack
- Congestive Heart Failure
- Serious infection (for example, pneumonia)
- Lung disease (for example, emphysema or COPD)
- Currently on bed rest or severely restricted mobility

Total Risk Factor Score _____

* This is a partial list of risk factors. Ask your doctor about other risk factors or conditions that may predispose you to DVT blood clots.

‡ Most frequently missed risk factor.

Adapted with permission from Caprini JA. Thrombosis risk assessment as a guide to quality patient care. *Dis. Man.* 2005;51:70-78.

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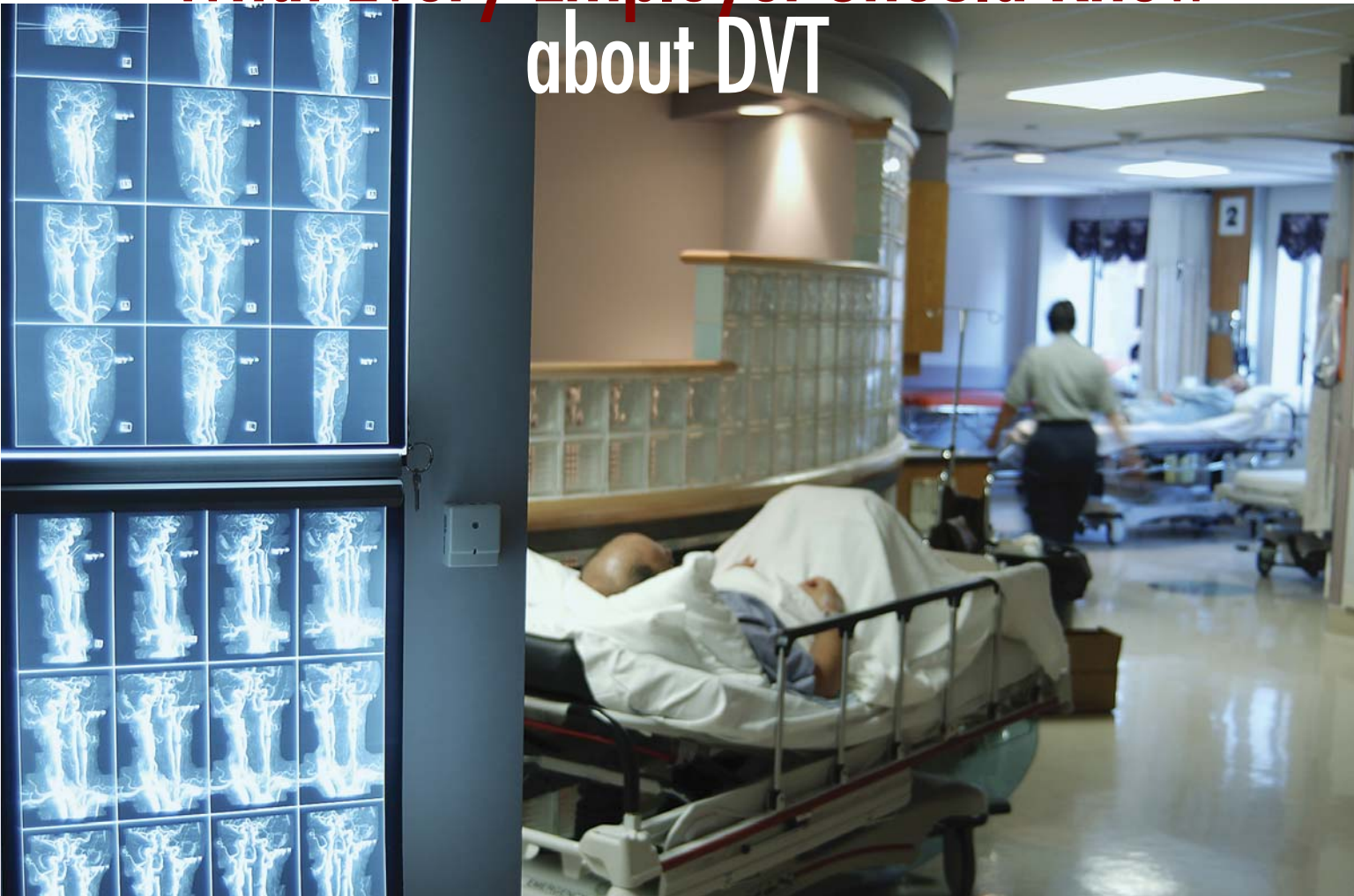
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What Every Employer Should Know about DVT



Introduction

The Federal Centers for Medicare and Medicaid Services (CMS) have established an initiative for value-based purchasing of healthcare for its beneficiaries. Part of that initiative involves defining and setting standards of care, as CMS transitions from a passive payer of healthcare services to an informed purchaser of quality and efficient healthcare.

Part of the standards of care focuses on reducing the frequency and impact of hospital-acquired and preventable conditions. Among the conditions is deep vein thrombosis (DVT).

CMS has set policy to not pay healthcare costs due to preventable conditions. The implication for the employer is that commercial health insurance companies often adopt CMS

policies for commercially covered lives. That is why it is important for employers and employees to be aware of the new CMS policy.

Some DVT Background

What is it?

Deep vein thrombosis, commonly referred to as DVT, occurs when a blood clot, or thrombus, develops in the large veins of the legs or pelvic area. Some DVTs may cause no pain, whereas others can be quite painful. The blood clot can break free and travel through the vein. If it lodges in a lung artery, the condition is known as a pulmonary embolism, or PE, a potentially fatal condition if not immediately diagnosed and treated.

By Rick Nevins, MD

Generally, a DVT is caused by a combination of two or three underlying conditions:

- **Slow or sluggish blood flow through a deep vein.** This can result from being on bed rest during or after a surgical procedure or medical illness, or being confined during prolonged car or air travel.
- **A tendency for a person's blood to clot quickly.** This can be a genetic condition. It can also occur in those with active cancer.
- **Irritation or inflammation of the inner lining of the vein,** as occurs during orthopedic surgery or when a leg vein is injured by a major accident or medical procedure.

Also, there are specific medical conditions that may increase your risk of developing DVT, such as congestive heart failure, severe obesity, chronic respiratory failure, smoking, varicose veins, pregnancy, and estrogen treatment (birth control pills or hormone replacement therapy). If you are concerned that you may be at risk due to any of these conditions, consult with your physician.

What are the symptoms?

Approximately one-half of those with a DVT never experience symptoms. When symptoms are present, the most common are leg pain and tenderness in the calf or inner thigh muscles, leg swelling, or redness or discoloration of skin in the affected area. The signs and symptoms may appear suddenly or may steadily develop over a short time. If you observe these signs or symptoms, you should contact

your doctor immediately.

Symptoms are quite different if the clot breaks loose and travels to the lungs, causing a pulmonary embolism (PE). The symptoms of PE include chest pain (usually with inhaling), shortness of breath, rapid pulse, or coughing up blood. There may also be a feeling of apprehension, sweating, or fainting. Such symptoms are not specific to a PE, and can occur with pneumonia, heart attack, and other medical conditions. These are always critical symptoms that demand immediate medical attention.

Diagnosis, treatment, and "down the road" effects

A suspicion of DVT is raised after a clinical exam and by identifying the associated risk factors, but a definite diagnosis of DVT (enough to guide treatment) cannot be accurately made without additional testing, including an ultrasound, a D-dimer blood test, or a venogram (also called a phlebogram).

Both DVT and PE are treated with blood-thinning medication (anticoagulants). Sometimes patients with DVT are also asked to wear a prescription stocking. Thrombolysis and thrombectomy are invasive and expensive catheter-guided procedures to treat DVT; thrombolysis destroys the clot and thrombectomy removes it manually from the vein.

Small blood clots in the leg veins may dissolve without serious later consequences. However, larger blood clots, especially those located in the upper thigh and pelvic areas, are



Some Tips to avoid DVT

- **Do not sit for long periods of time.**
- **Elevate your legs if you are sitting for moderate periods of time.**
- **If you are on an airplane for more than four hours, get up and walk in the aisles and pump your feet up and down frequently while seated. Drink plenty of non-alcoholic beverages. Talk to your doctor about the need for medications for long airplane flights.**
- **Keep hydrated. Drink six glasses of water a day.**
- **If you have varicose veins, wear support hose (especially if pregnant).**
- **Do not wear constricting garments on the legs (elastic bands or garters).**

Proactive efforts to increase overall wellness will reduce your healthcare costs, and healthier employees will be less likely to develop DVT or PE.

more likely to contribute to significant, long-term leg symptoms like chronic swelling, skin discoloration and, ultimately, the development of chronic skin ulcers near the ankle. These symptoms are commonly called post-thrombotic syndrome (PTS).

An Ounce of Prevention

Regular exercise will decrease the risk of DVT. People who undergo major surgery are at risk to develop DVT; therefore, calf and leg exercises before surgery, along with resuming physical activity as soon as possible after the surgery, will decrease the risk of DVT. Preventing a DVT is the major reason why hospitalized patients are encouraged to be up and walking as soon as possible after surgery. Regular stretching and leg movement are important for individuals who sit at a desk all day or are traveling on long trips, particularly air travel. It also is important to stop smoking to reduce the tendency of the blood to clot, and to avoid wearing tight garments that produce restrictions below the waist.

What Can Employers Do?

Employers can play an important role in the prevention of DVT.

Increase DVT awareness among your employees.

Include DVT awareness in any workplace health or wellness event. Distribute copies of a DVT risk-assessment tool to employees and participate in the DVT Awareness by Design campaign. More information is available from www.preventdvt.org. We've included a sample risk-assessment tool for all employees to complete and forward to their physicians (please see page 9).

Focus on comprehensive employee wellness. Since obesity, smoking, and a sedentary lifestyle are all risk factors for DVT, any general wellness efforts that focus on increased activity levels, weight reduction, and smoking cessation will help reduce the incidence of DVT among employees. Research findings indicate that individuals who go on to experience DVT or PE already have higher healthcare costs. Proactive efforts to increase overall wellness will reduce your

healthcare costs, and healthier employees will be less likely to develop DVT or PE.


Develop a DVT prophylaxis protocol for your company medical clinic, network physicians and hospitals. An easy-to-follow protocol will raise awareness of DVT among clinic staff and ensure that patients who fall into one of the DVT risk target groups will receive the preventive care they require.

Encourage office employees to “get active” while at work. “E-thrombosis” is a cute nickname for DVT that develops from a sedentary office culture. As an employer, don't take this sitting down! Remind employees to get up and move around at least once an hour. Encourage periodic walking by placing photocopiers, printers, fax machines, and even garbage bins away from desks. Purchase wireless telephone headsets for employees, so they are free to move around while they're on the line. Discourage the “dine at your desk” phenomenon.

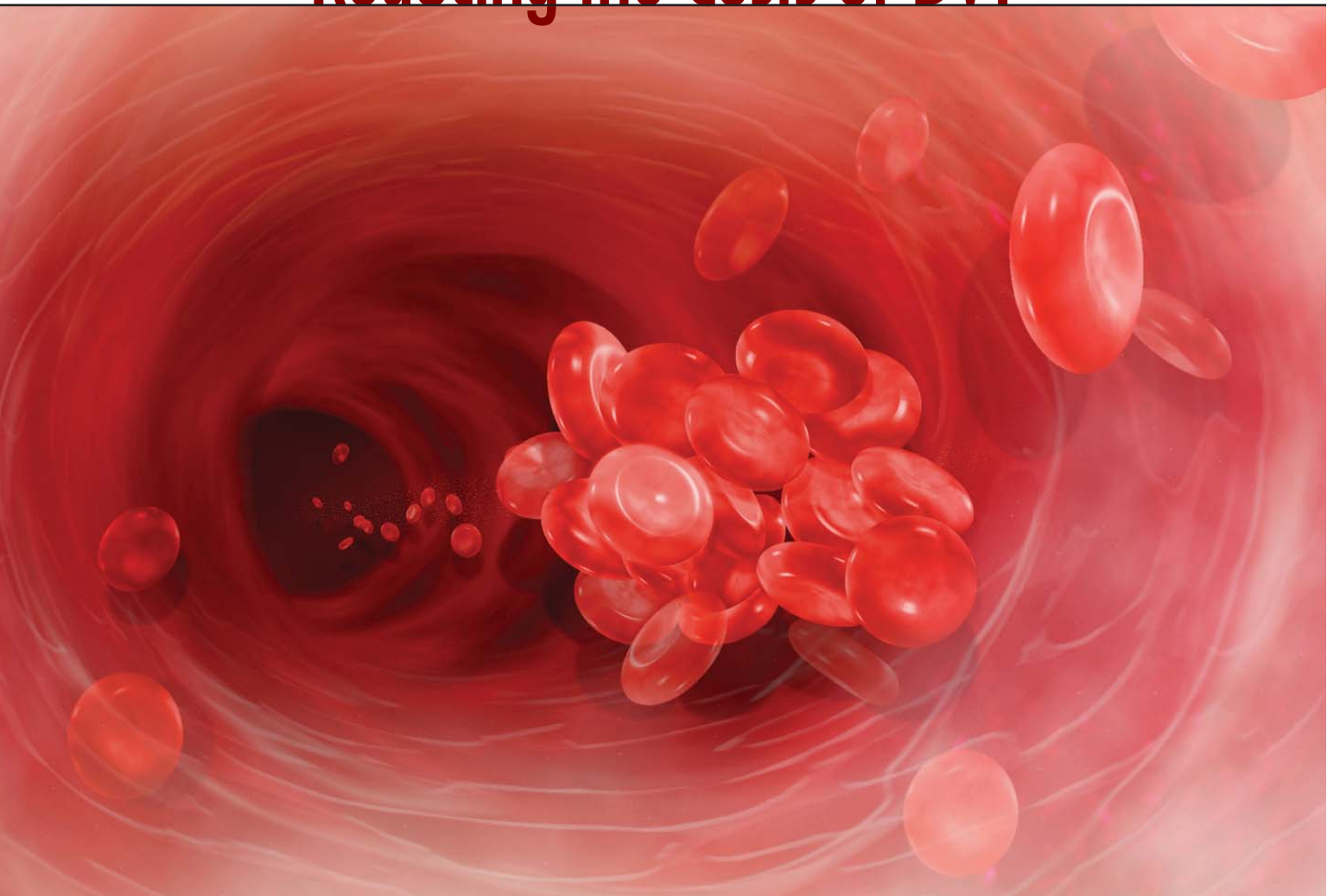
Institute at-work walking groups. Some employers, including BMW and Google, give employees the option of sitting on an exercise ball rather than an office chair. From the relatively staid “standing stations” to the creative and eccentric “iPlod” (a treadmill computer desk) and “geek-a-cycle” (part workstation, part recumbent bicycle), there are many options to bring a change of pace to an office environment. All of these human resources efforts – most of which are inexpensive – will increase morale and decrease the risk of DVT among your employees.

Get tough with health plans and disability vendors.

You can implement a contractual requirement that DVT is managed according to established clinical and patient safety standards. Make sure that DVT risk screening is done by your health plan provider and that there is appropriate DVT case management before, during and after hospitalization. Refuse to pay for hospital-acquired DVT.

Be an active healthcare purchaser. Join the growing national patient safety movement that advocates non-payment for patient injuries and conditions that are reasonably preventable by following generally accepted guidelines. 

Too High a Price to Pay: Reducing the Costs of DVT



Deep vein thrombosis, or DVT, results from a blood clot that forms in a large vein, usually in the leg. If the clot breaks loose and travels to the lungs, it can cause a life-threatening pulmonary embolism, or PE. DVT, and related complications, affect almost three million Americans every year. It is the leading cause of preventable death in hospitals and kills more Americans than AIDS and breast cancer combined.

DVT can affect individuals of all ages, and is of particular concern for those with acute medical conditions, cancer, those who are having surgery, and those with additional DVT risk factors like an inherited blood-clotting disorder,

obesity, advanced age, pregnancy, and medication containing the hormone estrogen.

Approximately 600,000 of the 2.8 million Americans affected by DVT/PE each year will require expensive inpatient treatment.²⁷ Those who survive an initial event usually have a lifelong battle with chronic DVT-related conditions that often require additional hospitalizations and treatments. Three in 10 individuals will have at least one recurrence within the decade following the initial DVT event.²⁸ And those who acquire DVT as a consequence of another procedure or condition will experience delays in their recovery.²⁹

By Jeremy Nobel, MD

Healthcare Costs

The economic burden of DVT is based on three factors: a large number of patients, the high costs of management, and additional long-term healthcare costs.³⁰ U.S. hospital costs, alone, are estimated to be \$1.5 billion each year.³¹ This does not take into consideration the costs of outpatient treatment and the costs to employers and insurance companies of disabled, less-productive employees. A broader calculation of DVT/PE-related costs in the U.S. is \$15.5 billion annually.³² Both of these figures exclude the human costs of pain, suffering, anxiety, and physical disfigurement that accompany DVT and its related, long-term conditions.

The burden to health plans from DVT and PE is significant. A study by Spyropoulos and Lin, published in the July/August 2007 issue of *Journal of Managed Care Pharmacy*, examined thousands of patients who had continuous health plan enrollment and continuous pharmacy benefit during a period when they were diagnosed with DVT/PE.³³ The study reported the average annual healthcare cost for those who received hospital care for DVT/PE ranged from \$7,594 to \$16,644 per patient, depending on the type of event and whether it was a primary or secondary diagnosis. All cost calculations were based on costs associated with venous thromboembolism (DVT or PE), although costs associated with co-morbid conditions could not be excluded.

Another study, published in the *American Journal of Health-System Pharmacy* in 2006, estimated the median annualized medical costs of care for patients who had DVT to be \$17,512 and DVT plus PE to be \$25,554.³⁴ These numbers should be seen in the context of a patient in the study's control group, whose median annualized medical costs were calculated to be \$680.

The long-term consequences of DVT and PE, called post-thrombotic syndrome, are also expensive. The lifetime costs of managing these long-term complications were calculated at \$3,069 per patient per year in a study of total hip replacement patients that was published in 2003 by Caprini et al.³⁵ A 2002 study by Botteman et al. calculated annual costs of long-term events experienced by total hip replacement surgery patients with DVT to be \$3,798 and with PE to be \$6,404.³⁶ Spyropoulos and Lin also examined the costs of hospital readmissions as a result of complications following an initial DVT or PE event.³⁷ Re-admissions, the authors reported, incur a 21 percent greater cost than the initial episode. The study only considered those costs directly associated with DVT / PE.

DVT prophylaxis – or treatment to prevent the condition from occurring – can save both lives and money. According to the American College of Chest Physicians, “a vast number of randomized clinical trials over the past 30 years provide

DVT Quick Facts

- **DVT affects about three million americans every year.**
- **Up to 600,000 people are hospitalized in the U.S. each year for DVT.**
- **PE is the most common preventable cause of hospital death in the United States.**
- **PE is the leading cause of maternal death associated with childbirth.⁴⁷**
- **Only one-third of hospitalized patients with risk factors for blood clots receive preventive treatment in the U.S., even though studies show that DVT prophylaxis is less expensive than treating full-blown DVT/PE.^{48,49}**
- **DVT-associated hospital costs in the U.S. are estimated at \$1.5 billion annually. When more than hospital costs are considered, the annual costs jump to \$15.5 billion.**
- **Annualized median medical costs for a patient with DVT are more than \$17,000. For a patient with both DVT and PE, costs are more than \$25,000.⁵⁰**
- **Thirty percent of patients who have had one DVT episode will experience a recurrence within ten years, at a cost of approximately 21 percent more than the initial episode.⁵¹**

irrefutable evidence that primary thromboprophylaxis reduces DVT, PE, and fatal PE.³⁸ DVT prophylaxis has been shown to be less expensive than diagnosing the condition and treating its consequences once it has developed.³⁹ The Agency for Healthcare Research and Quality, in its report “Making Health Care Safer: A Critical Analysis of Patient Safety Practices,” identifies as its highest-ranked safety practice the appropriate use of prophylaxis to prevent DVT/PE in patients at risk.⁴⁰ This high ranking was awarded based on the capacity for DVT prophylaxis to reduce adverse patient outcomes and its ability to decrease overall costs.

Employment-Related Costs

The Surgeon General's Call to Action on DVT admits there are few data on the economic costs of DVT/PE,

DVT/PE Economic Impact	Australian Cost	U.S. Equivalent*
Productivity losses due to premature death	\$1.366 billion	\$13.5 billion
Additional search and hiring costs associated with employees who experience DVT/PE	\$2.0 million	\$19.78 million
Cost of absenteeism due to DVT/PE	\$8.8 million (\$7.4 million borne by employer and \$1.4 million borne by the employee)	\$87 million (\$73 million borne by employer and \$14 million by employee)
Total employment-related financial costs of DVT/PE	\$1.4 billion	\$13.6 billion

Table adapted from "The burden of venous thromboembolism in Australia," produced for The Australia and New Zealand Working Party on the Management and Prevention of Venous Thromboembolism.

*U.S. Equivalent figures were calculated as follows: Australian total multiplied by 14.76 (magnitude of difference between the Australian population of 20.4 million and the U.S. population of 301.1 million) and divided by .67 (the difference between the Australian dollar and U.S. dollar).

particularly the direct and indirect costs to individuals and society. He does say, however, that individuals with these conditions may have to withdraw from the workforce, creating economic hardship for families and the country.⁴¹

Since there is no U.S. study of the general economic impact of DVT/PE, we have to look beyond our own borders for this information. An Australian study, released in May 2008, paints a stark economic picture.⁴² While the numbers are not directly relevant to the U.S. context, they give a sense of the scope of negative impact of DVT/PE on the workplace.

There are particular elements of the U.S. employment context for which we do have concrete numbers, however. Corporate healthcare costs continue to rise at double the inflation rate. The National Coalition on Health Care, based in Washington D.C., notes that in 2008 the annual premium charged by a health insurer for an employer-based health plan covering a family of four averaged \$12,700, with employers contributing more than \$9,300.⁴³ Compounding this is the fact that the U.S. workforce is aging. By 2020 it is predicted that Americans older than 55 will be the largest workforce population group.⁴⁴ Since the prevalence of DVT increases substantially with age, we can realistically expect the employment-related costs of venous thromboembolism to increase substantially as well.

We also know that DVT/PE increases time away from work. For example, the complications associated with DVT

and PE doubled the average length of hospital stay in a study of patients who had undergone major orthopedic surgery.⁴⁵

Interestingly, patients who ultimately experience a DVT or PE event tend to already have higher annual medical costs than individuals who are not diagnosed with these conditions. A study, published in 2006 in the *American Journal of Health-System Pharmacy*, compared administrative claims data for patients having DVT, PE, or suspected post-thrombotic syndrome (long-term complications due to DVT) with a control group.⁴⁶ The control group's median annualized medical costs were \$1,045. The group that eventually experienced DVT / PE already had medical costs 6.5 times higher than the control group prior to experiencing DVT. If we assume that the higher medical costs prior to the DVT event are due to general ill health, this finding is a clear call to action for policymakers and employers: promote overall health and wellness and the incidence of DVT – and its related costs – will decrease.

DVT and PE have a devastating impact on millions of Americans each year. While we have yet to quantify the economic costs of the pain, suffering, and reduced quality of life associated with these conditions, we do know that they have a significant impact on healthcare costs, a burden that is borne by governments, employers, and individual Americans. Efforts to reduce the incidence of these preventable conditions will improve the health of the country, its corporations, and its citizens. **HPM**

The Clinical Picture: A Protocol for DVT Prevention That Saves Lives



Deep vein thrombosis, or DVT, affects millions of Americans and is responsible for one in 10 deaths in U.S. hospitals.⁵² DVT is a silent killer. It is often asymptomatic and can be difficult to diagnose. But the silence goes beyond symptoms: almost three-quarters of Americans have little or no awareness of the condition.

For medical directors and clinicians, prevention and treatment of DVT must become a priority. From a corporate bottom-line perspective, employees who survive a DVT or pulmonary embolism (PE) event have extended hospital stays and many experience recurrence, resulting in time off work

and productivity losses. DVT is considered a preventable condition, and major governing and accrediting bodies are taking an ever-stronger stand on universal, quality-driven guidelines for DVT. The Centers for Medicare and Medicaid Services are including DVT as a hospital-acquired condition for which hospitals will no longer be reimbursed.⁵³ The Leapfrog Group, a leading advocate for quality health-care, includes DVT prevention as a “safe practice” on its hospital rating survey.⁵⁴

Proper DVT risk assessment and appropriate prophylaxis are quality improvement issues which, according to the

By Jeremy Nobel, MD

Surgeon General, could save tens of thousands of lives each year and reduce the suffering for many more.⁵⁵

Determining DVT Risk

Those considered at high risk of experiencing DVT should be given special treatment to prevent its onset. Unfortunately, this does not happen often enough.

Inadequate risk assessment is one of the key reasons for the high rate of DVT in hospitals.⁵⁶ A number of rigorous risk assessment tools have been developed for use in clinical settings. Outspoken advocates of DVT prevention – such as Dr. Geno Merli (member of the national DVT Coalition), Dr. Kenneth Kizer (President of the National Quality Forum), and Dr. Steven Galson (Acting Surgeon General) – have called for hospitals to use evidence-based DVT/PE guidelines to prevent the disease in high-risk patients. Despite these efforts, hundreds of thousands of cases of DVT are allowed to develop and may progress to a potentially fatal PE.

DVT risk assessment can be approached in two ways.⁵⁷ The first determines risk according to each patient's individual predisposing factors and the nature of his or her current illness or procedure. Based on this assessment, preventive treatment (prophylaxis) is individually prescribed. The second, and the one recommended by the 7th American College of Chest Physicians (ACCP) Conference on Antithrombotic and Thrombolytic Therapy, advocates routine implementation of prophylaxis for all patients who belong to a major "target group."⁵⁸ The type and degree of

prophylaxis, be it mechanical or pharmacological, is influenced by the presence of other risk factors, such as advanced age, obesity, malignancy etc.

Target groups:

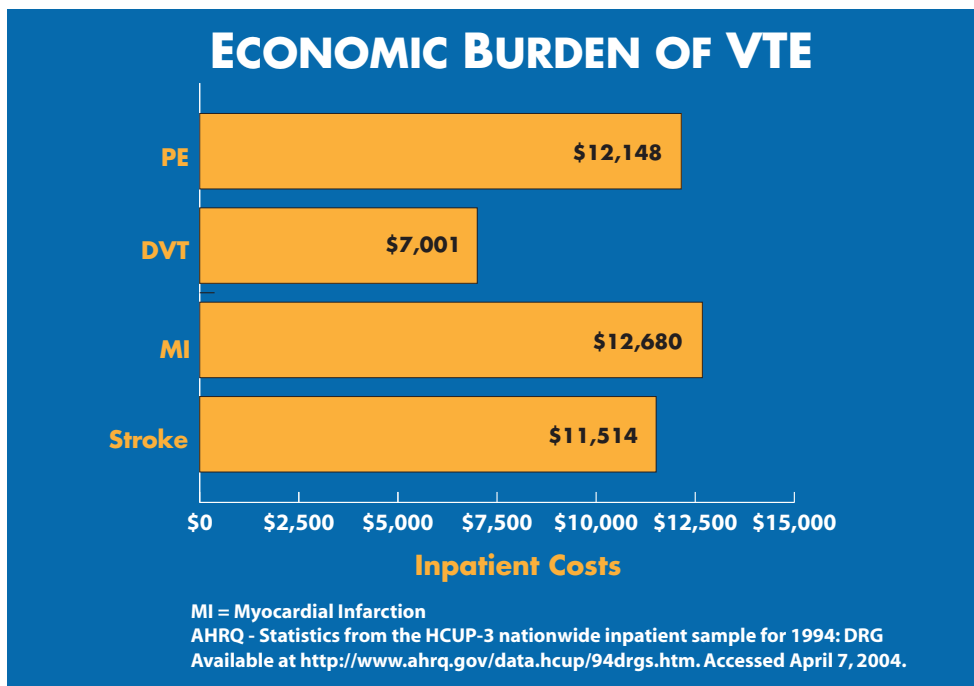
- general surgery
- major gynecologic surgery
- major urologic surgery
- laparoscopic surgery
- neurosurgery
- burn patients
- acute medical conditions
- stroke
- hip or knee arthroplasty, hip fracture surgery
- major trauma
- spinal cord injury
- critical care
- malignancy

DVT Prophylaxis

DVT prophylaxis – or treatment to prevent the onset of the condition – has the capacity to drastically reduce the number of cases of venous thromboembolism (VTE). According to the American College of Chest Physicians, "DVT prophylaxis is the number one strategy to improve patient safety in hospitals."⁵⁹ In practice, however, there are significant barriers to routine prescription of DVT prophylaxis.

Many physicians lack awareness of DVT risk factors and incidence. They may not believe that DVT is a problem in their practice. They may be concerned about bleeding complications associated with prophylactic prescription of anticoagulants (blood thinners). And they may lack an understanding of the cost-effectiveness of prophylaxis.

Identifying a patient's risk for DVT can be a challenge, and there is no validated method to predict an individual patient's risk for VTE. In the absence of an established DVT protocol at a medical clinic or hospital, physicians lack adequate direction and may not feel confident prescribing prophylaxis.⁶⁰⁻⁶²





Many physicians lack awareness of DVT risk factors and incidence. They may not believe that DVT is a problem in their practice.

following surgery. Intermittent pneumatic compression devices are another non-pharmacological approach; they can be used on a patient's leg or foot to increase the amount of blood that is sent back to the heart and reduce the likelihood of clotting. These pumps are especially useful to prevent DVT in immobile individuals but are not recommended if a patient has already been immobile for more than 72 hours, as clots may have already formed and could be dislodged by the compression.

High-risk patients who cannot walk, use an intermittent pneumatic compression device, or take anticoagulants may have a temporary "filter" inserted into the vena cava to prevent clots from traveling to the lungs. While vena cava filters are very effective at preventing pulmonary embolism from DVT, their use is controversial for individuals who do not have DVT at the time the filter is inserted.

Pharmacological prophylaxis can also prevent DVT. One review of more than 70 randomized trials involving more than 16,000 patients showed that using a low-dose anticoagulant prior to surgery can prevent about half of all pulmonary emboli and about two-thirds of all DVT.⁶⁹ Examples of anticoagulants include heparin, low molecular weight heparin (LMWH), low-dose unfractionated heparin

All of these factors explain study findings that, while 75 to 80 percent of hospitalized patients are appropriate candidates for DVT prophylaxis, prophylaxis is successfully administered in only 30 percent of cases when a hospital does not have a prophylaxis protocol in place.⁶³ Even in those cases where a clinic or hospital has a DVT prophylaxis protocol, it may be inconsistently applied.⁶⁴ It appears that prophylaxis is more likely to be omitted in medical patients than in surgical patients.^{65,66}

Patients, for their part, are usually unable to advocate for adequate preventive treatment because they lack awareness of the disease, the risk factors, the signs and symptoms, and recommended standards for prevention.⁶⁷

Non-pharmacological (or "mechanical") prophylaxis is used in low-risk patients, those who have undergone low-risk hospital procedures, and those who are unable to take anti-clotting medication. Early and aggressive ambulation, or walking, is the most important non-pharmacological approach to preventing DVT/PE in patients who have had a recent operation. It is the only approach recommended for low-risk patients undergoing general surgery.⁶⁸

Compression stockings – tight elastic socks that help maintain circulation – are also recommended prior to and

DVT Prophylaxis

- **early ambulation**
- **compression stockings**
- **use of a pneumatic compression device (a "pump")**
- **vena cava filters**
- **anticoagulation (blood thinners)**

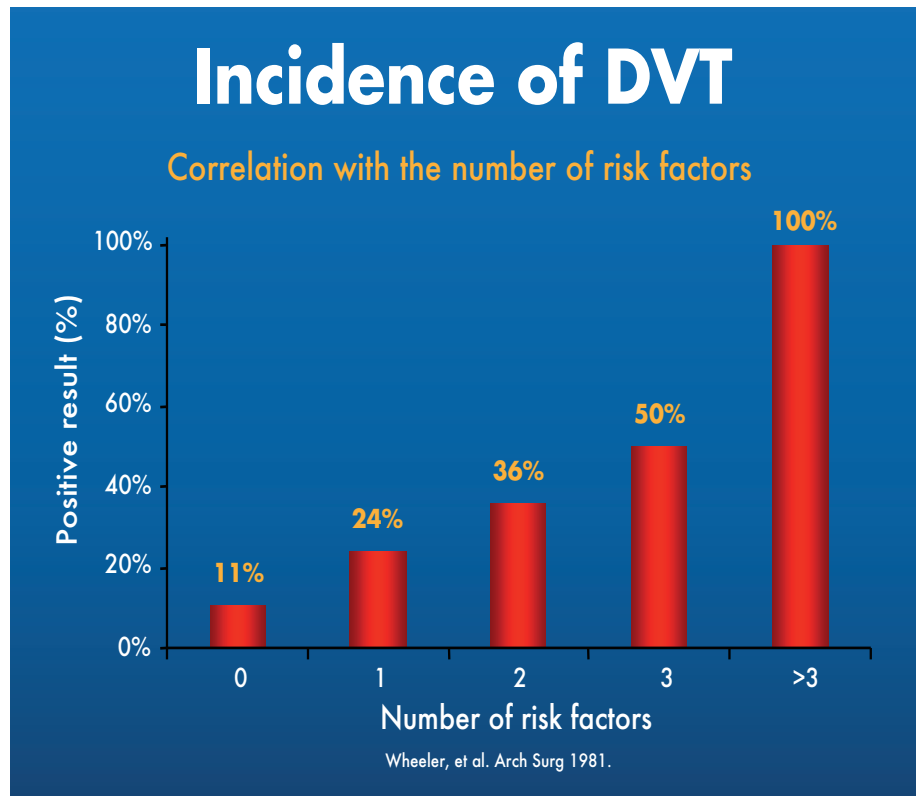
(LDUH), Factor Xa inhibitor, and warfarin. Aspirin is not considered a prophylactic treatment for DVT by the Society of Hospital Medicine or the American College of Chest Physicians.^{70,71}

Evidence-based best practice recommendations are to prescribe anticoagulating medication for at-risk individuals who are undergoing medical procedures, particularly hip, knee, and orthopedic procedures, and neurosurgery.⁷² These drugs are usually given prior to surgery, but may be offered as secondary prevention after surgery to high-risk patients who did not receive pre-operative anticoagulating medication.⁷³ There are abundant data from blinded, randomized clinical trials that there is little or no increase in the rate of incidental bleeding with prophylactic doses of heparin (LDUH or LMWH), or a vitamin K antagonist.⁷⁴

Anticoagulants are also recommended as a preventive measure for individuals outside of a hospital setting, including those who are paralyzed, have had a stroke or heart failure, have cancer or severe lung disease, have long-term central vein catheters, and those on bed rest.⁷⁵ Research indicates that medical patients – as opposed to surgical patients – may not receive adequate prophylaxis.⁷⁶ If not given in sufficient

amounts, an anticoagulant is little more than a placebo.⁷⁷

DVT and PE can be prevented through appropriate prophylaxis, an approach that saves both lives and money. Every hospital or clinic should develop a DVT prevention protocol, and evaluate the protocol regularly to ensure that it meets its DVT prevention goals. **HPM**



Developing a DVT Prevention Protocol for Your Clinic

- **Assemble an interdisciplinary team of key people to work on the DVT Protocol.**
- **Establish general goals and a timeline.**
- **Identify best practices in prophylaxis.**
- **Draft your protocol making ease of use your first priority.**
- **Recruit a focus group to try out your protocol.**
- **Implement and evaluate the protocol and adjust as necessary.**

Adapted from "Preventing Hospital-Acquired Venous Thromboembolism: A Guide for Effective Quality Improvement," version 3.0, published by the Society of Hospital Medicine.

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