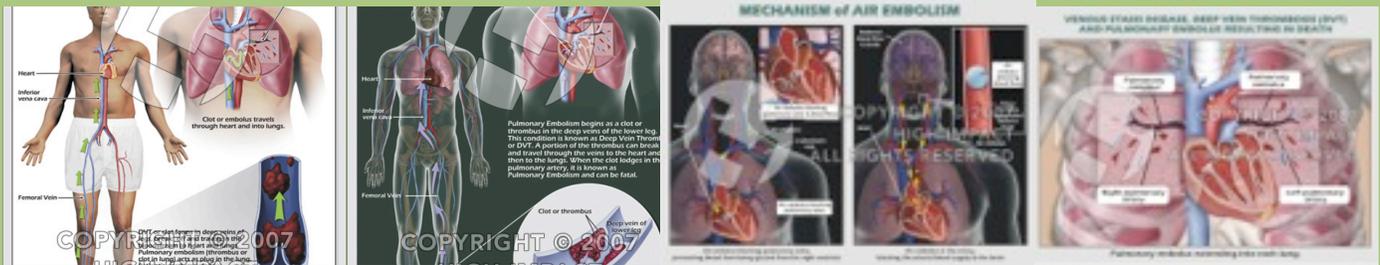


Venous Thromboembolism



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VENOUS THROMBOEMBOLISM

Venous thromboembolism (VTE) covers a spectrum of clinical problems, including asymptomatic calf vein thrombosis, symptomatic deep vein thrombosis (DVT), and pulmonary embolism (PE). These diagnoses are significant causes of mortality and morbidity with admissions to the hospital associated with both DVT and PE.

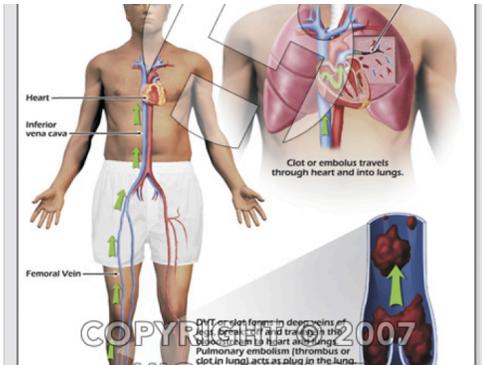
Hospitalized patients are at greater risk of VTE due to surgery, prolonged immobilization, use of certain medications, and presence of other conditions such as obesity, congestive heart failure, and cancer. VTE is a leading cause of preventable death in hospitalized patients, with as many as 10% of deaths estimated from PE. Additionally, the treatment of non-fatal symptomatic VTE and long-term associated morbidities are connected to considerable health care costs. Assessing risk and initiating prophylaxis, which is now a routine part of hospital care, have the potential to save lives, reduce harm, and reduce the cost of care.

VTE as a significant patient safety issue resulting in the endorsement that each patient be evaluated upon admission, and regularly thereafter, for the risk of developing DVT/VTE. Further, as of July 31, 2008, the Centers for Medicare & Medicaid Services (CMS) put into effect a rule which states that, if a patient who has a total knee or hip replacement develops DVT or PE while hospitalized, the hospital will be paid as if the complication were not present.

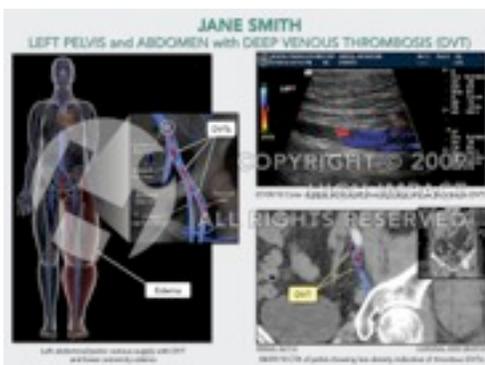
Deep venous thrombosis (DVT) and pulmonary embolism (PE) represent different manifestations of the same clinical entity referred to as a venous thromboembolism (VTE). Venous thrombosis occurs when red blood cells, fibrin and, to a lesser extent, platelets and leukocytes, form a mass within an intact vein. A pulmonary embolism results when a piece of thrombus detaches from a vein wall, travels to the lungs, and lodges within the pulmonary arteries. More than 70% of all pulmonary emboli originate in the pelvic and deep veins of the lower extremities. The superior vena cava, upper extremity veins, and right chambers of the heart are less common sources.

The venous thrombo-embolism (VTE) measures were developed as a result of the ‘National Consensus Standards for the Prevention and Care of Deep Vein Thrombosis (DVT)’ project between The Joint Commission and the National Quality Forum (NQF) that formally began in January 2005. The development process was guided by the expertise and advice provided by the NQF steering committee (SC) and the technical advisory panel (TAP). The measures were tested through a multi-phased approach and the results were reviewed by the SC and TAP. Six VTE measures were endorsed by the NQF in May, 2008 and aligned with the Centers for Medicare & Medicaid Services.

PULMONARY EMBOLISM



A pulmonary embolism is a blockage of an artery in the lungs. An embolus can be a blood clot, air bubble, or piece of fat, bone marrow, or tumor tissue that travels through the bloodstream to the lungs. Once the clot is stuck in a lung artery, it blocks the blood from nourishing that lung. The tissues on the other side of the blockage may die if it doesn't receive enough blood from other sources. The lung may become damaged and stop working properly. In severe cases this can lead to death.



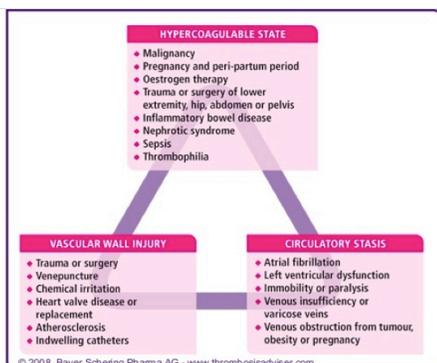
DEEP VEIN THROMBOSIS

Sometimes known as, deep venous thrombosis, (DVT) is the formation of a blood clot (thrombus) in a deep vein, predominantly in the legs though can also form in the pelvic veins. Non-specific signs may include pain, swelling, redness, warmth, and engorged superficial veins. Once detached, (embolization) of a clot that travels to the lungs creating a pulmonary embolism.

VIRCHOWS TRIAD

Surgery is an important risk factor for PE and all surgical patients are at increased risk for PE compared with the general population. Virchow's triad of venous stasis, venous injury, and hyper-coagulability of blood, all of which may result from surgery, cause thrombus formation. Relative PE risk in surgical patients is influenced by a number of factors, including type of surgery and patient-specific factors. To prevent the development of DVT (Deep vein thrombosis)—and ultimately PE—surgical patients may receive pharmacological prophylactic measures prior to surgery. The type of treatment prophylaxis depends on the level

of DVT risk; and would need to be determined and ordered by the physician. These guidelines are contained in the ACCP standards.



Risk Factors for pulmonary embolism

These factors increase the chance of pulmonary embolism:

- Age older than 40
- Prior history of blood clot in a deep vein or pulmonary embolism
- Prior major surgical procedure
- Trauma
- Hip fracture
- Immobilization/paralysis
- Venous stasis
- Varicose veins
- Congestive heart failure
- Myocardial infarction
- Obesity
- Pregnancy/ postpartum period
- Cerebrovascular accident (stroke)
- Increased levels of clotting factors in the blood. Usually caused by cancer (e.g., pancreatic)
- Prior major surgery, especially after pelvic surgery, knee replacement, or heart surgery
- Estrogen containing birth control pills or hormone replacement therapy
- Smoking

Signs and Symptoms/Clinical Presentation

The symptoms of pulmonary embolism vary in type and severity depending on the size and location of the blockage, and the area affected by the lack of blood. Symptoms may include:

- Shortness of breath that starts suddenly for no obvious reason
- Chest pain, especially when breathing or coughing (it can mimic a heart attack)
- Feeling faint, lightheaded, dizzy
- Cough, sometimes with bloody phlegm
- Rapid heartbeat
- Rapid breathing
- Anxiety
- Feeling of impending doom
- Swollen, distended neck veins

The signs and symptoms of PE are nonspecific and are often seen in other cardio-respiratory diseases. Clinical manifestations depend on the size of the thrombus and the region of occlusion. The most common signs and symptoms are dyspnea and tachypnea. The patient may present with sudden chest pain that mimics angina pectoris or myocardial infarction. Other symptoms include anxiety, apprehension, tachycardia, fever, diaphoresis, hemoptysis, and syncope.

Reference: Hurst's the heart, 12th edition, volume two. Ch 7

PHARMACOLOGICAL PROPHYLAXIS

The Joint Commission and the National Quality Forum initiated performance measurement goals in 2005. Hospitals are required to formulate policy to support the prophylactic management of venous thromboembolism.

I-VTE-1

Venous Thromboembolism Prophylaxis

Measure Overview

Patients who received VTE prophylaxis (or reasons of why this was not done) on the day of or day after hospital admission or surgery.

Note: This measure applies to medical and surgical cases that are not included in the SCIP measure population.

Overview/Details:

VTE prophylaxis given on the day of or the day after hospital admission or surgery or a reason documented of why VTE prophylaxis was not given.

Rationale:

Hospitalized patients at high-risk for VTE may develop an asymptomatic deep vein thrombosis (DVT), and die from pulmonary embolism (PE) even before the diagnosis is suspected. Therefore, the best approach is for every patient to be evaluated for primary prophylaxis since preventing DVT is essential to reducing morbidity and mortality. There is clinical evidence that appropriately used thromboprophylaxis has a desirable risk/benefit ratio and is cost effective.

Thromboprophylaxis provides an opportunity to improve patient outcomes and reduce hospital costs.

The Joint Commission

SURGICAL CARE IMPROVEMENT PROJECT

The Surgical Infection Prevention (SIP) measures were added as a core measure set in the fall of 2003. Hospitals began collecting core measure data for SIP with patient discharges beginning July 1, 2004. The SIP set subsequently transitioned to the [Surgical Care Improvement Project \(SCIP\) measures](#) effective July 1, 2006.

The Surgical Care Improvement Project (SCIP) is a national quality partnership of organizations interested in improving surgical care by significantly reducing surgical complications. SCIP Partners include the Steering Committee of 10 national organizations who have pledged their commitment and full support for SCIP.

In addition, each of the SCIP target areas are advised by a technical expert panel (TEP). These groups have provided hours of technical expertise and resources to ensure the SCIP measures are fully supported by evidence-based research.

Finally, The Joint Commission continues to align with Centers for Medicare and Medicaid Services (CMS) with respect to the performance measures for patients undergoing surgery. Measure Set: Surgical Care Improvement Project (SCIP)

Set Measure ID#: SCIP-VTE-1

Performance Measure Name: Surgery Patients with Recommended Venous Thromboembolism Prophylaxis Ordered.

Description: Surgery patients with recommended venous thromboembolism (VTE) prophylaxis ordered anytime from hospital arrival to 48 hours after Surgery End Time.

Rationale: There are over 30 million surgeries performed in the United States each year. Despite the evidence that VTE is one of the most common postoperative complications and prophylaxis is the most effective strategy to reduce morbidity and mortality, it is often underused. The frequency of venous thromboembolism (VTE), that includes deep vein thrombosis and pulmonary embolism, is related to the type and duration of surgery, patient risk factors, duration and extent of postoperative immobilization, and use or nonuse of prophylaxis. According to Heit et al, 2000, surgery was associated with over a twenty-fold increase in the odds of being diagnosed with VTE. Studies have shown that appropriately used thromboprophylaxis has a positive risk/benefit ratio and is cost effective. Prophylaxis recommendations for this measure are based on selected surgical procedures from the 2004 American College of Chest Physicians guidelines.

Set Measure ID#: SCIP-VTE-2

Performance Measure Name: Surgery Patients Who Received Appropriate Venous Thromboembolism Prophylaxis Within 24 Hours prior to Surgery to 24 Hours After Surgery

Description: Surgery patients who received appropriate venous thromboembolism (VTE) prophylaxis within 24 hours prior to Surgical Incision Time to 24 hours after Surgery End Time.

Rationale: There are over 30 million surgeries performed in the United States each year. Despite the evidence that VTE is one of the most common postoperative complications and prophylaxis is the most effective strategy to reduce morbidity and mortality, it is often underused. The frequency of venous thromboembolism (VTE), that includes deep vein thrombosis and pulmonary embolism, is related to the type and duration of surgery, patient risk factors, duration and extent of postoperative immobilization, and use or nonuse of prophylaxis. According to Heit et al, 2000, surgery was associated with over a twenty-fold increase in the odds of being diagnosed with VTE. Studies have shown that appropriately used thromboprophylaxis has a positive risk/benefit ratio and is cost effective. Prophylaxis recommendations for this measure are based on selected surgical procedures from the 2004 American College of Chest Physicians guidelines.

The Joint Commission

MECHANICAL PROPHYLAXIS

The patient may also be fitted with an external pneumatic compression device (Sequential compression device-SCD) that is designed to improve venous (blood via the vein) return from the lower extremities, or elastic compression stockings (TEDs) to prevent pooling of blood in the legs. Vena cava interruption by placement of an inferior vena caval filter may be necessary for patients at extremely high risk for DVT. A filter is a tiny cage-like device that is inserted in a blood vessel to break up clots and prevent them from reaching the heart or lungs.

TED (thromboembolic disease) hose is frequently given to patients when they are in the hospital or medical facility. TED hose are designed for individuals that are non-ambulatory, or lying down 95% of the time. The compression starts in the calf and decreases as it goes up the leg.

The reason the compression starts in the calf, is when lying down fluid tends to travel no further than our mid leg. The stockings will help push additional fluid from that position up through the lymphatic system, then through body. TED hose are usually white in color and available as a thigh high or knee high style. Ted hose (stockings) needs to be ordered either knee high or thigh high. To determine the correct hose for the patient, sizing is of absolute importance. If the physician orders thigh high ted hose, the patient will need to be measured.

The two measurements of importance are, calf circumference and leg length. The calf measurement determines size and the distance from gluteal furrow (buttocks) to bottom of heel determines length.

Thigh-Hi Ted stockings are designed to reduce venous stasis in the entire leg. Correct graduated compression from ankle to upper thigh helps insure optimum blood flow velocity.

Knee high Ted hose are designed to reduce venous stasis below the knee and are measured from the bend in the knee to the bottom of the heel. As with thigh high, the Calf circumference determines size. Distance from bend of knee to bottom of heel determines the length. ***It is of utmost importance that the patient is measured accurately and these stockings applied correctly, if the stockings are inappropriately measured and inappropriately applied, then a tourniquet effect will occur and increase the risk of VTE due to venous stasis and damage to the vein wall causing tissue damage.***

Sequential Compression Device- often called intermittent pneumatic devices:

- Placed on calves
- Pair of double-walled vinyl pneumatic sleeves 12 to 16 inches long
- Connects to a compressor
- Inflates and deflates the garment
- Compressions last 12 seconds Inflation pressure 45 mm Hg
- Cycles every 60 seconds

As with the TED stockings, it is imperative that the SCD's are applied correctly with the bladder against the calf of the leg. These devices move around the patients leg with patient activity, and must be assessed for correct application, frequently per nursing assessment guidelines.

Indications for use:

- DVT prophylaxis when anticoagulants are contraindicated
- DVT prophylaxis for moderate and high-risk patients
- Paralyzed limbs
- Pre-, intra-, and post-phases of surgery
- DVT prophylaxis for high DVT risk surgeries

Contraindications:

- Severe peripheral vascular disease
- When an increase of fluid to the heart is detrimental
- Severe heart failure or pulmonary edema
- Known or suspected DVT or PE within 6 months
- Immobilized for > 72 hours without DVT prophylaxis
- Post-operative vein ligation
- Deformity of the limb
- Gangrene or Infected leg wounds
- Recent skin graft
- Dermatitis

IN SUMMARY

The physician is responsible for obtaining a thorough history and physical, which includes the patients past medical, surgical history and family history. From this assessment, the physician should identify risk factors for venous thromboembolism and generate orders for prophylaxis using the institutions protocol. The physician may consider added precautions based on the type of surgery or medical plan of care that has been ordered for the patient.

In my nursing experience I have found that the areas that contribute to patient injury related to deep venous thromboembolism, be in prolonged hospital stay or death are:

- Failure of the physician to correctly assess and identify patient risk factors for VTE
- Failure of the physician to order the appropriate anticoagulant medications to support the prevention of VTE.
- Failure of the physician to order the appropriate mechanical prophylaxis to support the prevention of VTE
- Failure of the nursing staff to follow the physicians order and apply the Ted hose and sequential compression devices.
- Failure of the nursing staff to correctly apply the Ted hose and sequential compression devices.
- Failure of the nursing staff to educate patient on the reason and purpose of these devices to ensure compliance.
- Failure of the surgeon to ensure that sequential compression devices are applied intra-operatively.
- Failure of the operating room nursing staff to ensure the correct application of sequential compression devices are applied to the patient during the procedure.

REFERENCES

American College Of Chest Physicians: Prevention of venous thromboembolism

AORN (American Operating Room Nurses) guidelines for the prevention of Venous Stasis

Hurst's the heart: 12th edition, volume two. Ch 7

Joint Commission Performance Measure Name: Surgery Patients with Recommended Venous Thromboembolism Prophylaxis Ordered.

Joint Commission Performance Measure Name: Surgery Patients Who Received Appropriate Venous Thromboembolism Prophylaxis Within 24 Hours Prior to Surgery to 24 Hours After Surgery

Mosbys Nursing Skills: Applying elastic stockings and Sequential compression devices