

Postoperative Complications: Managing Deep Vein Thrombosis

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What Are Interventions to Manage Postoperative Deep Vein Thrombosis?

- › Deep vein thrombosis (DVT) refers to the development of a thrombus (i.e., blood clot) in one or more of the deep veins of the extremities, often following surgery or other prolonged period of inactivity (e.g., coma). (For more information, see *Quick Lesson About ... Deep Vein Thrombosis*). DVT is most likely to form in the leg (**Figure 1**), but can also form in the arm. (For more information, see *Quick Lesson About ... Deep Vein Thrombosis, Upper Extremity*)



Figure 1: Note the swelling and redness in the right leg which has a deep vein thrombosis. Copyright© James Heilman, 2010. Licensed under Creative Commons Attribution-Share Alike 3.0 Unported License

- *What:* DVT can occur postoperatively as a result of venous stasis, vessel wall injury, and altered blood coagulation (i.e., Virchow's Triad; **Figure 2**). DVT is considered a serious postoperative complication, because the thrombus can become dislodged from the surface of the vein wall, travel through the circulatory system to other parts of

ICD-9
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Authors

Mary Woten, RN, BSN

Cinahl Information Systems, Glendale, CA

Tanja Schub, BS

Cinahl Information Systems, Glendale, CA

Reviewers

Teresa-Lynn Spears, RN, MSN

Cinahl Information Systems, Glendale, CA

Alysia Gilreath-Osoff, RN, MSN

Cinahl Information Systems, Glendale, CA

Nursing Practice Council

Glendale Adventist Medical Center,

Glendale, CA

Editor

Diane Pravikoff, RN, PhD, FAAN

Cinahl Information Systems, Glendale, CA

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the body (e.g., lung, brain), and cause potentially life-threatening damage. Pulmonary embolism (PE), a potentially fatal complication of DVT, occurs when a thrombus travels to the lungs and obstructs one or more pulmonary arteries (for more information, see *Quick Lesson About ... Pulmonary Embolism in the Surgical Patient*)

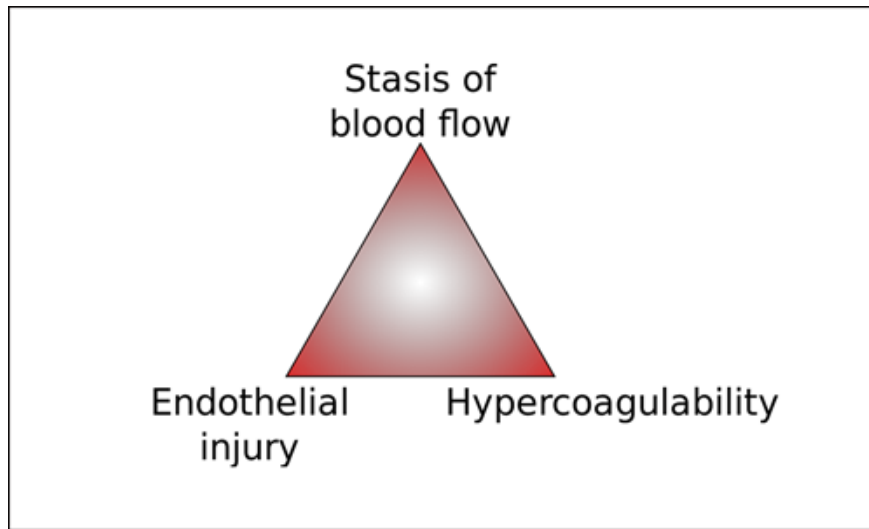


Figure 2: Virchow's Triad describes the three broad categories of factors that are believed to contribute to thrombosis: Endothelial injury, hypercoagulability, and blood flow stasis. Copyright© Rudolf.hellmuth, 2012. Licensed under Creative Commons Attribution-Share Alike 3.0 Unported License

- *How:* Nursing responsibilities in the management of DVT include
 - frequent assessment for signs and symptoms of DVT (e.g., edema, pain, tenderness, warmth, erythema)
 - implementation of strategies to prevent DVT, including the use of antiembolism/compression stockings or an intermittent pneumatic compression device (**Figure 3**) (for more information, see *Quick Lesson About ... Deep Vein Thrombosis: Prevention -- an Overview*)
 - maintaining patient activity restriction, if needed
 - performing or assisting with active or passive range of motion (ROM) exercises
 - elevating an affected extremity
 - administering anticoagulants or thrombolytic agents
 - preparing the patient for surgical or other invasive interventions
 - providing preoperative/postoperative patient/family education about DVT risk, prevention, and treatment



Figure 3: Typically, antiembolic stockings (TED hose) are worn beneath pneumatic compression boots to reduce the risk of deep vein thrombosis associated with immobility. Copyright ©2014, EBSCO Information Services

- *Where:* Interventions to manage DVT are performed in any setting where surgery is performed or where surgical patients are cared for postoperatively, including inpatient and outpatient surgical centers as well as in tertiary care settings (e.g., rehabilitation center)

- *Who*: Nurses provide patient/family education and patient interventions to reduce risk for DVT and administer or assist with initiating clinician orders for management of patients who develop DVT. Although assistive personnel can assist in performing interventions to prevent or manage DVT, RNs are responsible for assessing patient and managing patient outcomes. Family members can be present when interventions are performed to prevent and manage DVT

What is the Desired Outcome of Interventions to Manage Postoperative Deep Vein Thrombosis?

- › The desired outcomes of interventions to manage postoperative DVT are to
 - reduce morbidity
 - prevent or reduce the risk for PE
 - PE is the most common cause of preventable in-hospital death
- › prevent or reduce the risk of recurrence of DVT
 - prevent or reduce the risk for developing chronic venous insufficiency (CVI), also called post thrombotic syndrome (PTS), which is damage to or absence of the valves in an extremity resulting in venous stasis (**Figure 4**)



Figure 4: Chronic venous insufficiency (previously referred to as postthrombotic syndrome) can develop following deep vein thrombosis. Copyright© Țetcu Mircea Rareș, 2015. Licensed under Creative Commons Attribution-Share Alike 4.0 International License

Why Are Interventions to Manage Postoperative Deep Vein Thrombosis Important?

- › Although DVT in itself is not a life-threatening condition, if the clot dislodges the patient is at risk for life-threatening PE
- › In addition, DVT can cause long term complications, including CVI, in which the affected leg becomes chronically swollen and painful, with skin color changes and ulcer formation around the foot and ankle

Facts and Figures

According to the American Society of Hematology 2020 guidelines for the treatment of DVT/PE, venous thromboembolism (VTE) occurs in 1-2 people per 1000 each year, resulting in about 300,000 to 600,000 events in the US per year. DVT and PE are collectively known as VTE (Ortel, 2020)

The most disabling long-term complication of PE is chronic thromboembolic pulmonary hypertension. (Wang, 2020)

Establishing whether VTE is provoked, i.e., caused by an identifiable event, or unprovoked, determines the length of time a patient is on anticoagulation. If VTE is provoked by a transient risk factor, such as surgery, there is a lower risk of recurrence after completing a course of anticoagulant therapy. (Phillippe, 2017)

In an extensive review of the Cochrane Vascular Specialized Register, 20 randomized controlled trials involving graduated compression stockings (GCS) revealed that there was high quality evidence to support the use of GCS in preventing DVT in patients undergoing general and orthopedic surgery. (Sachdeva, 2018)

What You Need to Know Before Performing Interventions to Manage Postoperative Deep Vein Thrombosis

- › Risk factors for DVT include
 - prolonged immobilization (> 3 days)

- orthopedic, neurosurgical, thoracic, abdominal, or pelvic oncologic surgeries
 - pregnancy or cesarean surgery
 - age > 40 years (Hinkle and Cheever, 2018, Wood, 2020)
 - history of prior venous thrombosis
 - cancer
 - an acute infectious disease
 - inflammatory bowel disease
 - mutations in the coagulation cascade, hereditary factors
 - burns, sepsis, or major trauma
 - acute myocardial infarction (MI) or stroke
 - Polycythemia (Hinkle and Cheever, 2018)
 - Varicose Veins (Hinkle and Cheever, 2018)
 - Use of hormones for replacement therapy or contraception (Hinkle and Cheever, 2018)
 - Presence of an intravenous catheter. Upper extremity thrombus may be caused by peripherally inserted central catheter (PICC) lines (Christenson, et al, 2018, Wood, 2020)
- › It is necessary for nurses to have knowledge of the signs and symptoms of DVT, and to be aware that DVT can be symptomatic or asymptomatic
- Signs and symptoms of DVT include
 - swelling of the affected limb. A larger calf diameter is the most useful finding
 - pain (e.g., leg pain often starts in the calf and feels like a cramp)
 - skin tenderness, redness, and/or warmth at the DVT site
 - Homan’s sign, pain in the calf during dorsiflexion of the foot, is not a reliable sign of DVT because other conditions can cause calf pain. (Hinkle and Cheever, 2018)
 - Homans’ sign is not a consistent indicator of DVT and some investigators believe that testing for Homans’ sign should not be performed because vigorous movement increases risk for thrombus dislodgement
- › Diagnostic strategies for DVT include
- a positive D-dimer test and baseline coagulation studies which include CBC, protime (PT), international normalized ratio (INR), activated partial thromboplastin time (aPTT) to assess for a hypercoagulable state. A chemistry to assess renal function is done since dosing of some anticoagulants is dependent on adequate renal clearance. (Farge, 2019)
 - imaging studies, which can include compression ultrasonography (US) with doppler or duplex US are the tests of choice (McKenzie, 2020)
- › Strategies for preventing or managing DVT include
- frequent repositioning, active or passive range of motion exercises, and early ambulation
 - Depending on the location of the DVT, the clinician might restrict ambulation and use of the affected extremity
 - the use of antiembolism stockings or an intermittent pneumatic compression device
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 - If antiembolism stockings are ordered, measurement for proper sizing and application should be performed prior to surgery (Wood, 2020)
 -
 - If the patient has a DVT, antiembolism stockings and intermittent pneumatic compression devices should not be used on the affected extremity to prevent migration of the clot, but should be continued on the unaffected extremity
 - **Anticoagulant therapy and Surgical Treatments for DVT**
 - Although systemic anticoagulation does not lyse current thromboses, it has been shown to resolve symptoms of DVT and reduce the risk for or prevent PE, recurrent DVT and CVI. Anticoagulant therapy should be initiated immediately upon suspicion of DVT, prior to return of diagnostic tests, if the suspicion is high or diagnostic test results will be delayed
 - Systemic administration of thrombolytic agents to actively lyse the thrombus is not recommended as it does not result in a significantly lower risk for CVI but is associated with a higher risk for bleeding and death
 - The American Society of Hematology recommends 3 months of anticoagulant therapy following postoperative DVT (Ortel, 2020)
- › First line therapies are unfractionated heparin (UFH) given IV infusion via an electronic infusion device to prevent administration errors. (Hinkle and Cheever, 2018) Or, low molecular weight heparins (LMWH) such as enoxaparin

(Lovenox) or dalteparin (Fragmin), can be used and given subcutaneously. Oral factor Xa inhibitors such as rivaroxaban (Xarelto), apixaban (Eliquis) or subcutaneous fondaparinux (Arixtra) may be used as well. (Ortel, 2020)

- Patients should be monitored for bleeding and heparin-induced thrombocytopenia (HIT), an uncommon but serious complication of heparin therapy; monitoring for HIT involves measuring the platelet count at the initiation of heparin therapy, and rechecking platelet count against baseline every 3–5 days
- When administering I.V. UFH, the goal is to maintain an activated partial thromboplastin time (aPTT) of 1.5 times control, according to the particular clinical lab control. The aPTT should be measured 6 hours after initiating therapy, and then every 6 hours following dosage adjustments until two readings in the therapeutic range have been achieved; thereafter the aPTT should be measured every 24 hours
- UFH is associated with a greater risk for bleeding complications than is LMWH. Extreme caution must be taken to prevent over-coagulation
- LMWH has a greater bioavailability and a longer half-life when compared to UFH; it can be administered SQ once- or twice-per-day and is appropriate for outpatient prevention and treatment of DVT in some cases. LMWH does not require laboratory monitoring.
- The American Society of Hematology recommends dabigatran, rivaroxaban, apixaban, or Edoxaban, collectively known as DOACs, or direct oral anticoagulants, over warfarin, a vitamin K antagonist. In addition, if long term therapy is indicated, the patient should continue the anticoagulant he was started on if it was tolerated. (Ortel, 2020)
- Oral anticoagulants (e.g., warfarin, dabigatran, rivaroxaban, apixaban, edoxaban) are appropriate for use as long-term anticoagulant therapy. Warfarin is the only oral anticoagulant that requires laboratory monitoring
- › If the clinician plans to start Warfarin, the patient will need to remain on UFH or LMW heparin until the PT/INR is within therapeutic range of 2-3. This generally takes about five days to occur but can vary considerably. (Ortel, 2020)
 - In patients receiving warfarin, the risk for DVT increases when the international normalized ratio (INR) drops below 2.0, and the risk for bleeding increases when the INR is over 3.0
 - Antiplatelet agents (e.g., aspirin [ASA]) can be administered for DVT prevention in patients who are not candidates for other anticoagulant therapy. ASA cannot be the sole therapy for DVT prevention, however, but must be administered in conjunction with compression device use. Therapy with ASA does not result in a lower risk for bleeding. Patients on ASA are at higher risk of gastrointestinal (GI) bleeding.
 - surgical or endoscopic management, including thrombectomy can be used to treat DVT especially when the thrombus is large and in a proximal (iliac or common femoral) vein. (Ortel, 2020)
- › Insertion of a filter in the inferior vena cava (IVC) can be ordered to prevent PE in those who cannot take anticoagulation but it is considered a last resort due to risk of infection and chronic thrombosis associated with the device. Most IVC filter insertions are temporary measures. (Christenson, et al, 2018)
 - **Complications of DVT**
 - Some patients will have already developed a PE at the time DVT is diagnosed. Signs and symptoms of PE include
 - sudden onset shortness of breath
 - pleuritic chest pain: discomfort or pain that worsens with a deep breath or coughing
 - tachycardia
 - lightheadedness, dizziness, and/or syncope
 - hemoptysis (i.e., coughing up blood)
 - anxiety
- › Patients can develop deep venous CVI following DVT, even if it is successfully treated. CVI occurs when the blockage to blood flow and inflammation associated with DVT causes damage to the valves of the deep veins of the leg. This form of CVI, also called postthrombotic syndrome, occurs in up to 50% of patients with DVT. (Phillippe, 2017)
 - Signs and symptoms of CVI include leg pain, swelling, heaviness, achiness, cramping, itching, tingling and chronic skin color changes
 - Chronic, nonhealing, debilitating venous leg ulcers (also called venous stasis ulcers) can also develop as a result of CVI (**Figure 5**)



Figure 5: Venous leg ulcers (also called venous stasis ulcers) can develop as a result of chronic venous insufficiency. This image is in the public domain

- Risk factors for DVT-associated CVI include
 - having a proximal DVT (i.e., DVT occurring above the knee)
 - Approximately 25% of patients with a proximal DVT develop CVI
 - having > 1 thrombus in the same leg > once
 - experiencing DVT symptoms > 30 days following the DVT
 - obesity
 - insufficient maintenance coagulation following DVT
- › **Preliminary steps that should be performed before providing post-procedure care include the following:**
 - Review facility/unit-specific protocols for strategies to prevent and manage postoperative DVT
 - Review the treating clinician’s orders for strategies to prevent and manage postoperative DVT, including
 - postoperative ambulation orders
 - use of antiembolism/compression stockings and compression devices
 - anticoagulant administration
 - monitoring of anticoagulant therapy
 - Review the manufacturer’s instructions for all equipment to be used and verify that all equipment is in good working order
 - Verify completion of facility informed consent documents, as appropriate
 - Review the patient’s medical history/medical record for
 - history of DVT
 - risk factors for DVT
 - comorbidities
 - contraindications for anticoagulant therapy
 - allergies (e.g., medications, latex, or other substances); use alternative materials, as appropriate
- › Gather the necessary supplies, which can include the following:
 - Personal protective equipment (PPE; e.g., sterile/nonsterile gloves); use additional PPE (e.g., gown, mask, eye protection) if exposure to body fluids is anticipated
 - Antiembolism/compression stockings and/or intermittent pneumatic compression device
 - Stethoscope and other equipment to assess vital signs
 - Analgesic agent, if ordered and indicated
 - Anticoagulant agent, as ordered, and necessary equipment to administer
 - Supplies for drawing laboratory specimens
 - Facility-approved pain measurement tool
 - Written information, if available, to reinforce verbal education

How to Perform Interventions to Manage Postoperative Deep Vein Thrombosis

- › Perform hand hygiene and don PPE, as appropriate
- › Identify the patient according to facility protocol
- › Establish privacy by closing the door to the patient’s room and/or drawing the curtain surrounding the patient’s bed

- › Introduce yourself to the patient and family member(s), if present; explain your clinical role in interventions and management of postoperative DVT; assess the coping ability of the patient and family and for knowledge deficits and anxiety regarding postoperative DVT
 - Determine if the patient/family requires special considerations regarding communication (e.g., due to illiteracy, language barriers, or deafness); make arrangements to meet these needs if they are present
 - Use professional certified medical interpreters, either in person or via phone, when language barriers exist (TJC, 2010)
 - Explain the procedure(s) for managing postoperative DVT and their purpose; answer any questions and provide emotional support as needed
- › Assess the patient's general health status, including vital signs and pain using a facility-approved pain assessment tool. Determine if the patient is a fall risk. (Wood, 2020)
 - Administer analgesics and promote comfort, as indicated
- › Assess the patient for signs and symptoms of DVT
 - ›
 - Remove antiembolism stockings or extremity wrapping if present for DVT prevention, or turn off the intermittent pneumatic compression device if present, and remove the patient's leg(s) from the device
 - Assess the patient's extremities—particularly the calf area of the leg—every 8 hours, or more frequently if ordered by the treating clinician, for edema, erythema, warmth, pain, and tenderness
 - Measure the circumference of each calf and thigh daily or according to facility protocol, and mark the site of measurement on the skin with a waterproof marker so the same area will be measured each time; a unilateral increase in the circumference of a calf or thigh can be an early sign of DVT
 - Measurement of the upper extremities can be ordered, especially in patients with a history of DVT, or following mastectomy in patients with lymphedema of the upper extremities
 - Assess distal peripheral pulses and check lower extremity sensation
 - › **Implement strategies to prevent DVT**
 - ›
 - Reposition the patient every 2 hours following surgery or more frequently as ordered and for comfort
 - Perform or ask the patient to perform frequent passive or active ROM exercises
 - Promote early ambulation following surgery, as tolerated and ordered
 - Apply antiembolism/compression stockings or an intermittent pneumatic compression device, as ordered
 - Apply graduated compression stockings according to the manufacturer's written instructions.
 - After application, verify that the stockings are not rolled up the foot or down the leg, stockings are smooth when fitted with no wrinkles, toe holes lie underneath the toes, heel patches are in the correct position, and thigh gussets are positioned on the patient's inner thighs. (Perry/Potter, 2020, Wood, 2020)
 - Verify that the compression stockings have not rolled up the foot or down the leg during transfer to and from the OR bed or during procedural positioning. (Wood, 2020)
 - Remove every 8 hours, or according to facility protocol, to assess skin and for DVT
 - Maintain adequate hydration to prevent hemoconcentration
 - Administer prescribed anticoagulants to prevent thrombus formation, as ordered; monitor for bleeding and review laboratory test results for coagulation studies
 - › Perform the following if a DVT is suspected:
 - Draw or assist with drawing a blood specimen to measure D-dimer, CBC, PT/INR, aPTT, chemistry as ordered
 - Assist with or send the patient for diagnostic imaging studies, as ordered
 - Implement strategies to manage DVT
 - - Restrict ambulation; request referral to physical therapy, if appropriate, for an individualized exercise routine
 - Elevate the affected extremity
 - Avoid massaging or rubbing the calf and thigh
 - Administer anticoagulants, as ordered
 - Monitor for bleeding
 - Draw or assist with drawing and review results of coagulation studies
 - Maintain adequate hydration to prevent hemoconcentration
 - Continue strategies to prevent DVT in the unaffected extremity

- Apply antiembolism/compression stockings and an intermittent pneumatic compression device, as ordered, to the unaffected extremity
- Perform or ask the patient to perform frequent passive or active ROM exercises; active ROM is optimal if the patient is allowed to or can walk, but can be contraindicated if the DVT is in the leg
- › Follow facility pre- and postsurgical protocols if the patient becomes a candidate for endoscopic or surgical thrombectomy
 - Reinforce pre- and postsurgical/procedure education and verify completion of facility informed consent documents
- › Provide emotional support, educate, and encourage discussion about DVT etiology, potential complications, prevention strategies, treatment risks and benefits, the challenges of recovering from a postoperative complication, and participation in rehabilitation, if ordered
- › Dispose of used materials in proper receptacles and perform hand hygiene
- › **Documentation**
- › Update the patient’s plan of care, as appropriate, and document all interventions in the patient’s medical record and medication administration record (MAR), including the following information:
 - Date and time care provided
 - Description of care provided (e.g., antiembolism stockings applied, patient assisted to ambulate)
 - Patient assessment findings, including
 - vital signs
 - level of pain
 - signs and symptoms of DVT
 - Fall risk assessment
 - Administration of anticoagulants, analgesics, or other prescribed medications
 - Patient response to interventions and management strategies
 - Any unexpected patient events or outcomes (e.g., a fall), interventions performed, and whether the treating clinician was notified
 - Patient/family education, including topics presented, response to education provided/discussed, plan for follow-up education, and details regarding any barriers to communication and/or techniques that promoted successful communication

Other Tests, Treatments, or Procedures That May be Necessary Before or After Performing Interventions to Manage Postoperative Deep Vein Thrombosis

- › Once DVT is suspected, the clinician will typically order the following tests:
- › D dimer – a degradation product of cross-linked fibrin, is elevated in most patients with acute DVT. However, it is nonspecific and may be elevated in other conditions.(Christenson, 2018)
 - CBC, as an elevated hematocrit (i.e., hemoconcentration) increases risk for thrombus formation
 - Coagulation profile, as a decreased prothrombin time (PT)/activated partial thromboplastin time (aPTT) or elevated platelet count can identify hypercoagulability
 - INR is monitored in patients receiving warfarin; the goal of therapy is to maintain an INR of 2–3
 - aPTT is monitored in patients receiving UFH. The goal is to maintain an aPTT of 1.5 times control
 - Chemistry – to assess renal function.
 - Compression ultrasonography with doppler or duplex ultrasound on the affected limb to assess for DVT or, in patients diagnosed with DVT, for the presence of additional DVT sites
 - Contrast venography to assess for blood flow and volume abnormalities that suggest venous occlusion, vascular damage, and/or vascular insufficiency; this test is invasive and is used less frequently since the development of enhanced ultrasound (e.g., compression ultrasonography)
 - Contrast venogram is associated with risk of inducing DVT and is used only in distinguishing old from new thrombus.
 - Chest X-ray to compare to CT angiography of the chest, performed to evaluate for PE, which is the preferred diagnostic study for PE, for better visualization of blood flow obstruction
- › If PE is suspected, diagnostic testing can include the following:
- › CT angiography of the chest
 - V/Q radionuclide lung scan, which can indicate ventilation/perfusion mismatch is not used as much
 - EKG, which can show ST-segment and T-wave changes, and left or right axis deviation, although these changes are not specific for PE
 - Echocardiography, which can assess for a coexisting cardiac condition in patients who demonstrate hemodynamic instability

What to Expect After Performing Interventions to Manage Postoperative Deep Vein Thrombosis

- › The patient will not develop DVT; alternately, if the patient develops DVT, the DVT will resolve and the patient will not develop PE or treatment-related bleeding
- › Hemodynamic stabilization will be achieved, with improved tissue perfusion in affected limb(s), normal vital signs, and bilateral clear breath sounds
- › Pain and discomfort will be relieved
- › Patient reaches maximum mobility
- › Lower extremities are free of excoriations, wounds or ulcerations that may occur from compression devices or stockings

Red Flags

The risk of venous thromboembolism (VTE), which includes deep vein thrombosis (DVT) and pulmonary embolism (PE), begins with preoperative immobility and administration of anesthesia and continues throughout the postoperative phase of care until the patient regains mobility. (Wood, 2020)

Do not rely on Homan's sign as an indicator of DVT

- › Monitor closely for signs and symptoms of PE (e.g., tachycardia, pleuritic chest pain, weak rapid pulse, hypotension, restlessness, transient pleural friction rub, crackles, S3 and S4 gallop with increased intensity of the pulmonic component of S2, and, with a large PE, cyanosis, syncope, and distended neck veins). PE can be **fatal**
- › Contraindications to anticoagulant use include
 - active bleeding, particularly intracranial bleeding (absolute contraindication)
 - hemorrhagic blood dyscrasias (e.g., thrombocytopenia)
 - aneurysm
 - impending surgery
 - recent cerebrovascular accident (CVA)
 - recent major surgery
 - recent brain, eye, or spinal cord surgery (absolute contraindication)
 - pregnancy (absolute contraindication)
 - recent childbirth
 - recent brain, eye, or spinal cord surgery (absolute contraindication)
 - malignant hypertension (absolute contraindication)
 - hazardous occupations with high risk for injury
 - alcoholism
 - Patients who have had falls resulting in injuries that caused excessive bleeding secondary to anticoagulation

What Do I Need to Tell the Patient/Patient's Family?

- › It is recommended that patient teaching about DVT prevention be carried out in clinician office or outpatient clinic settings well in advance of the day of surgery
 - Some facilities or clinicians have written materials (e.g., educational booklets) on preventing DVT or instructional videos that can be watched in the home or in the outpatient setting
 - When possible, family members should be included in educational sessions so they can help encourage the patient to follow prevention strategies, and clinician orders after surgery
 - If preoperative teaching is not performed until the night before surgery or the morning of the surgery, patient anxiety can interfere with learning, and teaching at those times is typically ineffective
- › Educate about the signs and symptoms of recurrent DVT, prevention strategies, and the risks and benefits of the prescribed treatment regimen, including potential adverse effects of anticoagulation therapy (e.g., bruising and the presence of blood in urine and stool)
- › Educate about the signs and symptoms of PE, and the importance of seeking immediate medical attention if they occur
- › Educate about bleeding prevention strategies during anticoagulation therapy (e.g., using a soft toothbrush and using only electric razors for shaving); instruct patient to seek immediate medical attention in the case of severe bleeding
- › Emphasize the importance of ongoing medical surveillance, including adherence to the follow-up schedule for clinician evaluation of coagulation time and potential adjustment to the medication regimen

- › Educate to reduce modifiable risk factors associated with DVT, including oral contraceptive use, hormone replacement therapy, nicotine products, sedentary lifestyle, avoiding extended periods of immobility (i.e., 6 hours or greater) for one month, and obesity
- › Advise the patient to avoid prolonged sitting or standing in one position or to wear anything that is restrictive and could impair circulation (e.g., tight straps or clothing). Instruct the patient to flex the knees and rotate the ankles on automobile or airplane trips that are longer than 4 hours
- › Educate about the importance of strict adherence (e.g., taking the medication at the same time daily) to the prescribed anticoagulation regimen, testing clotting time regularly, avoiding activities that can cause bleeding or bruising, and wearing a medical alert bracelet
- › Emphasize the importance of regular movement and exercise, even in patients with post thrombotic syndrome, because movement and exercise improve flexibility without increasing post thrombotic syndrome manifestations
- › Provide written postoperative instructions, if available, to reinforce verbal education
- › If laboratory testing or other diagnostic procedures are ordered, explain how these tests and/or procedures are performed and when the results will likely become available
- › Review fall prevention measures and provide a list of actions that helps the patient/family/caregiver make the home environment safe. (Wood, 2020)
- › Review important points about compression stockings: review the importance of wearing them, identify a family member or caregiver who can assist with application, review with patient/family/caregiver the correct way to remove and replace them and conditions to monitor that indicate the stockings should remain off (such as skin lesions) (NICE, 2019, Wood, 2020)
- › Review drugs, vitamins, herbals, minerals and other supplements that may interfere with anticoagulant effects. Provide a list. (Hagler, 2020)

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