

Chronic Complications of Venous Thromboembolism (VTE)

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CARILION CLINIC

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Disclosure

- The speaker has no conflicts of interest to disclose.



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- System-wide, serves nearly
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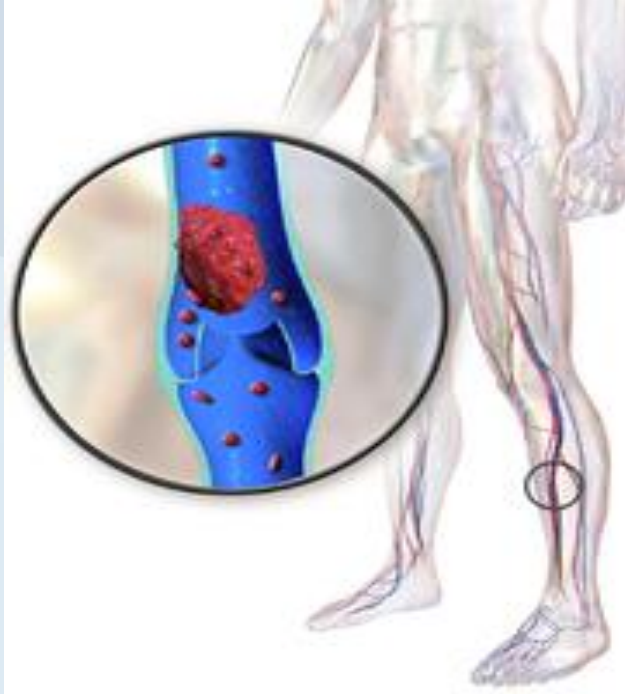
Objectives

At the conclusion of this education activity, the learner will be able to:

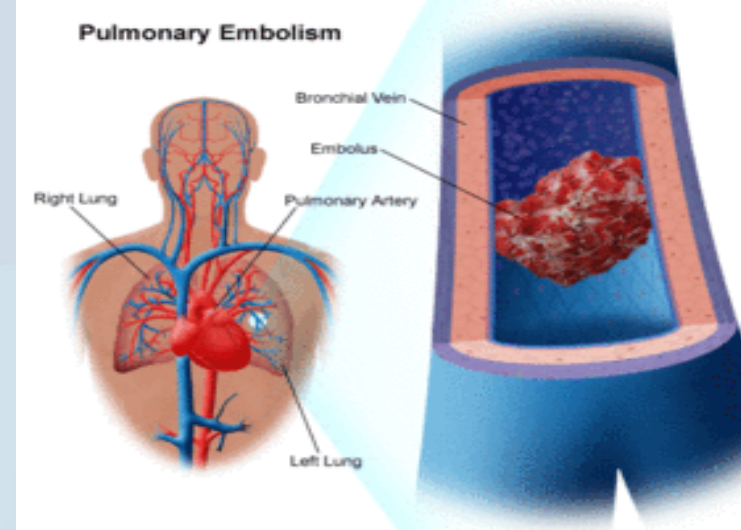
- recall VTE risk factors and prevention
- describe post-thrombotic syndrome and chronic thromboembolic pulmonary hypertension (CTEPH)
- identify nursing implications of caring for patients with post-thrombotic syndrome and CTEPH



What is VTE?



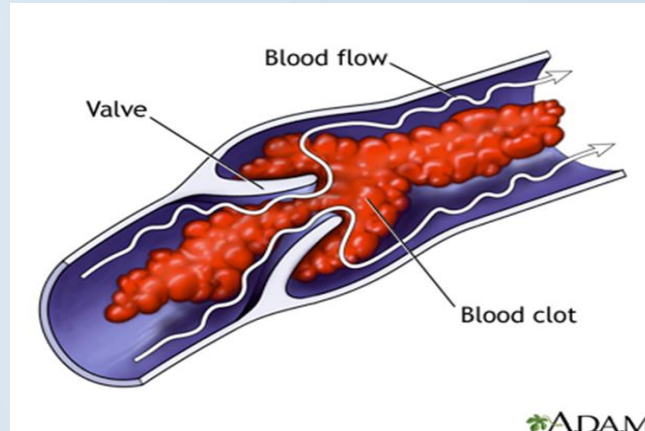
Deep Vein
Thrombosis (DVT)



Pulmonary Embolus
(PE)

Signs/Symptoms of DVT

- Swelling
- Erythema
- Pain
- Warmth¹



ADAM.



Signs/Symptoms of PE¹

- Sudden onset of dyspnea
- Tachycardia
- Irregular heartbeat
- Chest pain, worse with deep breath
- Hemoptysis
- Low blood pressure, light-headedness or syncope



QUICK FACTS

- 350,000 – 900,000 people per year are affected by VTE^{1, 2}
- VTE is the leading cause of preventable hospital death in the US²
- VTE can occur without symptoms (silent)³

Quick Facts

- Patients with DVT who are untreated have a 37% incidence of PE that is fatal⁴
- Combined mortality from PE (initial and recurrence) is 73%⁴



Quick Facts

- 1 in 20 hospitalized patients will suffer a fatal PE if they have not received adequate VTE prophylaxis⁵
- For 25% of patients with PE, the first symptom is **sudden death**⁶



Financial Impact



- Cost of healthcare-associated VTE ranges from \$7,700 - \$16,600 in additional costs per VTE, exceeding **\$5 billion** per year^{1,7}

VTE Risk Factors

Venous Stasis	Vessel Injury	Hypercoagulability
Increasing age	Surgery	Cancer & cancer therapy
Immobility	Prior VTE	Oral contraceptives, HRT
Stroke/paralysis	Central venous catheters	Inflammatory bowel
Acute medical illness	Trauma	Sepsis
Spinal cord injury	Fractures	Pregnancy & postpartum
Obesity	Vasculitis	Thrombophilia
Severe COPD	Chemotherapy	Nephrotic syndrome
Anesthesia	Vascular injuries	Polycythemia vera
Varicose veins	Burns	Sickle cell disease
CHF	Smoking	Dehydration

8, 9,10,11



VTE Prevention

- A clot can start forming in just hours, so early prophylaxis is important
- Ambulation alone does not provide adequate prophylaxis for hospitalized patients⁹

**PREVENTION
WORKS!**

Low VTE Risk

- No pharmacologic or mechanical prophylaxis required¹²



Low risk

Moderate VTE Risk

- Moderate risk prophylaxis options
 - Pharmacologic if no contraindications
 - Mechanical if contraindications to pharmacologic¹²



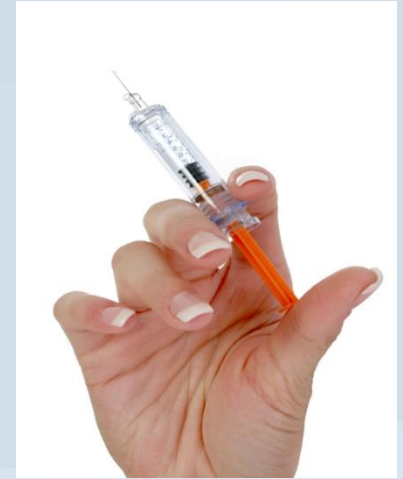
High VTE Risk

- High risk prophylaxis options
 - Both pharmacologic and mechanical prophylaxis¹²



Pharmacologic Prophylaxis

- Low molecular weight heparin¹²
 - Enoxaparin (Lovenox)
- Low-dose unfractionated heparin¹²
- Factor Xa Inhibitor¹²
 - Fondaparinux (Arixtra)¹²



Pharmacologic Prophylaxis For Orthopedic Surgery

- Low molecular weight heparin¹³
- Factor Xa Inhibitor¹³
- Low dose unfractionated heparin¹³
- Direct Thrombin Inhibitor¹³
 - Dabigatran (Pradaxa)¹³



Pharmacologic Prophylaxis For Orthopedic Surgery

- Oral Factor Xa Inhibitor¹⁴
 - Apixaban (Eliquis)
 - Rivaroxaban (Xarelto)
- Aspirin¹⁴
- Dose adjusted warfarin (Coumadin)¹⁴



Potential Contraindications to Pharmacologic Prophylaxis¹²

Active bleeding (within the last 3 months)	Intracranial bleeding within last year or until cleared by neurological services
Active gastroduodenal ulcer	Intraocular surgery within 2 weeks
Platelet count <50,000, or <100,000 and downtrending	Untreated inherited bleeding disorders
Therapeutic levels of anticoagulation	Hypertensive urgency/emergency
Advanced liver disease with INR >1.5	Postoperative bleeding concerns
Heparin induced thrombocytopenia (no heparinoids; consider consultation)	Epidural/spinal anesthesia within previous 4 hours or expected within next 12 hours



Mechanical Prophylaxis

- Sequential compression devices
- Foot pumps
- Graduated compression stockings



Contraindications to Mechanical Prophylaxis

- Any local leg condition in which the sleeves may interfere
- Severe arteriosclerosis or other ischemic vascular disease¹⁵
- Massive edema of the legs or pulmonary edema from congestive heart failure



Contraindications to Mechanical Prophylaxis.....

- Suspected pre-existing deep venous thrombosis, thrombophlebitis
- Conditions where an increase of fluid to the heart may be detrimental¹⁶



Treatment of VTE



- Unfractionated Heparin¹⁷
- Low-molecular-weight heparin¹⁷
 - Enoxaparin (Lovenox), Dalteparin (Fragmin)
- Warfarin (Coumadin)¹⁸
- Direct factor Xa inhibitors
 - Rivaroxaban (Xarelto)¹⁹
 - Apixaban (Eliquis)²⁰

Complications of VTE

- Post-thrombotic syndrome
- Chronic Thromboembolic Pulmonary Hypertension



Post-thrombotic Syndrome

- Occurs in 20 – 50% of patients with DVT²¹
- 5 – 10% of patients progress to severe post-thrombotic syndrome¹⁸
- May cause significant impact on quality of life

Post-thrombotic Syndrome

- Average annual cost of treatment is \$7000¹⁸
- Symptoms may be so severe that the patient is disabled³



Post-thrombotic Syndrome

- Signs and symptoms may include:²²
 - pain, aching, cramps
 - heaviness, fullness
 - paresthesia
 - induration
 - hyperpigmentation
 - edema
 - venous stasis ulcers



Assessment of Ulcers

- Accurate wound measurement
- Identify sinus tracts or undermining
- Assess the wound bed for granulation, slough or necrosis
- Assess the surrounding skin²³

Risk Factors for Post-Thrombotic Syndrome

- Recurrent DVT
- Proximal DVT
- Increased BMI
- Older age²¹



Treatment of Post-thrombotic Syndrome²²

- Elevation
- Compression
 - Stockings or elastic bandages²¹
- Wound care
 - Unna boot
 - Hydrocolloid dressing
 - Foam dressing
- Treatment of secondary infection, if present



Nursing Implications

- Prevent DVT
 - Provide prophylaxis as ordered
 - Provide adequate anticoagulation after DVT²⁴
- Patients with DVT
 - Compression stockings for discharge
 - Encourage mobility
 - Anticoagulants available at discharge²⁵



Nursing Implications

- Patient education
 - Follow-up for adequate DVT treatment
 - Use of compression stockings
 - Skin inspection for signs of chronic venous insufficiency¹⁸

Case Study

- 54 y.o male
- Morbid obesity (BMI 35), hypertension, diabetes, peripheral vascular disease
- Limited mobility due to arthritis
- R leg DVT 6 months previously



Case Study

- R Leg ulcers
- Leg pain
- R leg edema



Case Study Treatment

- Compression stockings
- Foam dressing to ulcers
- Doxycycline 100 mg daily X 10 days for cellulitis



Case Study



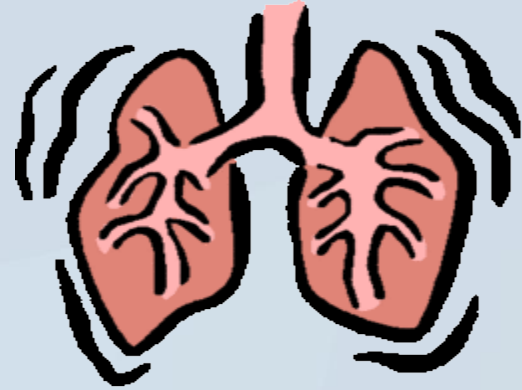
Pulmonary Hypertension

- Persistently increased pulmonary artery pressure²⁴
- Progressive and fatal without treatment²³
- Mean pulmonary arterial pressure of 25 mmHg or greater²⁷



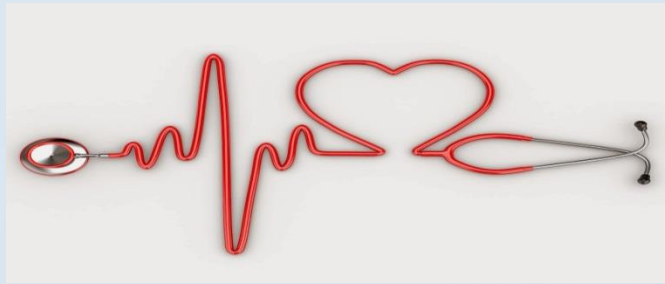
Signs & Symptoms

- Dyspnea on exertion
- Exercise intolerance
- Fatigue
- Syncope
- Signs of R heart failure ²⁸



Diagnosis

- Echocardiography
 - Pulmonary artery pressure $\geq 35 - 40$
- R heart catheterization
 - Required for classification and treatment options²⁸



Clinical Classification

- Group 1: Pulmonary arterial hypertension
- Group 2: Pulmonary hypertension due to L heart disease
- Group 3: Pulmonary hypertension due to lung diseases and/or hypoxia
- Group 4: Chronic thromboembolic pulmonary hypertension
- Group 5: Multifactorial pulmonary hypertension^{26, 27}

Severity Classification

- I No limitation of physical activity
- II No symptoms at rest
- III No or slight symptoms at rest
- IV Dyspnea and fatigue present at rest²⁸

Treatment Goals

- Improve symptoms
- Increase walk distance
- Lower pulmonary artery pressure
- Normalize cardiac output²⁶



Medications

- Calcium channel blockers²⁷
 - amlodipine, diltiazem, nifedipine, verapamil
- Endothelin receptor antagonists²⁷
 - bosentan, ambrisentan



Medications

- Phosphodiesterase-5 (PDE-5) inhibitors²⁷
 - sildenafil, tadalafil
- Prostacyclin analogues²⁷
 - epoprostenol, treprostinil, iloprost



Chronic Thromboembolic Pulmonary Hypertension (CTEPH).....

- 3.8% incidence after acute PE²⁸
- Can be cured by endarterectomy²⁶
- Inoperable patients can be treated with anticoagulation and targeted therapy for CTEPH²⁸



Treatment of CTEPH

Goals:

- Improve dyspnea
- Lower pulmonary artery pressure
- Normalize cardiac output²⁶



Riociguat

- Riociguat (Adempas®) is the only drug approved specifically for CTEPH²⁶
- Acts by stimulating an enzyme in the nitrous oxide stimulating pathway to promote vasodilation in the pulmonary arteries²⁹

Riociguat Warning



- Black Box Warning for Embryo-Fetal Toxicity
Do not give to pregnant women
- Pregnancy must be excluded before treatment begins and monthly during treatment
- All women of reproductive age must use 1 highly effective or a combination of contraceptives²⁷

Riociguat Dosage

- Start at 1 mg three times daily
- For patients who may not tolerate hypotensive effect, may start at 0.5 mg three times daily
- Increase dosage by 0.5 mg every 2 – 4 weeks to a maximum dose of 2.5 mg three times daily³⁰



Riociquat Serious Side Effects

- Birth defects
- Reduced blood pressure
 - Lightheadedness
 - Dizziness
 - Chest pain
- Increased risk of bleeding
- Worsening of symptoms in people with pulmonary veno-occlusive disease³⁰



Riociguat Common Side Effects

- Headache
- Dizziness
- Indigestion
- Peripheral edema
- Nausea, diarrhea, vomiting³⁰



Riociguat Precautions

- Monitor patient for hypotension
- Do not give to pregnant women
- Do not give to patients taking nitrates³⁰
- Avoid touching the tablets



Cost

- **\$9600** per month
- **\$115,200** per year³¹
- Must be obtained from a specialty pharmacy
- Grants are available to help cover the costs



Case Study

- 92 y.o. female
- History of osteoarthritis, peripheral arterial disease, hypertension, PE 2 years previously
- Increasing shortness of breath on exertion, activity intolerance



Case Study

- Pulmonary artery pressure 70 on echo
- Chest CT showed chronic PE
- Pulmonary artery pressure 55 on R heart cath



Case Study Treatment

- Continuous oxygen 3L/min
- Riociguat 0.5 mg three times daily, increased by 0.5 mg every three weeks to a maximum dose of 2.5 mg three times daily
- Bumetanide 20 mg daily
- Compression stockings



Conclusion

Post-thrombotic syndrome and CTEPH:

- require life-long treatment
- create significant impact on the quality of life
- may lead to disability
- cause financial strain due to the cost of treatment

Conclusion

Medical-surgical nurses are the first line of defense in preventing VTE and the associated complications, as well as in treating these complications.



Questions?



Contact

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