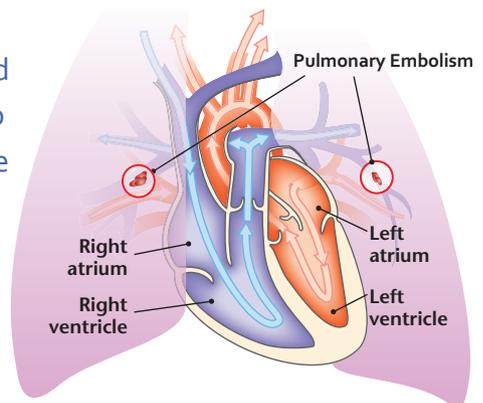


Pulmonary Embolism

Part 1

Blood flows through the lungs from the right side of the heart to pick up oxygen and get rid of carbon dioxide (called gas exchange). The blood then flows from the lungs back to the left side of the heart to be pumped out to the rest of the body. A pulmonary embolism (PE) is a blood clot that gets into blood vessels in the lungs and prevents normal flow of blood in that area. This blockage causes problems with gas exchange. Depending on how big a clot and number of vessels involved, it can be a life-threatening event.



Most blood clots that end up in the lungs first form in the legs as deep vein thrombosis (DVT). This fact sheet will discuss the diagnosis of pulmonary embolism. Part 2 will discuss treatment and prevention of pulmonary embolism.

What is an acute pulmonary embolism?

Embolism (Em-bo-liz-m) refers to a blood clot (embolus) that has broken off and is floating freely in the blood vessel. It can travel to another area of the body and cause a blockage of a blood vessel. Sometimes there are multiple clots (called emboli). Blood clots that do not travel and stay in the vein are called DVTs. Most blood clots that become pulmonary emboli form in veins in the leg. All veins in the body drain blood into larger veins that carry blood to the right side of the heart and on into the pulmonary arteries. This embolus travels from veins into right side of the heart. From the right side of the heart it enters the main pulmonary artery and can get stuck there or move further into one of the lungs. If there are several clots, they can go into different areas of one or both lungs.

When a blood clot is in a pulmonary artery, it blocks the flow of blood to the lung that needs to pick up oxygen. If not enough blood gets oxygen and moves to the left side of the heart, the oxygen level in the body drops dangerously low which can cause stress and damage to all the organs in body including the brain, kidneys, and heart. How severe this is depends on how much blood flow is cut off to the lungs.

In addition, because of blockage, pressure increases back on the right side of the heart. The right heart can get stretched and work harder. This can also affect the left side of the heart which get squeezed because of ballooned up (distended) right heart. If the left side of the heart is not able to pump enough blood, a person's blood pressure also drops.

All of these effects can lead to death, either suddenly, or if left untreated, in a short period after the pulmonary embolism occurs.

What is a deep vein thrombosis (DVT) and how it is related to PE?

A DVT is a clot that forms and builds up in the large veins of legs or sometimes the arms.

Signs and symptoms of a DVT in the affected leg (or arm) include,

- swelling
- pain
- redness
- warmth

Venous blood flow studies (doppler) can be done to look for a blood clot. Treating a DVT promptly can help relieve symptoms and prevent a pulmonary embolism.

What are risk factors for DVT or PE clots?

There are people who are at higher risk of a blood clot because of:

- An inherited condition such as a blood clotting disorder. In some cases, a family history of blood clots will be a clue to get checked for a genetic problem

such as Factor V Leiden

- Abnormal blood vessels such as varicose veins
- Certain diseases such as cancer or heart disease
- Pregnancy or in the 6 weeks following delivery
- Smoking
- Obesity
- Long car or airplane rides without stops to get up and move around (>4-6 hours at a time)
- Prolonged bed rest after major surgery or trauma
- Oral contraceptive pills/hormonal medications
- Older age (age 70 years and older)
- People with prior history of blood clot
- Failure to take blood thinners prescribed

The more risk factors a person has, the greater the chance of having a blood clot. It is important to recognize people who are at increased risk of a DVT as there can be ways to prevent them.

What are the symptoms of pulmonary embolism?

- Shortness of breath (usually sudden in onset)
- Light-headedness
- Chest pain
- Rapid heart beat
- Loss of consciousness
- Coughing up blood

How severe is Pulmonary Embolism?

Pulmonary embolism can be grouped based on the location of clot or how sick a person is.

Based on location of the clot into pulmonary artery following terms are used A) saddle PE (large clot into main pulmonary artery), B) lobar PE (into big branch of pulmonary artery), or C) distal PE (into small branches of pulmonary artery). Location of clot is progressively into smaller branches moving from category 'A' to 'C'.

Types based on how sick the person is can be divided into low, moderate or high risk pulmonary embolism. This is the risk of death or serious complications. Severity also is rated in part based on how symptomatic the person is, how well the lungs are working, and how low a person's blood pressure is.

To define risk and severity, the healthcare provider needs to order various blood tests and imaging (x-rays or scans or ultrasound of the heart). Treatment choices are also based in part on the risk or severity.

What are the tests to look for blood clots?

CT scan (an advanced version of x-ray) of pulmonary arteries is the most commonly used test to look for the pulmonary embolism. In this test, dye is injected into the veins of a hand or arm, and a CT computerized scan of the chest is done to look for clot in the lungs. Ultrasound

of the leg can also be done to look for the blood clots in the legs. An echocardiogram (type of ultrasound) of the heart is often done to evaluate the severity of pulmonary embolism on heart function and pressures. Blood tests can be done to look for blood clotting abnormalities, strain on the heart, or damage to other organs.

How is pulmonary embolism treated?

Typically, a person having an acute pulmonary embolism will be hospitalized and may have to go to the intensive care unit (ICU) for initial support and treatment. There are medications that can be used to help break up the blood clot (thrombolytics). Medicines that help prevent the clot from getting bigger or new ones from forming are also given (blood thinners called anti-coagulants such as warfarin or heparin). See the ATS Patient Information Series fact sheet on Treatment of Pulmonary Embolism for more detail at www.thoracic.org/patients.

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Rx Action Steps

- ✓ If you have any symptoms of a possible blood clot in your leg or arm or lungs, seek medical help right away.
- ✓ If your healthcare provider tells you that you are at increased risk of a blood clot, follow advice to try to manage your risk and avoid blood clots.
- ✓ If you are prescribed anti-coagulant medication, take doses as prescribed and get follow-up blood tests as directed by your healthcare provider.

Healthcare Provider's Contact Number:

Resources

American Thoracic Society

- www.thoracic.org/patients

National Heart, Lung and Blood Institute

- <https://www.nhlbi.nih.gov/health/health-topics/topics/pe>

Centers for Disease Control and Prevention (CDC)

- <https://www.cdc.gov/ncbddd/dvt/index.html>

Clot Connect

- <http://www.clotconnect.org/healthcare-professionals/patient-handouts>

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