



WORLD THROMBOSIS DAY
13 OCTOBER

What is pediatric thrombosis?

Pediatric thrombosis involves the formation of blood clots in the veins or arteries of a child or adolescent. Although thrombosis is less common in children compared to adults, it can be serious and requires timely diagnosis and treatment.

The most common age groups for pediatric thrombosis are infants and teens, respectively. This reflects the pattern of associated underlying diseases and interventions. The most common risk factor for a child to get a blood clot is hospitalization, and as such, the presence of a central venous catheter. This can account for up to 90% of all pediatric thrombosis cases, excluding other conditions such as cancer, cardiac, renal, liver disease and inflammatory bowel disease.

With advancements in diagnosis and treatment, survival rates have significantly improved. Nonetheless, complications such as post-thrombotic syndrome can occur. It is important to speak with a healthcare professional about a child's risk factors for developing a blood clot, regardless of if the child is hospitalized.



SIGNS AND SYMPTOMS

Recognizing thrombosis in children is important, however it can be challenging because symptoms can vary based on the clot's location. Some thrombosis symptoms may resemble those of other more common medical problems.

Because some of these symptoms can also point to other conditions, it is important to have a child evaluated by a healthcare professional for an accurate diagnosis and prompt treatment. If a child or his or her parent has a family history of thrombosis, it is important to bring this up during evaluation for these symptoms.



Signs and systems of a blood clot in children



Deep vein thrombosis (DVT)

- Swelling, usually in one limb
- Pain or tenderness in the affected limb
- Redness or warmth in the area
- Discomfort, numbness and/or paralysis

Several factors can increase a child's risk of developing a blood clot:

- **Catheter use:** Central venous catheters (CVCs) are commonly used in pediatric patients for treatments such as chemotherapy or long-term medication administration. The presence of a catheter can damage blood vessels and increase the risk of clot formation.
- **Genetic factors:** Inherited conditions such as Factor V Leiden or deficiencies in Protein C, Protein S or Antithrombin (ATIII) can predispose children to thrombosis, which is why family history is important.
- **Medical conditions:** Chronic illnesses, including cancer, autoimmune disorders or congenital heart defects can elevate risk.
- **Trauma or surgery:** Recent surgical procedures or injuries can contribute to thrombosis.
- **Immobility:** Prolonged periods of immobility, whether due to illness or injury, can also increase the likelihood of clot formation.



Pulmonary embolism (PE)

- Sudden onset of shortness of breath
- Chest pain or discomfort
- Rapid heartbeat
- Coughing, potentially with blood
- Lightheadedness and/or passing out
- Swelling of the head or neck
- Headache or changes in vision

Remember to ask your doctor if your child is at risk of a blood clot. If a blood clot is suspected, imaging is done to confirm the diagnosis and to define the location of the clot. Sometimes the health provider needs to offer treatment called thromboprophylaxis.



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Diagnosis and treatment



Diagnostic tests

- Physical exam to identify physical signs and symptoms
- Ultrasound imaging, computed tomography (CT) scan and/or magnetic resonance imaging (MRI)
- Analysis of blood samples to evaluate whether the child's blood is clotting normally and identify any abnormalities in the levels of certain proteins
- Genetic testing to identify any hereditary disorders

Healthcare providers may perform other necessary diagnostic tests to determine the best possible treatment options.

Treatments and other considerations

Effective management of pediatric thrombosis involves several key approaches:

- Anticoagulant therapy: Medications such as unfractionated heparin (UFH), low molecular weight heparin (LMWH) and warfarin are commonly used. Treatment plans are tailored to the child's specific needs and condition.
- Direct oral anticoagulants (DOACs) in children for treatment of VTE has been increasing. There are limitations in information, depending upon the available formulation and other patient-specific factors besides evaluated renal and liver function. It is strongly recommend seeking an evaluation with an expert before starting.
- Surgical intervention: In some situations, surgery may be required to remove the clot or place a filter to prevent further complications.
- Long-term monitoring: Ongoing follow-up is essential to manage potential complications and monitor for clot recurrence.
- Supportive care: Some treatment plans may include pain management and physical therapy to support recovery and maintain mobility.

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Diagnosis and treatment



Resources for the public

- **International Society on Thrombosis and Haemostasis (ISTH):** www.isth.org
- **International Alliance for Pediatric Stroke:** <https://iapediatricstroke.org/>
- **International Pediatric Thrombosis Network:** <https://pediatricthrombosis.com/>
- **American Heart Association (AHA) - Pediatric Stroke Initiative:** www.heart.org
- **The American Society of Hematology:** www.ash.org
- **Thrombosis Canada:** <https://thrombosiscanada.ca/>
- **Thrombosis & Hemostasis Societies of North America (THSNA):** www.thsna.org
- **Sociedad Mexicana de Trombosis y Hemostasia (SOMETH):** www.someth.org

Research on pediatric thrombosis

- Venous Thromboembolism in Children (Journal of Thrombosis and Haemostasis [JTH])
- The incidence and risk factors for venous thromboembolism in adolescent and young adult oncology patients (Pediatric Blood and Cancer)
- The Impact of Central Venous Catheters on Pediatric Venous Thromboembolism (Frontiers in Pediatrics)
- Long-term outcomes of venous thrombosis in children (Current Opinion in Hematology)
- The Genetic Basis of Strokes in Pediatric Populations and Insight into New Therapeutic Options (International Journal of Molecular Sciences)
- Management of thrombosis in children and neonates: practical use of anticoagulants in children | Hematology, ASH Education Program | American Society of Hematology (ashpublications.org)
- Treatment of venous thromboembolism in pediatric patients | Blood | American Society of Hematology (ashpublications.org)
- CHEST Guidelines: CHEST Guidelines and Consensus Statements (chestnet.org)
- Bhat RV, Young G, Sharathkumar AA. How I treat pediatric venous thromboembolism in the DOAC era. Blood. 2024 Feb 1;143(5):389-403. doi: 10.1182/blood.2022018966. PMID: 37390311; PMCID: PMC10862368.

Move Against Thrombosis with Education, Awareness and Engagement

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