

## Anticoagulants

Anticoagulants are prescribed in high-risk populations to **prevent** blood clot formation to reduce the risk of thromboembolic events such as ischemic stroke, deep vein thrombosis (DVT), and pulmonary embolism.

### How Do Anticoagulants Work?

“**Anticoagulant**” is a general umbrella term used to classify medications that work to thin the blood. These agents can be further categorized based upon how they work within the body.

	Vitamin K Antagonists	Heparins	Direct Factor Xa Inhibitors*	Direct Thrombin Inhibitors
Mechanism	Inhibits synthesis of vitamin K-dependent clotting factors (II, VII, IX, X)	Binding to antithrombin results in subsequent inhibition of clotting factor Xa and thrombin	Direct inhibition of the clotting factor Xa	Direct inhibition of the clotting factor thrombin
Examples	<b>Warfarin</b> (Jantoven®)	<b>Unfractionated Heparin</b> <b>Enoxaparin</b> (Lovenox®) <b>Dalteparin</b> (Fragmin®)	<b>Apixaban</b> (Eliquis®) <b>Rivaroxaban</b> (Xarelto®) <b>Edoxaban</b> (Savaysa®)	<b>Argatroban</b> <b>Bivalrudin</b> (Angiomax®) <b>Dabigatran</b> (Pradaxa®)

\*Direct Factor Xa Inhibitors are also referred to as Direct Oral Anticoagulants (**DOACs**)

### Who Needs Anticoagulation?

Specific risk factors such as smoking, obesity, and prolonged immobility can all increase an individual’s risk of developing a blood clot. Anticoagulation is also used to mitigate blood clot risk in certain conditions including:

- **Arrhythmias** (e.g., atrial fibrillation): abnormal rhythms can cause blood to pool and clot within the heart’s chambers
- **Deep Vein Thrombosis**: clot formation within the deep vasculature of the extremities
- **Pulmonary Embolism**: clot formation within the pulmonary veins and arteries
- **Mechanical Heart Valves**: platelets can adhere to the foreign valve material increasing the risk of clot development
- **Post Surgical Prophylaxis**: reduced mobility while the body heals increases the risk of clot formation

### Do Anticoagulants Require Monitoring?

Since anticoagulants are associated with an increased risk of bleeding, CMS considers them a **high-risk medication class**. Facilities that fail to implement protocols for routine monitoring and evaluation may face penalties under multiple Ftags including **F710 (Physician Services)**, **F755 (Pharmacy Services)**, and **F757 (Unnecessary Drugs)**. Consider the following monitoring parameters when reviewing your facility's anticoagulant policies and procedures.

Monitoring Parameter	Notes
<b>International Normalized Ratio (INR)</b>	<ul style="list-style-type: none"> <li>Used to monitor <b>warfarin</b> therapy</li> <li>Typically measured once every 3 days to once weekly during initial dosing titrations                             <ul style="list-style-type: none"> <li>May be extended to once monthly once on an established dosing regimen</li> <li>Increase frequency of testing during acute illness, dose changes, or introducing interacting medications</li> </ul> </li> <li><b>Normal reference range:</b> 0.8 - 1.1                             <ul style="list-style-type: none"> <li>Goal (most indications): 2.0 - 3.0</li> <li>Goal (mechanical valves): 2.5 - 3.5</li> </ul> </li> </ul>
<b>Activated Partial Thromboplastin Time (aPTT)</b>	<ul style="list-style-type: none"> <li>Used to assess <b>heparin</b> therapy</li> <li>Titrated per facility's protocol</li> <li><b>Normal reference range:</b> 25 – 35 seconds</li> </ul>
<b>Anti-Xa Activity</b>	<ul style="list-style-type: none"> <li>Measures the concentration of clotting factor Xa within the blood</li> <li>Can be used to assess efficacy of <b>heparin (UFH)</b> and <b>low molecular weight heparins (LMWH)</b></li> <li><b>Therapeutic reference ranges</b> <ul style="list-style-type: none"> <li>UFH: 0.3-0.7 IU/mL</li> <li>LMWH: 0.5-1.2 IU/mL</li> </ul> </li> <li><b>Prophylactic reference ranges</b> <ul style="list-style-type: none"> <li>UFH: 0.1-0.4 IU/mL</li> <li>LMWH: 0.2-0.5 IU/mL</li> </ul> </li> </ul>
<b>Complete Blood Count</b>	<ul style="list-style-type: none"> <li>CBC should be collected at baseline and periodically throughout anticoagulant treatment to assess for signs of bleeding</li> <li><b>Normal reference ranges</b> <ul style="list-style-type: none"> <li>Platelets (Plt): 150,000-400,000/mm<sup>3</sup></li> <li>Hematocrit (Hct):                             <ul style="list-style-type: none"> <li>Males: 0.41-0.53</li> <li>Females: 0.36-0.46</li> </ul> </li> <li>Hemoglobin (Hb):                             <ul style="list-style-type: none"> <li>Males: 13.5-17.5 g/dL</li> <li>Females: 12.0-16.0 g/dL</li> </ul> </li> </ul> </li> </ul>
<b>Serum Creatinine (SCr)</b>	<ul style="list-style-type: none"> <li>Used to determine renal clearance and guide dose adjustments</li> <li><b>All DOACS are renally dose adjusted</b></li> <li><b>Normal reference ranges</b> <ul style="list-style-type: none"> <li>Males: 0.7 – 1.3 mg/dL</li> <li>Females: 0.6 – 1.1 mg/dL</li> </ul> </li> </ul>

In addition to laboratory monitoring, residents prescribed anticoagulants should be **routinely monitored for signs and symptoms of bleeding**. Nosebleeds, bleeding gums, and prolonged clotting times are expected with use of these agents. However, presence of black or tarry stools, vomit resembling “coffee grounds,” blood in the urine or vomit, or sudden onset hypotension may all be signs of major internal bleedings, prompting immediate clinical evaluation.

### **Additional Information**

- [ACC/AHA/ACCP/HRS Guideline for the Diagnosis and Management of Atrial Fibrillation \(2023\)](#)
- [CHEST Guideline: Antithrombotic Therapy for VTE Disease \(2021\)](#)
- [ACC/AHA/AACVPR/APMA/ABC/SCAI/SVM/SVN/SVS/SIR/VESS Guideline for the Management of Lower Extremity Peripheral Artery Disease \(2024\)](#)
- [AHA/ASA: Guideline for the Prevention of Stroke in Patients With Stroke and Transient Ischemic Attack \(2021\)](#)