



Objective:

To review the risk factors for venous thromboembolism (VTE) and bleeding in acutely ill hospitalized medical patients and to recommend thromboprophylaxis options based on the risks of thrombosis and bleeding.

Background:

VTE is a common hospitalization complication in patients admitted with a medical illness. Pharmacologic thromboprophylaxis has been shown to reduce the incidence of VTE in hospitalized medical patients and is recommended by the American Society of Hematology (ASH) and CHEST guidelines. Since 2008 though, the recommendation grade level for thromboprophylaxis in hospitalized medical patients has decreased, notably because initial studies included patients with asymptomatic thrombosis diagnosed by systematic imaging, which could have increased the perceived effectiveness of prophylaxis.

The **risk of developing VTE** is affected by a patient's underlying medical condition as well as the presence of other co-morbidities. Patients admitted with stroke, admitted to the intensive care unit or those with active cancer are at higher risk of VTE. Other risk factors for VTE in medically ill patients are less well defined, but may include: age >60 years, reduced mobility, history of congestive heart failure, previous VTE, known thrombophilia, fracture in the past 3 months, sepsis, acute inflammatory conditions and acute infectious disease (including COVID-19). A number of scoring systems have been studied to estimate risk of VTE in hospitalized medical patients including the IMPROVE-DD risk score, the Padua Prediction Score, and the GENEVA risk score.

The **risk of developing bleeding** in patients hospitalized for a medical condition is significantly increased if the patient has a known gastroduodenal ulcer, had a major bleeding in the past 3 months or has a low platelet count ($<50 \times 10^9/L$). Pharmacologic thromboprophylaxis is generally contraindicated in patients with active bleeding or intracranial hemorrhage and in patients with a low platelet count ($<50 \times 10^9/L$). Caution is mandatory if the patient has a planned surgery during hospitalization, and thromboprophylaxis should be held in the 6 to 12 hours before surgery. Validated models for predicting bleeding risk in hospitalized medical patients are lacking.

Decisions regarding anticoagulant thromboprophylaxis in acutely-ill hospitalized medical patients should be made after consideration of risk factors for both VTE and bleeding. Computerized risk-assessment tools should be implemented wherever feasible to increase the net clinical benefit from thromboprophylaxis and avoid unnecessary provision of thromboprophylaxis to patients at low risk.

Acutely ill hospitalized medical patients at increased risk of VTE who are not bleeding or at high risk of bleeding should receive anticoagulant thromboprophylaxis generally with a low molecular weight heparin (LMWH). On the other hand, thromboprophylaxis for acutely ill hospitalized medical patients at low risk of VTE is not warranted. Patients with active bleeding or at high risk of bleeding should not receive pharmacologic thromboprophylaxis. In this latter situation, properly measured and fitted elastic

compression stockings (ECS) or intermittent pneumatic compression (IPC) devices should be used. When the bleeding risk decreases, pharmacologic thromboprophylaxis should be started.

Options for pharmacologic thromboprophylaxis:

Depending on the LMWH available in your center, here are the usual doses recommended for thromboprophylaxis:

- dalteparin 5,000 units SC daily
- enoxaparin 40 mg SC daily
- tinzaparin 4,500 units SC daily
- fondaparinux 2.5 mg SC daily

Unfractionated heparin (UFH) 5,000 units SC twice daily may also be a consideration. However, LMWH is preferred over UFH because of less frequent dosing and lower risk of heparin-induced thrombocytopenia (HIT).

Duration of prophylaxis:

Anticoagulant thromboprophylaxis should generally continue until acute care hospital discharge and not be extended beyond the period of hospitalization.

Special Considerations:

- **Direct oral anticoagulants** (apixaban, dabigatran, edoxaban, rivaroxaban): These agents should generally not be used for prophylaxis in medically ill hospitalized patients, due to a lack of data to date to support their effectiveness and safety in this patient population.
- **Under- and over-weight:** Dose reduction should be considered for patients with weight < 40 kg. Dose increase should be considered for patients with weight >100 kg. For patients weighing over 120 kg, even higher doses could be considered for tinzaparin and enoxaparin (eg. calculated dose of 75 units/kg daily for tinzaparin or 0.5 mg/kg twice daily of enoxaparin), but should be decided on a case-by-case basis since the ideal prophylactic dose in this population is unknown.
Recommended thromboprophylaxis dose of dalteparin stays at 7500 units daily up to 180kg.

LMWH	<40 kg	40 to 100 kg	101 to 120 kg
Dalteparin	2500 units daily	5000 units daily	7500 units daily
Enoxaparin	30 mg daily	40 mg daily	60 mg daily
Tinzaparin	3500 units daily	4500 units daily	8000 units daily

- **Renal impairment:** In patients with CrCl <30 mL/min, a dose reduction of enoxaparin to 30 mg SC daily (or use of UFH) should be considered. No dose adjustment for dalteparin, tinzaparin or UFH is needed in patients with impaired renal function. Fondaparinux should not be used in patients with CrCl <30 mL/min.
- **Stroke:** Patients with ischemic stroke can generally receive thromboprophylaxis with LMWH as for most other medical patients. For limited mobility stroke patients with a contraindication to LMWH at

prophylactic doses, mechanical thromboprophylaxis should be used until LMWH can be started. Use of Intermittent Pneumatic Compression (IPC) appear to be more effective than elastic compression stockings (ECS) in stroke patients with immobility.

- **Heparin-induced thrombocytopenia (HIT):** Fondaparinux is used as an alternative to UFH or LMWH for thromboprophylaxis in patient with a history of HIT (usual dose of 2.5 mg SC daily).

Other Relevant Thrombosis Canada Clinical Guides

- [Cancer and Thrombosis](#)
- [Central Venous Catheter-Related Deep Venous Thrombosis](#)
- [Unfractionated Heparin, Low Molecular Weight Heparin and Fondaparinux](#)

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Date of Version: 19February2024

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