THROMBOPROPHYLAXIS:
HOSPITALIZED MEDICAL
PATIENTS

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 frequent cause of preventable morbidity and mortality in patients hospitalized with medical illness, and 1-3% of patients admitted to hospital will suffer a complication of VTE during hospitalization. Thromboprophylaxis in medically-ill patients has been shown to be safe and effective.

The risk of developing VTE is affected by a patient’s underlying medical condition as well as the presence of other co-morbidities. Risk factors for VTE in medically ill patients include: age >70 years, previous VTE, immobility ≥3 days, stroke, acute spinal cord injury, active cancer, known thrombophilia, sepsis, acute inflammatory conditions, acute infectious disease, obesity (body mass index >30), hormone therapy, intensive care unit admission, and respiratory or cardiac failure.

The risk of developing bleeding is significantly increased if the patient has an active gastroduodenal ulcer, previous bleeding (<3 months before hospitalization), advanced age, severe renal failure (creatinine clearance [CrCl] <30 mL/min), hepatic failure, active cancer, low platelet count (<50 x 10⁹/L), or planned surgery in the next 6 to 12 hours. There are few externally validated models for predicting bleeding risk in hospitalized medical patients. One such model is the IMPROVE bleeding risk score.

Decisions regarding anticoagulant thromboprophylaxis in acutely-ill hospitalized medical patients should be made after consideration of risk factors for both VTE and bleeding. 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. 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. From a population perspective, a recent Markov model suggests that prophylaxis was cost-effective for an average medical inpatient with a VTE risk of ≥1.0%.

OPTIONS FOR THROMBOPROPHYLAXIS:
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 subcutaneous (SC) low molecular weight heparin (LMWH):

- 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).

Acutely ill hospitalized medical patients at low risk of VTE and those who are bleeding or at high risk of bleeding should not receive anticoagulant 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, one of the anticoagulant thromboprophylaxis options above should be started.

**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.

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

- **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 should be considered.

<table>
<thead>
<tr>
<th>Weight Range</th>
<th>Dalteparin</th>
<th>Enoxaparin</th>
<th>Tinzaparin</th>
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</thead>
<tbody>
<tr>
<td>&lt;40 kg</td>
<td>2500 units daily</td>
<td>30 mg daily</td>
<td>3500 units daily</td>
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<tr>
<td>40 to 100 kg</td>
<td>5000 units daily</td>
<td>40 mg daily</td>
<td>4500 units daily</td>
</tr>
<tr>
<td>101 to 120 kg</td>
<td>7500 units daily</td>
<td>60 mg daily</td>
<td>8000 units daily</td>
</tr>
</tbody>
</table>

- **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.
OTHER RELEVANT THROMBOSIS CANADA CLINICAL GUIDES:

- Cancer and Thrombosis
- Central Venous Catheter-Related Deep Venous Thrombosis
- Unfractionated Heparin, Low Molecular Weight Heparin and Fondaparinux

REFERENCES:


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Please note that the information contained herein is not to be interpreted as an alternative to medical advice from your doctor or other professional healthcare provider. If you have any specific questions about any medical matter, you should consult your doctor or other professional healthcare providers, and as such you should never delay seeking medical advice, disregard medical advice or discontinue medical treatment because of the information contained herein.