

## Venous Thromboembolism Prevention

### Expected Practice:

- ☑ Assess all patients upon admission to the ICU for risk factors of venous thromboembolism (VTE) and anticipate orders for VTE prophylaxis based on risk assessment. [Level D]
- ☑ Clinical eligibility and regimens for VTE prophylaxis include:
  - Moderate-risk patients (medically ill and postoperative patients): low dose unfractionated heparin, low-molecular-weight heparin (LMWH), or fondaparinux [Level B]
  - High risk patients (major trauma, spinal cord injury, or orthopedic surgery): LMWH, fondaparinux, or oral vitamin K antagonist [Level B]
  - Patients with high risk for bleeding: mechanical prophylaxis including graduated compression stockings and/or intermittent pneumatic compression devices [Level B]
  - Mechanical prophylaxis may also be anticipated in conjunction with anti-coagulant based prophylaxis regimens
- ☑ Review daily—with the physician and during multidisciplinary rounds—each patient's current VTE risk factors including clinical status, necessity for central venous catheter (CVC), current status of VTE prophylaxis, risk for bleeding, and response to treatment. [Level E]
- ☑ Maximize patient mobility whenever possible and take measures to reduce the amount of time the patient is immobile because of the effects of treatment (e.g., pain, sedation, neuromuscular blockade, mechanical ventilation). [Level E]
- ☑ Ensure that mechanical prophylaxis devices are fitted properly and in use at all times except when being removed for cleaning and/or inspection of skin. [Level E]

### Scope and Impact of the Problem:

Almost all hospitalized patients have at least one risk factor for VTE. VTE is a common complication and contributes to excess length of stay, excess charges, and mortality. Primary thromboprophylaxis reduces the morbidity and mortality associated with deep vein thrombosis and pulmonary embolism.

### Supporting Evidence:

- Multiple medical and surgical risk factors leading to VTE formation have been identified.<sup>1</sup> Iatrogenic risk factors for VTE include immobilization, sedation/neuromuscular blockade, CVCs, surgery, sepsis, mechanical ventilation, vasopressor administration, heart failure, stroke, malignancy, previous VTE, and renal dialysis; a vast majority of patients in critical care units have 1 or more major risk factors.<sup>1-4</sup> In five prospective studies, the rate of VTE in patients in critical care not receiving prophylaxis ranged from 13 to 31 percent.<sup>5-8</sup> Because signs and symptoms of VTE are frequently silent and can lead to fatal pulmonary embolism, multiple professional organizations recommend VTE prophylaxis for at-risk patients.<sup>1,9-19</sup>
- Randomized trials indicate that both low dose unfractionated heparin and LMWH are efficacious in preventing VTE in moderate-risk critical care patients.<sup>5-8, 19</sup> For patients at higher risk, such as those who have major trauma or have had orthopedic surgery, LMWH has been shown to provide superior protection over low dose unfractionated heparin.<sup>1</sup> Direct thrombin inhibitors can be used in place of low molecular weight heparin or unfractionated heparin for patients with documented or suspected heparin induced thrombocytopenia.<sup>1, 21-2</sup> Numerous studies suggest that aspirin alone is not an efficacious means of VTE prophylaxis for any patient group.<sup>23-7</sup>

- Although examined less rigorously than anticoagulant based methods, mechanical methods of prophylaxis (including graduated compression stockings, intermittent compression devices, and venous foot pumps) have been shown to reduce the risk of VTE.<sup>28-38</sup> One study involving non-lower extremity trauma patients compared the efficacy of intermittent pneumatic compression devices and venous foot pumps. VTE rates among the venous foot pump group were three times greater when compared with the rates of the intermittent pneumatic compression group. The researchers concluded that intermittent pneumatic compression devices provided superior prophylaxis in this patient population.<sup>36</sup>
- In general, mechanical prophylaxis is less efficacious when compared to anticoagulation based therapy.<sup>33-5, 37-9</sup> Reduction in risk of death or pulmonary embolism has not been attributed to mechanical methods of prophylaxis.<sup>1</sup> In one study involving below-the-knee graded stockings, 98 percent of commercially available stockings failed to produce an ideal pressure gradient and 54 percent were found to produce a dangerous reverse pressure gradient.<sup>40</sup> Mechanical prophylaxis methods are a desirable option because they do not pose bleeding concerns.<sup>1</sup> A combination of mechanical prophylaxis and chemoprophylaxis is thought to potentiate overall efficacy but this combination has not been tested in the critical care setting.<sup>41</sup>
- Written policies for VTE prophylaxis in conjunction with either pre-printed or computerized ICU admission orders have been shown to increase compliance with prophylaxis measures.<sup>42</sup> One study found that implementation of a daily goals form, which included VTE prophylaxis in the ICU, resulted in a significant improvement in the percentage of residents and nurses who understood the patient's daily goals for care and decreased ICU length of stay by 1.1 days.<sup>19, 43-4</sup>
- The presence of a CVC is an independent risk factor for upper extremity VTE in the general population.<sup>45</sup>
- Several studies involving a variety of patient populations with diagnostically confirmed VTE have identified immobility either as a co-morbidity or independent risk factor.<sup>46-8</sup>
- Improperly fitted graduated compression stockings producing a reversed pressure gradient were associated with a statistically significantly higher incidence of VTE compared with stockings that produced a proper gradient.<sup>35</sup> Studies evaluating compliance with intermittent pneumatic compression devices demonstrated rates of non-compliance ranging from 22 to 81 percent in at-risk patients.<sup>40,49-50</sup>

#### AACN Evidence Leveling System

<b>Level A</b>	Meta-analysis of quantitative studies or metasynthesis of qualitative studies with results that consistently support a specific action, intervention or treatment.
<b>Level B</b>	Well-designed, controlled studies with results that consistently support a specific action, intervention or treatment.
<b>Level C</b>	Qualitative studies, descriptive or correlational studies, integrative review, systematic reviews, or randomized controlled trials with inconsistent results.
<b>Level D</b>	Peer-reviewed professional organizational standards with clinical studies to support recommendations.
<b>Level E</b>	Multiple case reports, theory-based evidence from expert opinions, or peer-reviewed professional organizational standards without clinical studies to support recommendations.
<b>Level M</b>	Manufacturer's recommendations only.

#### Actions for Nursing Practice:

- Ensure that your unit has a written policy for VTE prophylaxis that is updated regularly to reflect emerging evidentiary findings. Ensure that pre-printed or computerized ICU admission orders are available and current.
- Ensure that your unit has an organized process for developing and communicating patient goals (which include VTE prophylaxis) to members of the multidisciplinary team.
- Establish a process to educate and routinely evaluate all staff in the use of mechanical prophylaxis devices.
- Review orders of patients discharged from the ICU to ensure that transfer orders include a plan for VTE prophylaxis.
- Monitor your unit's compliance with VTE prophylaxis policies and rates of VTE and pulmonary embolism. Initiate quality improvement initiatives involving a multidisciplinary team as necessary.

#### Need More Information or Help?

- Go to ([www.aacn.org/prninfo](http://www.aacn.org/prninfo)).

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