

Selected Best Practices and Suggestions for Improvement

PSI 12: Perioperative Pulmonary Embolism (PE) or Deep Vein Thrombosis (DVT)

Why Focus on DVT/PE?

- Together deep vein thrombosis (DVT) and pulmonary embolism (PE) constitute the largest cause of preventable hospital death. DVT and PE affect an estimated 300,000 to 600,000 people per year and may directly cause more than 100,000 deaths and contribute to another 100,000 deaths each year.
- DVT may increase hospital length of stay by 2 to 5 days and result in excess costs of about \$7,500. And PE can increase hospital length of stay by more than 5 days, result in an intensive care unit admission, and incur additional costs of more than \$10,000.
- At least part of this cost is likely to be shouldered by hospitals. In 2008 the Centers for Medicaid and Medicare Services (CMS) identified deep vein thrombosis and pulmonary embolism following certain orthopedic procedures as one of a number of conditions for which hospitals do not receive the higher payment for cases when the condition was acquired during hospitalization.¹
- Starting in 2015, the perioperative DVT/PE rate PSI will be one of the measures used for Medicare’s Hospital Value-Based Purchasing (as part of a composite indicator) that links quality to payment.²
- The risk of DVT/PE in untreated patients after a major surgical procedure is approximately 20%. PE may occur in 1% to 2% of patients, and fatal PE may occur in 0.1% to 0.4%.

Recommended Practice	Details of Recommended Practice
Venous Thromboembolism (VTE) Risk Assessment	Evaluate each patient upon admission for the risk of developing VTE. Risk should be reassessed whenever the clinical situation changes. ³⁻⁶
Guideline-Directed VTE Prophylaxis Selection	Appropriate use of prophylaxis for VTE in patients at risk is the number one strategy to improve patient safety. Use clinically appropriate evidence-based methods of thromboprophylaxis. ^{3,4,6,7,8}
Nursing Assessment and Intervention	Promote highest level of patient mobility and advance as tolerated. ^{4,5} Assess for symptoms/presence of acute DVT and provide intervention, if appropriate. ⁵

Best Processes/Systems of Care

Introduction: Essential First Steps

- Engage key stakeholders, including pharmacy and therapeutics committee, nursing groups, orthopedics/surgery/trauma leaders, patient safety committee, perioperative committees, and chief residents and residency program directors; and engage representatives from quality improvement and information services as part of the team to develop time-sequenced guidelines, care paths, or protocols for the full continuum of care for prevention of VTE.³
- Team responsibilities include:

- Ensure institutional support and prioritization for the initiative, expressed in terms of a meaningful investment in time, equipment, personnel, and informatics, and a sharing of institutional improvement experience and resources to support any project needs.
 - Focus on reaching VTE prophylaxis targets and reporting to key medical staff committees.
 - Use reliable data collection and performance tracking.
 - Identify specific goals or aims that are ambitious, time defined, and measurable.
 - Draft or adopt evidence-based protocols that standardize VTE risk assessment and prophylaxis.⁶
 - Create institutional infrastructure, policies, practices, or educational programs promoting the use of the protocol.⁶
- Complete assessment of current practice and identify gaps.

Recommended Practice: VTE Risk Assessment

- Develop standardized VTE risk assessment that delivers decision support to the point of care; in other words, at the moment of medical decision making, providers have what they need to stratify the patient to a specific VTE risk level.^{3,4}
- Integrate VTE risk assessment into admission and transfer order sets.³
- Identify at-risk patients³⁻⁵:
 - Assess each patient's VTE risk at admission. Risk factors include:^{4,6,7}
 - Active cancer or cancer treatment
 - Age over 60 years
 - Critical care admission
 - Dehydration
 - Known thrombophilias
 - Obesity
 - One or more significant medical comorbidities (heart disease, metabolic, endocrine or respiratory pathologies; acute infectious diseases; inflammatory conditions)
 - History of VTE
 - Use of hormone replacement therapy
 - Use of estrogen-containing contraceptive therapy
 - Varicose veins with associated phlebitis
 - Fracture of pelvis/hip/lower extremity
 - Indwelling central venous catheter
 - Immobility
 - Use stickers placed on patient charts or electronic reminders to prompt caregivers to take this step.
 - Use the VTE risk assessment to triage patients into low-, moderate-, or high-risk categories.^{3,5}

Recommended Practice: Guideline-Directed VTE Prophylaxis Selection

- Prompt providers to order VTE prophylaxis when completing admission or transfer orders; they also should have a standardized VTE risk assessment immediately available to support medical decision making (see “VTE Risk Assessment”).^{3,4}
- Ensure that VTE protocols also have a visual link from the level of VTE risk to the options for appropriate prophylaxis; this visual link will enable providers to make a rapid, accurate decision and take action to order appropriate prophylaxis.³
- Determine contraindications to pharmacologic prophylaxis and deliver decision support to the point of care so that providers know when to choose alternative prophylaxis, e.g., if specific contraindications to anticoagulation or heparin products exist.³

Recommended Practice: Nursing Assessment and Intervention

- 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).^{4,5,8}
- Ensure nurse followup:
 - Ensure that appropriate treatment has been ordered and they are empowered to initiate contact with providers if prophylaxis has not been ordered for an eligible patient.
 - Review for appropriateness of therapy.
 - Assess for symptoms/presence of acute VTE to provide intervention if appropriate.
 - Signs of DVT include unilateral leg swelling, warmth, and erythema. Patient may also complain of tenderness of the involved veins. In some cases, the patient may be asymptomatic.
 - The most common symptom of PE is dyspnea and the most common sign is tachycardia. Other signs and symptoms may include dry cough, pleuritic pain, hemoptysis, syncope, cyanosis, hypotension, anxiety, a low-grade fever, or neck vein distension.

Educational Recommendation

- Plan and provide education on protocols and standing orders to physicians and other providers, nurses, and all other staff involved in DVT/PE prevention (emergency department, intensive care unit, other medical units, ancillary departments, etc.). Education should occur upon hire, annually, and when this protocol is added to job responsibilities.

Effectiveness of Action Items

- Track compliance with elements of established protocol.^{3,6}
- Evaluate effectiveness of new processes, determine gaps, modify processes as needed, and reimplement.³
- Develop a plan of action for staff in noncompliance.³
- Provide feedback to all stakeholders (physicians and other providers, nursing, and ancillary staff; senior medical staff; and executive leadership) on level of compliance with process.³
- Conduct surveillance and prevalence of healthcare-associated VTE to evaluate outcomes of new process.^{3,6}

- Monitor and evaluate performance regularly to sustain improvements achieved.^{3,6}

Additional Resources

Systems/Processes

- Society of Hospital Medicine. VTE implementation guide
http://www.hospitalmedicine.org/Web/Quality_Innovation/Implementation_Toolkits/Venous_Thromboembolism/Web/Quality_Innovation/Implementation_Toolkit/Venous/First_Steps/Implementation_Guide.aspx (requires account)
- UW Medicine Department of Pharmacy Anticoagulation Services
<http://depts.washington.edu/anticoag/home/>
- University of Massachusetts. Preventing Deep Vein Thrombosis and Pulmonary Embolism: A Practical Guide to Evaluation and Improvement
http://www.outcomes-umassmed.org/dvt/best_practice/

Staff Required

- Nurses trained to use tool to triage patients into low, moderate, or high risk
- Providers educated and reminded to order appropriate VTE prophylaxis at admission^{3,6}
- Pharmacists educated in pharmacologic prophylaxis^{3,6}
- Physical therapists to assess and assist in patient mobility

Equipment

- Mechanical compression devices
- Compression stockings
- Vena cava filters

Communication

- Systemwide education on protocol³

Authority/Accountability

- Senior leadership mandating protocol for all providers³
- Clinical support personnel dedicated to ensure and document that mechanical prophylaxis is worn by patients
- Nurses empowered to initiate contact with providers if prophylaxis has not been ordered for an eligible patient

References

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<https://www.nice.org.uk/guidance/cg92/evidence/full-guideline-243920125>. Accessed May 20, 2016.
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6. Dupras D, Bluhm J, Felty C, et al. Venous thromboembolism diagnosis and treatment. Bloomington, MN: Institute for Clinical Systems Improvement; 2013.
7. Arnold DM, Kahn SR, Shrier I. Missed opportunities for prevention of venous thromboembolism: an evaluation of the use of thromboprophylaxis guidelines. *Chest* 2001;120:1964-71.
8. Guyatt GH, Akl EA, Crowther M, et al., for the American College of Chest Physicians Antithrombotic Therapy and Prevention of Thrombosis Panel. Executive summary: Antithrombotic Therapy and Prevention of Thrombosis, 9th ed: American College of Chest Physicians Evidence-Based Clinical Practice Guidelines. *Chest* 2012;141:7S-47S.