

Deep Venous Thrombosis (DVT) Prophylaxis

Rationale for thromboprophylaxis in hospitalized patients

- High prevalence of venous thrombolism (VTE)
- Adverse consequences of unprevented VTE
- Efficacy & effectiveness of thromboprophylaxis

High prevalence of VTE

- Most hospitalized patients have risk factors for VTE
- DVT is common in many hospitalized patient groups
- Hospital-acquired DVT and PE are usually clinically silent
- Difficult to predict which at-risk patients will develop symptomatic thromboembolic complications
- Screening at-risk patients using physical examination or noninvasive testing is neither effective nor cost-effective

Adverse consequences of unprevented VTE

- Symptoms of DVT and PE
- Fatal pulmonary embolism (PE)
- Costs of investigating symptomatic patients
- Risks and costs of treating unprevented VTE, esp bleeding
- Increased future risk of recurrent VTE
- Chronic post-thrombotic syndrome

Efficacy and effectiveness of thromboprophylaxis

- Thromboprophylaxis is highly efficacious at preventing DVT and proximal DVT
- Thromboprophylaxis is highly effective at preventing symptomatic VTE and fatal PE
- The prevention of DVT also prevents PE
- Cost-effectiveness of prophylaxis has repeatedly been demonstrated

In ICU

- VTE and PE have been shown to contribute significantly to morbidity and mortality associated with critically illness

HoytDB, Swegle JR. Deep venous thrombosis in the surgical intensive care unit. Surg Clin North Am 1991; 71:811-8306

Jain M, Schmidt GA. Venous thromboembolism: prevention and prophylaxis. Semin Respir Crit Care Med 1997; 18:79-907

Davidson BL. Risk assessment and prophylaxis of venous thromboembolism in acutely and/or critically ill patients. Haemostasis 2000; 30(suppl 2):77-81

- Among patients who died while in the ICU, PE has been reported in 7 to 27% (mean 13%) of postmortem examinations and PE was thought to have caused or contributed to death in 0 to 12% (mean 3%)
- A clinical suspicion of PE was present in only 30% of these patients before death

Neuhaus A et al. Pulmonary embolism in respiratory failure. Chest 1978; 73:460-4659

Moser KM et al. Deep venous thrombosis and pulmonary embolism: frequency in a respiratory intensive care unit. JAMA 1981; 246:1422-142410

Pingleton SK et al. Prevention of pulmonary emboli in a respiratory intensive care unit: efficacy of low-dose heparin. Chest 1981; 79:647-65011

Cullen DJ et al. The autopsy incidence of acute pulmonary embolism in critically ill surgical patients. Intensive Care Med 1986; 12:399-40312

Blosser SA et al. Do autopsies of critically ill patients reveal important findings that were clinically undetected? Crit Care Med 1998; 26:1332-133613

Mort TC, Yeston NS. The relationship of pre-mortem diagnoses and post-mortem findings in a surgical intensive care unit. Crit Care Med 1999; 27:299-30314

Dimopoulos G et al. Post-mortem examination rate in the ICU: is it still useful [abstract]? Crit Care Med 2000; 28(suppl):A7815

Willemsen HW et al. The incidence of pulmonary embolism in a surgical intensive care unit [abstract], Crit Care Med 2000; 26(suppl 3):S242

- The vast majority of patients admitted to ICU have a major risk factor for VTE, and most have multiple risk factors

Keane MG, Ingenito EP, Goldhaber SZ. Utilization of venous thromboembolism prophylaxis in the medical intensive care unit. Chest 1994; 106:13-1417

Cook D, Attia J, Weaver B, et al. Venous thromboembolic disease: an observational study in medical-surgical intensive care unit patients. J Crit Care 2000; 15:127-13218

Selby R, Geerts WH. Venous thromboembolism: risk factors and prophylaxis. Semin Respir Crit Care Med 2000; 21:493-501

Table 1—Clinical Risk Factors for VTE in Critically Ill Patients*

Factors present before ICU admission

- Recent surgery

- Trauma, burns

- Malignancy and its treatment

- Sepsis

- Immobilization/bed rest, stroke, spinal cord injury

- Increasing age

- Heart/respiratory failure

- Previous VTE

- Pregnancy/puerperium

- Estrogens

Additional factors acquired in ICU

- Central venous lines

- Sepsis

- Pharmacologic sedation, paralysis

- Mechanical ventilation

*Adapted from Geerts et al¹ with permission.

Clinical risk factors for VTE in critically ill patients

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Clinical risk factors for VTE in critically ill patients

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- Sepsis
- Pharmacologic sedation, paralysis
- Mechanical ventilation

- Unsuspected DVT may already be present on admission to ICU
- When Doppler ultrasonography was performed in 729 patients at entry to the ICU, VTE was detected in 6.4%

Harris LM et al. Screening for asymptomatic deep vein thrombosis in surgical intensive care patients. J Vasc Surg 1997; 26:764-769

Fraisse F et al. Nadroparin in the prevention of deep vein thrombosis in acute decompensated COPD. Am J Respir Crit Care Med 2000; 161:1109-111429

Goldberg SK, Lippmann ML, Walkenstein MD, et al. The prevalence of DVT among patients in respiratory failure: the role of DVT prophylaxis [abstract]. Am J Respir Crit Care Med 1996; 153:A9430

Schonhofer B, Kohler D. Prevalence of deep-vein thrombosis of the leg in patients with acute exacerbation of chronic obstructive pulmonary disease. Respiration 1998; 65:171-177

- After admission to ICU, four prospective studies demonstrated that DVT rates varied between 13% and 31% in critically ill patients who did not receive prophylaxis

Moser KM, LeMoine JR, Nachtwey FJ, et al. Deep venous thrombosis and pulmonary embolism: frequency in a respiratory intensive care unit. JAMA 1981; 246:1422-1424

Fraisse F et al. Nadroparin in the prevention of deep vein thrombosis in acute decompensated COPD. Am J Respir Crit Care Med 2000; 161:1109-111429

Cade JF. High risk of the critically ill for venous thromboembolism. Crit Care Med 1982; 10:448-45032

Kapoor M, Kupfer YY, Tessler S. Subcutaneous heparin prophylaxis significantly reduces the incidence of venous thromboembolic events in the critically ill [abstract]. Crit Care Med 1999; 27(suppl):A69

Deep vein thrombosis and its prevention in critically ill adults

Attia J, Ray J, Cook DJ et al. Arch Intern Med.2001; 161:1268-1279

- A systematic review of randomized and observational studies of the incidence of DVT and efficacy of thromboprophylaxis in critically ill adults, including patients admitted to intensive care units and following trauma, neurosurgery, or spinal cord injury

Findings

- 10% to 30% of medical and surgical intensive care unit patients develop DVT within the first week of intensive care unit admission. The use of subcutaneous low-dose heparin reduced the rate by 50% compared with no prophylaxis.

Findings

- Approximately 60% of trauma patients developed DVT within the first 2 weeks of admission. Use of unfractionated heparin appears to decrease the incidence of DVT by only 20%, whereas low-molecular-weight heparin decreases the incidence by a further 30%.

Findings

- The estimated prevalence of DVT in neurosurgical patients not given prophylaxis is 22% to 35%. Mechanical prophylaxis reduces the incidence by 57% but low molecular weight heparin further reduces the risk by 26%

Findings

- The incidence of DVT without prophylaxis in acute spinal cord injury patients is likely in excess of 50% to 80%. Studies of prophylaxis in these patients are too sparse to come to any definitive conclusion.

NAICU 2004

- A 2 year review was carried out on survivors and non-survivors in ICU, 2003 and 2004
- The use of heparin was found to be an independent protective risk of death

Conclusion

- All patients in the ICU should have thromboprophylaxis

Conclusion

- The association of DVT prophylaxis and decreasing rates of VAP is unclear
- However, when DVT prophylaxis is applied as part of a package of interventions for ventilator care, VAP rates drop
- Therefore, this intervention remains an important practice in the general care of ventilated patients

Table 3—Risk Factors for VTE

Surgery
Trauma (major or lower extremity)
Immobility, paresis
Malignancy
Cancer therapy (hormonal, chemotherapy, or radiotherapy)
Previous VTE
Increasing age
Pregnancy and the postpartum period
Estrogen-containing oral contraception or hormone replacement therapy
Selective estrogen receptor modulators
Acute medical illness
Heart or respiratory failure
Inflammatory bowel disease
Nephrotic syndrome
Myeloproliferative disorders
Paroxysmal nocturnal hemoglobinuria
Obesity
Smoking
Varicose veins
Central venous catheterization
Inherited or acquired thrombophilia

Table 4—Absolute Risk of DVT in Hospitalized Patients^a

Patient Group	DVT Prevalence, %
Medical patients	10-20
General surgery	15-40
Major gynecologic surgery	15-40
Major urologic surgery	15-40
Neurosurgery	15-40
Stroke	20-50
Hip or knee arthroplasty, hip fracture surgery	40-60
Major trauma	40-80
Spinal cord injury	60-80
Critical care patients	10-80

^aRates based on objective diagnostic testing for DVT in patients not receiving thromboprophylaxis.