



## Complete Summary

---

### GUIDELINE TITLE

Prevention of deep vein thrombosis.

### BIBLIOGRAPHIC SOURCE(S)

Blondin MM. Prevention of deep vein thrombosis. Iowa City (IA): University of Iowa Gerontological Nursing Research Center, Research Dissemination Core; 2006 Feb. 40 p. [79 references]

### GUIDELINE STATUS

This is the current release of the guideline.

This guideline updates a previous version: Blondin M. Prevention of deep vein thrombosis. Iowa City (IA): University of Iowa Gerontological Nursing Research Center, Research Dissemination Core; 1999. 31 p.

### \*\* REGULATORY ALERT \*\*

### FDA WARNING/REGULATORY ALERT

**Note from the National Guideline Clearinghouse:** This guideline references a drug(s) for which important revised regulatory and/or warning information has been released.

- [February 28, 2008, Heparin Sodium Injection](#): The U.S. Food and Drug Administration (FDA) informed the public that Baxter Healthcare Corporation has voluntarily recalled all of their multi-dose and single-use vials of heparin sodium for injection and their heparin lock flush solutions. Alternate heparin manufacturers are expected to be able to increase heparin production sufficiently to supply the U.S. market. There have been reports of serious adverse events including allergic or hypersensitivity-type reactions, with symptoms of oral swelling, nausea, vomiting, sweating, shortness of breath, and cases of severe hypotension.
- [August 16, 2007, Coumadin \(Warfarin\)](#): Updates to the labeling for Coumadin to include pharmacogenomics information to explain that people's genetic makeup may influence how they respond to the drug.

### COMPLETE SUMMARY CONTENT

\*\* REGULATORY ALERT \*\*

SCOPE

METHODOLOGY - including Rating Scheme and Cost Analysis

RECOMMENDATIONS

EVIDENCE SUPPORTING THE RECOMMENDATIONS  
BENEFITS/HARMS OF IMPLEMENTING THE GUIDELINE RECOMMENDATIONS  
QUALIFYING STATEMENTS  
IMPLEMENTATION OF THE GUIDELINE  
INSTITUTE OF MEDICINE (IOM) NATIONAL HEALTHCARE QUALITY REPORT  
CATEGORIES  
IDENTIFYING INFORMATION AND AVAILABILITY  
DISCLAIMER

## SCOPE

### **DISEASE/CONDITION(S)**

Deep vein thrombosis (DVT)

### **GUIDELINE CATEGORY**

Prevention  
Risk Assessment

### **CLINICAL SPECIALTY**

Geriatrics  
Nursing  
Surgery

### **INTENDED USERS**

Advanced Practice Nurses  
Nurses  
Physicians

### **GUIDELINE OBJECTIVE(S)**

To identify a standard method by which to assess the elderly surgical patient for risk factors for the development of deep vein thrombosis (DVT)

### **TARGET POPULATION**

Elderly surgical patients including:

- Patients aged greater than 40 years
- All patients having major surgery
- Patients confined to bed prior to or anticipated after surgery
- Patients with a previous history of deep vein thrombosis (DVT)
- Patients with a history of varicose veins
- Patients who will undergo a planned operation over 2 hours
- Patients who will undergo a pelvic or total joint replacement surgery
- Patients who have incurred a pelvic or long bone fracture
- Patients with a family history of DVT

- Patients in hypercoagulable states
- Patients with multiple trauma
- Patients taking post menopausal hormone replacement therapy
- Patients with malignancy
- Patients undergoing cancer therapy
- Obese patients
- Patients undergoing central venous catheterization

## **INTERVENTIONS AND PRACTICES CONSIDERED**

1. Risk factor assessment for thrombosis
2. Prophylactic measures including, early ambulation post-operatively, graduated compression stockings (GCS), intermittent pneumatic compression devices (IPCD), foot pumps, anticoagulant therapy
3. Education for patient and family members

## **MAJOR OUTCOMES CONSIDERED**

- Risk for and incidence of deep vein thrombosis (DVT)
- Risk for and incidence of bleeding complications

## **METHODOLOGY**

### **METHODS USED TO COLLECT/SELECT EVIDENCE**

Searches of Electronic Databases

### **DESCRIPTION OF METHODS USED TO COLLECT/SELECT THE EVIDENCE**

Not stated

### **NUMBER OF SOURCE DOCUMENTS**

Not stated

### **METHODS USED TO ASSESS THE QUALITY AND STRENGTH OF THE EVIDENCE**

Weighting According to a Rating Scheme (Scheme Given)

### **RATING SCHEME FOR THE STRENGTH OF THE EVIDENCE**

**A1** = Evidence from well-designed meta-analysis or well-done systematic review with results that consistently support a specific action (e.g. assessment, intervention, or treatment)

**A2** = Evidence from one or more randomized controlled trials with consistent results

**B1** = Evidence from high quality evidence-based practice guideline

**B2** = Evidence from one or more quasi experimental studies with consistent results

**C1** = Evidence from observational studies with consistent results (e.g. correlational, descriptive studies)

**C2** = Inconsistent evidence from observational studies or controlled trials

**D** = Evidence from expert opinion, multiple case reports, or national consensus reports

## **METHODS USED TO ANALYZE THE EVIDENCE**

Review of Published Meta-Analyses  
Systematic Review

## **DESCRIPTION OF THE METHODS USED TO ANALYZE THE EVIDENCE**

Not stated

## **METHODS USED TO FORMULATE THE RECOMMENDATIONS**

Expert Consensus

## **DESCRIPTION OF METHODS USED TO FORMULATE THE RECOMMENDATIONS**

This guideline was developed from a systematic review and synthesis of current evidence on deep vein thrombosis. Research findings and other evidence, such as guidelines and standards from professional organizations, case reports and expert opinion were critiqued, analyzed and used as supporting evidence. The practice recommendations were assigned an evidence grade based upon the type and strength of evidence from research and other literature.

## **RATING SCHEME FOR THE STRENGTH OF THE RECOMMENDATIONS**

Not applicable

## **COST ANALYSIS**

A formal cost analysis was not performed and published cost analyses were not reviewed.

## **METHOD OF GUIDELINE VALIDATION**

External Peer Review

## **DESCRIPTION OF METHOD OF GUIDELINE VALIDATION**

This guideline was reviewed by experts knowledgeable of research on Deep Vein Thrombosis and development of guidelines. The reviewers suggested additional evidence for selected actions, inclusion of some additional practice recommendations, and changes in the guideline presentation to enhance its clinical utility.

## RECOMMENDATIONS

### MAJOR RECOMMENDATIONS

The grades of the strength and consistency of evidence (A1, A2, B1, B2, C1, C2, D) are defined at the end of the "Major Recommendations" field.

#### Definitions

Venous thrombi: "intravascular deposits composed predominantly of fibrin and red cells, with a variable platelet and leukocyte component". They often happen in the presence of stasis. These are commonly known as "blood clots."

Deep veins: This discussion is limited to the deep veins of the lower extremity. They include: posterior tibial, anterior tibial, peroneal, popliteal, femoral (common femoral, superficial femoral, profunda femoris), and iliac veins.

Pulmonary embolism: A thrombus that becomes mobile and travels to the pulmonary vasculature obstructing pulmonary circulation.

Anticoagulant: A substance that inhibits, prevents, or suppresses clotting of blood.

#### Individuals at Risk for Deep Vein Thrombosis

All surgical patients are considered at some degree of risk for development of deep vein thrombosis (DVT). This guideline focuses on the prevention of deep vein thrombosis in the elderly surgical patient. Advancing age is a known risk factor.

See Appendix A in the original guideline document for a comprehensive review of individuals at risk for the development of DVT and the effect of aging on DVT.

#### Assessment Criteria

Refer to the "Target Population" field of this summary for a listing of patients who are likely to benefit the most from use of this evidence-based guideline:

#### Description of Intervention

1. Risk factor assessment should be completed for every patient upon admission to the hospital for all unplanned admissions (see "Thrombosis Risk Factor Assessment for Surgical and Medical Patients" in Appendix B of the original guideline document for an example).

2. Risk factor assessment should be completed pre-operatively for every patient whose surgical admission is planned (Caprini et al., 1991. **Evidence Grade = C1**).
3. Thorough education is provided for patient and family members regarding the importance of DVT prophylaxis and their role in assuring compliance. Provide written as well as verbal information regarding the basic physiology about how blood flows to and from the heart, and the role of muscles in this process. Empower patients to be active participants in exercise, ambulation (if not contraindicated), and in the use of mechanical devices (Blondin & Titler, 1996. **Evidence Grade = D**).
4. Appropriate prophylaxis should be initiated as soon as medically possible for unplanned admissions (Hamilton, Hull, & Pineo, 1994. **Evidence Grade = A1**).
5. Appropriate prophylaxis should be initiated preoperatively for planned same-day admissions or on admission to the inpatient unit for those patients admitted on any day preceding their scheduled surgery (Hamilton, Hull, & Pineo, 1994. **Evidence Grade = A1**).
6. Patients arriving to nursing units without orders for DVT prophylaxis: nursing staff should immediately notify responsible physician.
7. All patients should have a plan for active and passive lower extremity activity unless contraindicated including flexion and extension of the ankle (ankle pumps), knees and hips. Involve Physical Therapy as appropriate. Provide written instructions, with pictures as well as a demonstration.
8. Early and aggressive ambulation for all patients if not contraindicated by condition.
9. If the following regimens are ordered, follow these guidelines:
  - a. Graduated Compression Stockings (GCS): wear at all times except when removed for skin care or bathing. Replace within 30 minutes (Sigel et al., 1975).
    - Measure each patient; do not "guess" size.
    - Consider knee high GCS for patients unable to wear thigh high due to size, injury, or physician preference.
    - Avoid stockings that threaten a "garter" effect at the calf, posterior knee or thigh.
    - Re-measure postoperatively for patients undergoing lower extremity surgery.
    - Note manufacturer's list of "contraindications for use" accompanying product prior to applying.
  - b. Intermittent Pneumatic Compression Devices (IPCD): wear at all times when inactive. This includes when patient is in bed, resting in the chair, or at lengthy tests.
    - Measure each patient; do not "guess" size.
    - Consider knee high IPCD for patients unable to wear thigh high due to size, injury, or physician preference.
    - Note manufacturer's list of "contraindications for use" accompanying product prior to applying.
  - c. Foot Pumps: wear at all times when inactive. This includes when patient is in bed, resting in the chair, or at lengthy tests.
    - Note manufacturer's list of "contraindications for use" accompanying product prior to applying.

- d. Anticoagulant Therapy per physician order.
- e. Continue GCS use after discharge for period of relative immobility (Caprini, Scurr, & Hasty, 1988; Clagett & Reisch, 1988. **Evidence Grade = A1**). This definition is variable and needs to be determined at your institution. A good rule of thumb is "up more than down". Hamilton, Hull, & Pineo, (1994) defined this as ambulating three to four hours per day (**Evidence Grade = A1**).
- f. Continue anticoagulant therapy after discharge per Licensed Independent Practitioner (LIP) order.

10. Monitor for clinical signs and symptoms of DVT (50% confidence) such as calf pain or tenderness, palpable cords, increased circumference, positive Homan's sign (Hamilton, Hull, & Pineo, 1994. **Evidence Grade = A1**).

### **Definitions:**

### **Evidence Grading**

**A1** = Evidence from well-designed meta-analysis or well-done systematic review with results that consistently support a specific action (e.g. assessment, intervention, or treatment)

**A2** = Evidence from one or more randomized controlled trials with consistent results

**B1** = Evidence from high quality evidence-based practice guideline

**B2** = Evidence from one or more quasi experimental studies with consistent results

**C1** = Evidence from observational studies with consistent results (e.g. correlational, descriptive studies)

**C2** = Inconsistent evidence from observational studies or controlled trials

**D** = Evidence from expert opinion, multiple case reports, or national consensus reports

### **CLINICAL ALGORITHM(S)**

None provided

## **EVIDENCE SUPPORTING THE RECOMMENDATIONS**

### **REFERENCES SUPPORTING THE RECOMMENDATIONS**

[References open in a new window](#)

### **TYPE OF EVIDENCE SUPPORTING THE RECOMMENDATIONS**

The type of supporting evidence is identified and graded for selected recommendations (see "Major Recommendations" field).

## BENEFITS/HARMS OF IMPLEMENTING THE GUIDELINE RECOMMENDATIONS

### POTENTIAL BENEFITS

- Prevention of deep vein thrombosis (DVT)
- Prevention of pulmonary embolism (PE)
- Decreased hospitalizations associated with DVT and PE
- Decreased morbidity and mortality associated with DVT and PE

### POTENTIAL HARMS

Pharmacological prophylaxis: potential harms are bleeding and thrombocytopenia.

- Extreme caution should be taken with the use of *low-molecular-weight heparin (LMWH)* in conjunction with spinal or epidural anesthesia or spinal puncture due to the potential for neurological complications related to bleeding.
- When used without other prophylactic measures, *warfarin* leaves patients unprotected against clotting during the initial dosing period.

Mechanical prophylaxis:

- Ineffectiveness of devices from ill fitting or poor compliance
- Thigh high stockings should be used with caution in patients that have arterial insufficiency

## QUALIFYING STATEMENTS

### QUALIFYING STATEMENTS

This research-based practice is only a guide. It is highly recommended that all hospitals develop a plan for deep vein thrombosis (DVT) prophylaxis for individual patients or for patient groups.

## IMPLEMENTATION OF THE GUIDELINE

### DESCRIPTION OF IMPLEMENTATION STRATEGY

The "Evaluation of Patient Outcomes and Process Factors" section and the appendices of the original guideline document contain a complete description of implementation strategies.

### IMPLEMENTATION TOOLS

Audit Criteria/Indicators  
Chart Documentation/Checklists/Forms



Resources  
Staff Training/Competency Material

For information about [availability](#), see the "Availability of Companion Documents" and "Patient Resources" fields below.

## INSTITUTE OF MEDICINE (IOM) NATIONAL HEALTHCARE QUALITY REPORT CATEGORIES

### IOM CARE NEED

Getting Better  
Staying Healthy

### IOM DOMAIN

Effectiveness  
Patient-centeredness

## IDENTIFYING INFORMATION AND AVAILABILITY

### BIBLIOGRAPHIC SOURCE(S)

Blondin MM. Prevention of deep vein thrombosis. Iowa City (IA): University of Iowa Gerontological Nursing Research Center, Research Dissemination Core; 2006 Feb. 40 p. [79 references]

### ADAPTATION

Not applicable: The guideline was not adapted from another source.

### DATE RELEASED

1999 Jun 10 (revised 2006 Feb)

### GUIDELINE DEVELOPER(S)

University of Iowa Gerontological Nursing Interventions Research Center,  
Research Translation and Dissemination Core - Academic Institution

### SOURCE(S) OF FUNDING

Developed with the support provided by Grant #P30 NR03979, [PI: Toni Tripp-Reimer, The University of Iowa College of Nursing], National Institute of Nursing Research, NIH

### GUIDELINE COMMITTEE

University of Iowa Gerontological Nursing Interventions Research Center Research Dissemination Core

## **COMPOSITION OF GROUP THAT AUTHORED THE GUIDELINE**

*Author:* Martha Blondin, RN, MSN

*Series Editor:* Marita G. Titler, PhD, RN, FAAN

## **FINANCIAL DISCLOSURES/CONFLICTS OF INTEREST**

Not stated

## **GUIDELINE STATUS**

This is the current release of the guideline.

This guideline updates a previous version: Blondin M. Prevention of deep vein thrombosis. Iowa City (IA): University of Iowa Gerontological Nursing Research Center, Research Dissemination Core; 1999. 31 p.

## **GUIDELINE AVAILABILITY**

Electronic copies: Not available at this time.

Print copies: Available from the University of Iowa Gerontological Nursing Interventions Research Center, Research Dissemination Core, 4118 Westlawn, Iowa City, IA 52242. For more information, please see the [University of Iowa Gerontological Nursing Interventions Research Center Web site](#).

## **AVAILABILITY OF COMPANION DOCUMENTS**

Appendices A - F of the original guideline document contain assessment tests (e.g., Thrombosis Risk Factor Assessment, Deep Vein Thrombosis Prevention Knowledge Assessment Test), process evaluation monitors, and a schematic of the coagulation cascade. Available from the [University of Iowa Gerontological Nursing Interventions Research Center Web site](#).

## **PATIENT RESOURCES**

None available

## **NGC STATUS**

This summary was completed by ECRI on November 19, 1999. The information was verified by the guideline developer as of January 20, 2000. This NGC summary was updated by ECRI on June 13, 2006. The updated information was verified by the guideline developer on June 27, 2006. This summary was updated by ECRI on March 6, 2007 following the U.S. Food and Drug Administration (FDA) advisory on Coumadin (warfarin sodium). This summary was updated by ECRI Institute on June 22, 2007 following the U.S. Food and Drug Administration (FDA)

advisory on heparin sodium injection. This summary was updated by ECRI Institute on September 7, 2007 following the revised U.S. Food and Drug Administration (FDA) advisory on Coumadin (warfarin). This summary was updated by ECRI Institute on March 14, 2008 following the updated FDA advisory on heparin sodium injection.

## **COPYRIGHT STATEMENT**

This summary is based on content contained in the original guideline, which is subject to terms as specified by the guideline developer. These summaries may be downloaded from the NGC Web site and/or transferred to an electronic storage and retrieval system solely for the personal use of the individual downloading and transferring the material. Permission for all other uses must be obtained from the guideline developer by contacting the University of Iowa Gerontological Nursing Intervention Research Core.

## **DISCLAIMER**

### **NGC DISCLAIMER**

The National Guideline Clearinghouse™ (NGC) does not develop, produce, approve, or endorse the guidelines represented on this site.

All guidelines summarized by NGC and hosted on our site are produced under the auspices of medical specialty societies, relevant professional associations, public or private organizations, other government agencies, health care organizations or plans, and similar entities.

Guidelines represented on the NGC Web site are submitted by guideline developers, and are screened solely to determine that they meet the NGC Inclusion Criteria which may be found at <http://www.guideline.gov/about/inclusion.aspx>.

NGC, AHRQ, and its contractor ECRI Institute make no warranties concerning the content or clinical efficacy or effectiveness of the clinical practice guidelines and related materials represented on this site. Moreover, the views and opinions of developers or authors of guidelines represented on this site do not necessarily state or reflect those of NGC, AHRQ, or its contractor ECRI Institute, and inclusion or hosting of guidelines in NGC may not be used for advertising or commercial endorsement purposes.

Readers with questions regarding guideline content are directed to contact the guideline developer.

© 1998-2008 National Guideline Clearinghouse

Date Modified: 11/3/2008

