# Complete Summary

## GUIDELINE TITLE

Prevention of thromboembolism in spinal cord injury.

## BIBLIOGRAPHIC SOURCE(S)

Paralyzed Veterans of America/Consortium for Spinal Cord Medicine. Prevention of thromboembolism in spinal cord injury. Washington (DC): Paralyzed Veterans of America (PVA); 1999 Sep. 29 p. [64 references]

## GUIDELINE STATUS

This is the current release of the guideline. This guideline updates a previously released version (Prevention of thromboembolism in spinal cord injury. J Spinal Cord Med 1997 Jul;20[3]:259-83).

According to the guideline developer, this guideline is still considered to be current as of January 2005, based on a review of literature published since the original guideline publication.

## ** 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

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## SCOPE

### DISEASE/CONDITION(S)

Venous thromboembolism in spinal cord injury

### GUIDELINE CATEGORY

Evaluation
Management
Prevention

### CLINICAL SPECIALTY

Critical Care
Family Practice
Internal Medicine
Neurological Surgery
Orthopedic Surgery
Physical Medicine and Rehabilitation

### INTENDED USERS

Advanced Practice Nurses
Nurses
Physician Assistants
Physicians

### GUIDELINE OBJECTIVE(S)

To improve outcomes for individuals with spinal cord injury by decreasing the frequency and severity of thromboembolic complications by:

- Providing a rationale for the implementation of thromboprophylaxis
- Making available to providers the best current knowledge and expert consensus regarding safe and effective prophylaxis procedures
- Encouraging providers to reexamine their practice patterns and to individualize treatment based on patient characteristics
- Stimulating future research to fill gaps in knowledge regarding thromboprophylaxis for spinal cord injury

## TARGET POPULATION

Individuals with spinal cord injury (SCI)

## INTERVENTIONS AND PRACTICES CONSIDERED

Prophylactic interventions for thromboembolic disease, including:

1. Compression hose or pneumatic device alone or in combination with antithrombotic agents, such as aspirin, dipyridamole, or heparin
2. Vena cava filter placement
3. Anticoagulant therapy with low molecular weight heparin (e.g., enoxaparin, tinzaparin) or adjusted dose unfractionated heparin
4. Ultrasound of lower extremities and/or ventilation/perfusion lung scanning, if prophylaxis failure
5. Mobilization and passive exercise once patient is medically and surgically stable
6. Training of health care professionals to recognize signs/symptoms of deep vein thrombosis and to apply prophylactic measures, with appropriate monitoring for side effects of treatment
7. Patient and family education on recognition and prevention of deep vein thrombosis

## MAJOR OUTCOMES CONSIDERED

- Incidence of deep vein thrombosis or pulmonary embolism
- Hemorrhagic episodes
- Mortality
- Quality of life

# METHODOLOGY

## METHODS USED TO COLLECT/SELECT EVIDENCE

Searches of Electronic Databases

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

An extensive literature search was performed. Sources included MEDLINE and several other databases and covered materials published in English as well as in most European languages. The search strategy included MeSH heading and key word searches and focused on spinal cord injury (SCI) and deep venous thrombosis (DVT) or other thromboembolic (TE) events. The time period from 1975 to 1999 was examined; more than 126 articles were reviewed. Information was extracted from each article and compiled into summary tables according to the epidemiology of deep venous thrombosis/thromboembolic event, the diagnosis of deep venous thrombosis/thromboembolic event, the prophylactic therapy for deep venous thrombosis/thromboembolic event, and the therapy/management approaches for deep venous thrombosis/thromboembolic event. A separate search was conducted for vena cava filter; some 30 articles published from 1990 to 1999 were retrieved and reviewed.

## NUMBER OF SOURCE DOCUMENTS

156 articles were reviewed

## 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

**Hierarchy of the Levels of Scientific Evidence**:

I. Large randomized trials with clear-cut results
II. Small randomized trials with uncertain results
III. Nonrandomized trials with concurrent or contemporaneous controls
IV. Nonrandomized trials with historical controls
V. Case series with no controls

## METHODS USED TO ANALYZE THE EVIDENCE

Review of Published Meta-Analyses
Systematic Review

## DESCRIPTION OF THE METHODS USED TO ANALYZE THE EVIDENCE

Each guideline recommendation is justified in terms of the level of evidence supporting it, with level I begin the strongest evidence and level V the weakest. Unfortunately, randomized, controlled clinical trials-level I evidence-have been conducted infrequently in patients with spinal cord injury. However, such studies have been done in patients undergoing joint replacement surgery, hip fracture, and stroke so that surrogate evidence for safety and efficacy is available. In addition, observational studies and clinical experience do provide important, though by no means infallible, support for some recommendations.

Next, each of the guideline recommendations was classified depending upon the level of scientific evidence supporting the specific recommendations. In situations where no published literature existed, consensus of the panel members and outside expert reviewers was used to develop the guideline recommendation and is indicated as "expert consensus."

After deliberation and discussion of each guideline recommendation and the supporting evidence, the level of panel agreement with the recommendation was assessed as either low, moderate, or strong, In this assessment, each panel member was asked to indicate his or her level of agreement on a 5-point scale, with 1 corresponding to "neutrality and 5 corresponding to "maximum agreement." The scores were aggregated across the panel members and an arithmetic mean was calculated. This mean score was translated into low, moderate, or strong.

See the "Major Recommendations" field for full definitions of the hierarchy of scientific evidence, grades of recommendations, and strength of panel opinion.

## METHODS USED TO FORMULATE THE RECOMMENDATIONS

Expert Consensus

## DESCRIPTION OF METHODS USED TO FORMULATE THE RECOMMENDATIONS

Panel members were asked to prepare a brief summary of the issues in their areas of expertise based on the published literature and on their own clinical experience. Next, a meeting of the panel was convened, and the summaries drafted by each panelist were thoroughly discussed. These discussions led to specific recommendations for management. Over a period of 2 months, panelists revised their drafts and recommendations, which were then forwarded to the Chair to be edited and incorporated into the complete document. Copies of the full draft guidelines were then submitted to representatives of each Consortium member organization for critique and amendment.

## RATING SCHEME FOR THE STRENGTH OF THE RECOMMENDATIONS

**Categories of the Strength of Evidence Associated with the Recommendation**:

A. The recommendation is supported by scientific evidence from properly designed and implemented controlled trials providing statistical results that consistently support the guidelines statement
B. The recommendation is supported by scientific evidence from properly designed and implemented clinical series that support the guidelines statement
C. The recommendation is supported by expert opinion

## COST ANALYSIS

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

## METHOD OF GUIDELINE VALIDATION

External Peer Review
Internal Peer Review

## DESCRIPTION OF METHOD OF GUIDELINE VALIDATION

The database of articles on spinal cord injury was sent to all members of the guideline panel, who were asked to prepare a brief summary of the issues in their areas of expertise based on the published literature and their own clinical experience. Next, a meeting of the panel was convened, and the summaries drafted by each panelist were thoroughly discussed. These discussions led to specific recommendations for management. Over a period of 2 months, panelists

revised their drafts and recommendations, which were then forwarded to the Chair to be edited and incorporated into the complete document. Copies of the full draft guidelines were submitted to representatives of each Consortium member organization for critique and amendment. Subject matter experts from each consortium member organization and legal consultants were involved in this review. Fifty expert reviewers are acknowledged in the guideline.

## RECOMMENDATIONS

### MAJOR RECOMMENDATIONS

#### Mechanical Methods of Prophylaxis

1. **Whenever possible, compression hose or pneumatic devices should be applied to the legs of all patients for the first 2 weeks following injury. External pneumatic compression devices may be knee or thigh length with single or sequential chamber compression. The effectiveness of these devices may be enhanced by combining them with other antithrombotic agents**.

   (*Scientific evidence-level I; Grade of recommendation - A; Strength of panel opinion - strong)*.

2. **During every nursing shift, compression modalities should be inspected for proper placement and the underlying skin examined for evidence of abrasions, ecchymoses, or injury. In patients whose thromboprophylaxis has been delayed for more than 72 hours after injury, tests to exclude the presence of leg thrombi should be performed prior to applying compression devices**.

   (*Scientific evidence-NA; Grade of recommendation - expert consensus; Strength of panel opinion - strong*)

3. **Vena cava filter placement is indicated in spinal cord injury patients who have failed anticoagulant prophylaxis or who have a contraindication to anticoagulation, such as active or potential bleeding sites not amenable to local control (e.g., the central nervous system, gastrointestinal tract, or lungs). Filters should also be considered in patients with complete motor paralysis due to lesions in the high cervical cord (C2, C3), with poor cardiopulmonary reserve, or with thrombus in the inferior vena cava despite anticoagulant prophylaxis. However, filter placement is not a substitute for thromboprophylaxis, which should be commenced as soon as feasible. Furthermore, filter placement may increase the risk for future development of deep vein thrombosis**.

   (*Scientific evidence-level IV; Grade of recommendation - C; Strength of panel opinion - moderate*)

   Adverse experiences reported with vena cava filters include cava thrombosis, filter migration, perforation of the vena cava, and complications at the skin

insertion site. The frequency of these problems using the newer small caliber systems and percutaneous insertion is low. Filter malposition is usually due to poor insertion technique, but also can be related to anomalies involving the cava or renal veins or to the presence of intracaval thrombus. This complication can be largely eliminated by the use of routine preinsertion inferior vena cavagrams and fluoroscopic guidance, which should be a prerequisite to filter placement. A follow-up plain film of the abdomen should always be obtained immediately after the procedure to document filter position. Recurrent pulmonary embolism (defined as embolization with the filter in place) is reported in 2 percent to 5 percent of patients.

**Anticoagulant Prophylaxis**

4. **Anticoagulant prophylaxis with either low molecular weight heparin (LMWH) or adjusted dose unfractionated heparin should be initiated within 72 hours after spinal cord injury, provided there is no active bleeding or coagulopathy**.

   (*Scientific evidence-one level II study; Grade of recommendation - B; Strength of panel opinion - strong*).

5. **Anticoagulants should be continued until discharge in patients with incomplete injuries, for 8 weeks in patients with uncomplicated complete motor injury, and for 12 weeks or until discharge from rehabilitation for those with complete motor injury and other risk factors (e.g., lower limb fractures, a history of thrombosis, cancer, heart failure, obesity, or age over 70). This recommendation also applies to those with inferior vena cava filters, because such persons are at increased risk for deep vein thrombosis**.

   (*Scientific evidence-level IV studies; Grade of recommendation - C; Strength of panel opinion - strong*).

**Prophylaxis Based on Patient Stratification for Risk**

6. **Patients with complete motor and/or incomplete nonfunctional motor involvement should be on prophylactic measures for venous thromboembolism as early as possible**.

   (*Scientific evidence-level I; Grade of recommendation - A; Strength of panel opinion - strong*).

   Many studies have shown that the risk of thromboembolism in spinal cord injury increases rapidly following injury and is maximal between days 7 and 10. Anticoagulants may be withheld during the first 24 to 48 hours after injury because of concern for bleeding complications and for potential neurological deterioration. The incidence of venous thromboembolism within the first 72 hours is probably small, but measures such as mechanical devices and physical modalities should be implemented to prevent thromboembolism. If surgical intervention such as spinal stabilization is required, heparin or low molecular weight heparin may be withheld the morning of the procedure and

resumed the next day. Physical modalities, including compression devices, should be continued if possible during this period.

7. **Spinal cord injured patients with functional motor movements or with no significant motor/neurological deficits should be on prophylactic measures as early as possible**.

   (*Scientific evidence-level I; Grade of recommendation - A; Strength of panel opinion - strong*).

   Because of prolonged bed rest and concomitant injuries, these patients should be on prophylactic measures, at least until they are ambulatory.

8. **The duration of the prophylaxis for thromboembolism should be individualized, depending on the need, medical condition, functional status, support services, and risk of the patient**.

   (*Scientific evidence-level II; Grade of recommendation - B; Strength of panel opinion - strong*).

   See the original guideline for a discussion of the evidence relating to duration of prophylaxis after spinal cord injury.

9. **Reinstitution of prophylactic measures should be considered in chronic spinal cord injury patients if they are immobilized with bed rest for a prolonged period of time, are readmitted for medical illnesses or altered medical conditions, or undergo surgical procedures**

   (*Scientific evidence-level I; Grade of recommendation - A; Strength of panel opinion - strong*).

   **Failure of Prophylaxis**

10. **In symptomatic patients, perform ultrasound of the lower extremities and/or ventilation/perfusion lung scanning. If clinical suspicion is strong but the tests are negative or indeterminate, obtain venography of the legs, spiral computerized tomography of the lungs, or pulmonary angiography**.

    (*Scientific evidence-level I; Grade of recommendation - A; Strength of panel opinion - strong*).

    Failure of prophylaxis should be suspected in individuals with unexplained fever; unilateral leg swelling, pain, or erythema; or sudden onset of hypotension, tachycardia, tachypnea, chest pain, cardiac arrhythmia, or hypoxemia. Although the ultrasound examination of the lower extremities is highly sensitive and specific in symptomatic persons, its is less sensitive in those who are asymptomatic, and venography may be necessary to establish a diagnosis.

Ventilation/perfusion lung scans are interpreted as normal or high, intermediate, or low probability of pulmonary embolism. Only normal or high probability lung scans are regarded as definitive; scans in the other categories offer no assurance that patients have or do not have thromboses, and therefore further evaluation, such as spinal computerized tomography of the chest or pulmonary angiography, is required if there is a strong clinical suspicion of thromboembolism.

**Exercise, Passive Movement, and Early Mobilization**

11. **Early mobilization and passive exercise should be initiated as soon as the patient is medically and surgically stable. These activities should be coordinated with other preventative modalities. With documented deep venous thrombosis, mobilization and exercise of the lower extremities should be withheld 48 to 72 hours until appropriate medical therapy is implemented**.

    (*Scientific evidence-NA; Grade of recommendation - expert consensus; Strength of panel opinion - strong*).

    Physical therapy has been a routine part of acute spinal cord injury treatment for decades. The physical therapy assessment and treatment focuses on respiratory function, muscle strength, joint range of motion, and skin condition. Orientation to the vertical position and initiation of functional activities begin when spinal stability has been established. In terms of prevention of deep vein thrombosis, it is widely held that early mobilization and movement of the extremities are essential parts of treatment.

    In the acute phase of spinal cord injury management, physical therapy intervention can begin immediately in the intensive care unit. The goal of range-of-motion activities is to prevent joint contractures. However, because of spinal instability, certain precautions may be necessary. Range-of-motion activities of the shoulder and arms must be limited in patients with cervical injuries. Similarly, hip flexion and extension should be limited in individuals with low thoracic and lumbar injuries. Movement of the extremities occurs passively or, if possible, actively. With incomplete injuries, active muscle contraction may be possible. Movement and strengthening activities can become more vigorous as the patient is cleared for more functional activity and as he or she moves into the postacute phase.

**Educational Priorities for Health Care Professionals**

12. **Health care professionals should be aware of the signs and symptoms of deep venous thrombosis and should perform physical assessment to detect this complication. Appropriate prophylactic measures, including application of mechanical devices and administration of anticoagulant agents, should be implemented. Patients, family members, and significant others should be educated in the recognition and prevention of deep venous thrombosis**.

    (*Scientific evidence-NA; Grade of recommendation - expert consensus; Strength of panel opinion - strong*).

With an understanding of the rate of incidence, risk factors, pathophysiology, clinical presentation, and treatment strategies, health care professionals can be instrumental in preventing and treating deep vein thrombosis. Physical assessment should be performed on each patient twice daily. All extremities should be inspected for the following signs of deep vein thrombosis:

- An increase in the circumference of the calf or thigh (unilateral edema)
- An increase in the venous pattern of collateral veins in the affected extremity
- Pain, tenderness, and/or heaviness of the affected extremity
- A low-grade fever of unknown origin

The patient also should be monitored for clinical manifestations of pulmonary embolus, which include chest pain, breathlessness, apprehension, fever, and cough. The neurovascular status of the extremities also should be assessed. The physician should be notified if there is a change in baseline signs and symptoms, and the patient should be immobilized until seen by a physician.

Because patients are frequently asymptomatic, health care professionals need to understand what factors increase the risk of developing a thromboembolism. In persons with spinal cord injury, immobilization due to paralysis or to concomitant injuries, such as lower limb fractures, greatly increase the risk of thrombosis. Other risk factors include dehydration, obesity, age over 40, malignancy, congestive heart failure, estrogen therapy, pregnancy, and a history of thrombosis.

Additional interventions should include the performance of active and passive range-of-motion exercises and the application of elastic support hose and mechanical devices. Elastic support, such as elastic bandages or compression stockings, should be worn to promote venous return and to control edema. The devices should be removed twice daily and the legs and feet carefully inspected for signs of erythema, ecchymoses, or skin breakdown. Hose must be applied so that tight bands around the limb are avoided. If pneumatic compression systems are implemented, they must be monitored regularly to assure correct placement of the sleeves and proper function of the pump. The extremities must be examined before and after the application of stockings and sleeves to make certain that the integrity of the underlying skin is not compromised from pressure exerted by the devices. Pneumatic compression systems--intermittent or sequential--are contraindicated in patients with severe arterial insufficiency.

A baseline partial thromboplastin time, prothrombin time, and platelet count should be obtained before heparin and/or warfarin therapy are initiated. Patients receiving heparin should be observed for signs of heparin-induced thrombocytopenia, which usually appear 5 to 7 days after initial exposure to heparin, or sooner with reexposure to heparin. The diagnosis is suspected if the platelet count declines by 50 percent or more and/or if signs of venous or arterial occlusion occur: stroke, myocardial infarction, or acute arterial or venous thrombosis. Patients also should be monitored for signs of bleeding, including epistaxis, hematoma, hematuria, melena, and/or decrease in hemoglobin and hematocrit.

Intake and output should be monitored and fluids administered as needed to maintain fluid balance and avoid dehydration. The legs should be elevated above the level of the heart. Elevation of the knees--using either pillows or the bed adjustment--should be avoided, as this creates a jack-knife position that can promote venous obstruction, venous hypertension, and thrombus formation. If elevation of the foot gatch is required, the knee section of the bed also should be raised to prevent hyperextension of the leg.

Comprehensive patient and staff educational programs should include information about the signs and symptoms of thromboembolism, the importance of physician notification if thrombosis is suspected, and the common risk factors that increase the likelihood of clotting. Interventions that protect against thrombosis should be emphasized:

- Exercise
- Weight loss
- Cessation of smoking
- Good elastic support
- Avoidance of constricting garters, leg bag straps, tight knee-high boots, girdles, or overly tight pantyhose or slacks

If the patient is receiving anticoagulant therapy, instructions should include the purpose of the drug, the side effects (e.g., bleeding), potential drug and food interactions, and the need for regular laboratory monitoring and medical follow-up. Written instructions should be provided whenever possible, and documentation of drugs, dose, and instructions in the medical record is always advisable.

**Definitions**:

**Hierarchy of the Levels of Scientific Evidence**:

I. Large randomized trials with clear-cut results
II. Small randomized trials with uncertain results
III. Nonrandomized trials with concurrent or contemporaneous controls
IV. Nonrandomized trials with historical controls
V. Case series with no controls

**Grade of Recommendations**:

A. Guideline recommendation is supported by one or more Level I studies
B. Guideline recommendation is supported by one or more Level II studies
C. Guideline recommendation is supported only by Level III, IV, or V studies

**Strength of Panel Opinion**:

Low - 1.0 to less than 2.33

Moderate - 2.33 to less than 3.67

Strong - 3.67 to 5.0

## CLINICAL ALGORITHM(S)

None provided

## EVIDENCE SUPPORTING THE RECOMMENDATIONS

### TYPE OF EVIDENCE SUPPORTING THE RECOMMENDATIONS

Randomized, controlled clinical trials-level I evidence-have been conducted infrequently in patients with spinal cord injury. However, such studies have been done in patients undergoing joint replacement surgery, hip fracture, and stroke so that surrogate evidence for safety and efficacy is available. In addition, observational studies and clinical experience do provide important, though by no means infallible, support for some recommendations. In situations where no published literature existed, consensus of the panel members and outside expert reviewers was used to develop the guideline recommendation and is indicated as expert opinion.

The type of supporting evidence is identified for each recommendation (see "Major Recommendations").

## BENEFITS/HARMS OF IMPLEMENTING THE GUIDELINE RECOMMENDATIONS

### POTENTIAL BENEFITS

- Decreased incidence of deep venous thrombosis in the first 72 hours postinjury
- Decreased incidence of death in the first year following spinal cord injury
- Decreased incidence of thromboembolic events

**Subgroups Most Likely to Benefit**:

Patients at highest risk for thromboembolism, based on degree of motor involvement (see table 1 in the original guideline for a clinical decision table concerning level of risk and intensity and duration of prophylaxis)

### POTENTIAL HARMS

- Adverse experiences reported with vena cava filters include cava thrombosis, filter migration, perforation of the vena cava, and complications at the skin insertion site. The frequency of these problems using the newer small caliber systems and percutaneous insertion is low. Filter malposition is usually due to poor insertion technique, but also can be related to anomalies involving the cava or renal veins or to the presence of intracaval thrombus. This complication can be largely eliminated by the use of routine preinsertion inferior vena cavagrams and fluoroscopic guidance, which should be a prerequisite to filter placement. A follow-up plain film of the abdomen should always be obtained immediately after the procedure to document filter position. Recurrent pulmonary embolism (defined as embolization with the filter in place) is reported in 2 percent to 5 percent of patients.

- Complications of anticoagulant therapy include hemorrhage, heparin-induced thrombocytopenia, and heparin-induced osteoporosis.

## QUALIFYING STATEMENTS

### QUALIFYING STATEMENTS

This guideline has been prepared based on scientific and professional information available in September 1999. Users of this guide should periodically review this material to ensure that the advice herein is consistent with current reasonable clinical practice.

The panelists recognize that these guidelines are but a first draft in what must be an ongoing dialogue among patients, members of the medical community, and researchers and practitioners who prepare documents such as this. Although every effort has been made to provide a comprehensive statement of the problem, some issues may have been overlooked or not dealt with completely. Some areas are controversial and clearly require further study. And some of the recommended devices and medications may soon become obsolete as other, safer, more effective agents take their place. In 1999, the panel considered three new references in the literature and modified appropriate recommendations accordingly. It is our fervent hope that these guidelines will stimulate new research into the pathophysiology, management, and prevention of thromboembolism in spinal injury and will lead to improved patient outcomes.

The guidelines apply not only to the period immediately following injury, but also to the months and years when longer term prophylaxis is needed.

## IMPLEMENTATION OF THE GUIDELINE

### DESCRIPTION OF IMPLEMENTATION STRATEGY

Distribution via consortium dissemination strategy including twelve (12) avenues of distribution and utilization.

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

### IOM CARE NEED

Staying Healthy

### IOM DOMAIN

Effectiveness
Patient-centeredness

## IDENTIFYING INFORMATION AND AVAILABILITY

### BIBLIOGRAPHIC SOURCE(S)

Paralyzed Veterans of America/Consortium for Spinal Cord Medicine. Prevention of thromboembolism in spinal cord injury. Washington (DC): Paralyzed Veterans of America (PVA); 1999 Sep. 29 p. [64 references]

### ADAPTATION

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

### DATE RELEASED

1997 Feb (updated 1999 Sep; reviewed 2005)

### GUIDELINE DEVELOPER(S)

Consortium for Spinal Cord Medicine - Private Nonprofit Organization
Paralyzed Veterans of America - Private Nonprofit Organization

### GUIDELINE DEVELOPER COMMENT

Consortium Member Organizations include: American Academy of Orthopedic Surgeons, American Academy of Physical Medicine and Rehabilitation, American Association of Neurological Surgeons, American Association of Spinal Cord Injury Nurses, American Association of Spinal Cord Injury Psychologists and Social Workers, American Congress of Rehabilitation Medicine, American Occupational Therapy Association, American Paraplegia Society, American Physical Therapy Association, American Psychological Association, American Spinal Injury Association, Association of Academic Physiatrists, Association of Rehabilitation Nurses, Congress of Neurological Surgeons, Insurance Rehabilitation Study Group, Paralyzed Veterans of America, U.S. Department of Veterans Affairs.

### SOURCE(S) OF FUNDING

Paralyzed Veterans of America

### GUIDELINE COMMITTEE

Guideline Development Panel

### COMPOSITION OF GROUP THAT AUTHORED THE GUIDELINE

The panel was composed of three specialists in internal medicine, two in physical medicine and rehabilitation, and one specialist each in nursing, physical therapy, pharmacology and radiology, and a methodologist.

*Names of Panel Members*: David Green, MD, PhD (Chair); Andrea K. Biddle, PhD, MPH (Methodologist); Victoria Fahey, RN, MSN; Geoffrey A. Gardiner, Jr., MD;

Russell Hull, MD; Michael Y. Lee, MD; Geno J. Merli, MD; Kurt Mossberg, PT, PhD; Graham Pineo, MD; Kristjan Ragnarsson, MD (Steering Committee Liaison); David Rosenbloom, DPharm; Kit N. Simpson, PhD (Methodologist); Jonathan R. Strayer, MD

## FINANCIAL DISCLOSURES/CONFLICTS OF INTEREST

Not stated

## GUIDELINE STATUS

This is the current release of the guideline. This guideline updates a previously released version (Prevention of thromboembolism in spinal cord injury. J Spinal Cord Med 1997 Jul;20[3]:259-83).

According to the guideline developer, this guideline is still considered to be current as of January 2005, based on a review of literature published since the original guideline publication.

## GUIDELINE AVAILABILITY

Electronic copies: Available from the Paralyzed Veterans of America (PVA) Web site.

Print copies: Single copies available from the Consortium for Spinal Cord Medicine, Clinical Practice Guidelines, 801 18th Street, NW, Washington, DC 20006.

## AVAILABILITY OF COMPANION DOCUMENTS

None available

## PATIENT RESOURCES

None available

## NGC STATUS

This summary was completed by ECRI on June 30, 1998. The information was verified by the guideline developer on December 1, 1998. This summary was updated by ECRI on December 11, 2001. The information was verified by the guideline developer on January 3, 2002. 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 13, 2008 following the updated FDA advisory on heparin sodium injection.

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