Recognizing and managing DVT (deep vein thrombosis)
DEEP VEIN THROMBOSIS (DVT) affects more than 2.5 million people every year. In itself, the formation of a DVT in the leg isn’t life-threatening, but if the clot embolizes to the lungs, it can cause a pulmonary embolus (PE). A PE may be so mild that the patient doesn’t even notice symptoms, or severe enough to cause an immediate cardiac arrest.

Identifying and treating DVT before a life-threatening complication develops is crucial. In this article, I’ll review the pathophysiology, risk factors, and causes of DVT, plus your role in assessment and patient teaching.

Pathophysiology of DVT
Originating in a deep vein, DVT usually occurs in the lower leg. However, it may also affect an arm in the presence of an indwelling venous catheter, compression injury to the arm, or compression of the subclavian vein by a rib.

Various factors influence blood flow through the legs. Veins, which return blood to the heart, are designed for unidirectional blood flow; valves in the veins prevent blood backflow, which would cause blood to pool and distend the veins. When people stand, the pressure exerted by the column of blood easily exceeds the pressure of the blood coming through the capillary bed into the venous system. However, when their calf muscles tighten—for example, when they walk—they compress the tissue around the veins, increasing pressure and moving venous blood up the leg. With prolonged immobility, the normal pump action of the calf muscles is lost, putting patients at risk for venous stasis and DVT formation.

Three causes of trouble
DVT rarely occurs in the absence of certain risk factors. Knowing what they are will help you identify patients at risk and perform a more focused physical examination.

Virchow’s triad—changes in blood coagulability, changes in the vessel wall, and changes in blood flow—are the three main factors linked to DVT development. (For more details, see A Closer Look at Virchow’s Triad.) The more risk factors present, the more likely that a DVT will develop.

Because a DVT inevitably causes vein inflammation, both thrombosis and thrombophlebitis are used to describe the process. The inflammation may also destroy the valves involved, contributing to postthrombotic syndrome, a chronic inflammation of the affected veins that develops in 40% to 60%
of patients with DVT.

However, if the thrombus doesn’t completely occlude the vein and the patient has adequate collateral circulation, he may remain asymptomatic: More than 50% of DVTs don’t cause symptoms initially. The first hint of trouble for some patients is the sudden onset of unexplained tachycardia, tachypnea, anxiety, and hypoxia, indicating a PE. Although the mortality associated with PE is variable, it can be as high as 25%.

A careful history and physical assessment may help you detect subtle clinical evidence of DVT before your patient develops PE or another dangerous complication.

One of the most reliable physical findings in DVT is unilateral edema of the affected leg. Measure both legs at mid thigh and mid calf and compare the circumferences to each other and to earlier measurements. An initial finding of a difference in circumference between the left and right leg may not be significant, but any increase in circumference should be reported and documented. Other common physical signs of DVT include warmth and erythema of the affected extremity.

The patient may experience pain or tenderness in the calf in response to movement or pressure or when he stands. Homans’ sign—increased resistance or pain that occurs in the calf on forced dorsiflexion of the foot—has been historically considered an indication of DVT, but it’s an unreliable diagnostic sign: Calf pain from muscular injury will also elicit Homans’ sign.

**Testing, testing**

Because many DVTs are difficult to detect clinically, diagnostic studies may be indicated. One of the simplest is duplex venous ultrasonography, which may be performed at the bedside. Ultrasound imagery can reveal a thrombus in a deep vein; the Doppler ultrasound measures the blood flow velocity in veins and can detect flow abnormalities.

Although a duplex study is noninvasive and relatively simple to perform, its accuracy depends upon the technician’s skill. If the ultrasound is negative for DVT and the health care team still suspects that the patient has DVT, a venogram may be indicated to make a definitive diagnosis.

**Although it’s being replaced by ultrasound, the venogram is still considered by many health care providers to be the gold standard for diagnosing DVT.**

Magnetic resonance imaging (MRI) is another noninvasive study that can be used to detect DVT in the proximal deep veins. Whether to use this test or a venogram depends on the patient’s clinical findings; MRI is more useful than venography in patients with suspected DVT of the inferior vena cava or pelvic veins.

Although it’s being replaced by ultrasound, the venogram is still considered by many health care providers to be the gold standard for diagnosing DVT. During this invasive test, the patient is placed on a fluoroscopic table that’s usually tilted 45 degrees, and a contrast medium is injected into a superficial foot vein. A clinician observes the flow of contrast medium by fluoroscopy and takes X-rays; if the contrast doesn’t fill the veins normally, acute DVT is confirmed.

Complications of venography include hypersensitivity reactions to the contrast medium, acute renal failure because of the volume of contrast medium used, and extravasation of the contrast medium (especially in patients with a history of arterial insufficiency because of tissue necrosis and ulceration). The risk of acute renal failure is higher in the elderly and in patients with diabetes, hyperuricemia, or multiple myeloma.

Postprocedural thrombophlebitis, another possible complication, is related to the concentration and osmolality of the contrast medium used and the length of time it was in contact with the venous endothelium.

A D-dimer test is a blood test to measure fibrin degradation fragments generated by fibrinolysis. Elevated D-dimer levels indicate a thrombotic process but aren’t specific to DVT. This test is useful as an adjunct to noninvasive testing. If the patient has a low clinical probability of DVT and a negative D-dimer, DVT can be ruled out without an ultrasound.

**Clot-busting strategies**

Treatment for DVT has three goals: to prevent PE, halt further thrombus formation, and dissolve the existing thrombus by letting the body’s own fibrinolytic system work.

Effective, prompt treatment significantly decreases the likelihood of future episodes of DVT, which can occur in up to 33% of patients within 5 years. Treatment also may prevent the development of postthrombotic syndrome.

The cornerstone of DVT treatment is dose-adjusted, intravenous (I.V.) unfractionated heparin, which prevents the formation of new thrombi and growth of the existing thrombi.

Baseline serum lab values such as activated partial thromboplastin time (aPTT), prothrombin time (PT), international normalized ratio (INR), and platelet counts must be obtained. The goal of heparin therapy, according to the American College of Chest Physicians (ACCP) guidelines, is to maintain the aPTT between 1.5 and 2.3 times the mean normal.
The other lab values are drawn to identify bleeding problems. Make sure you check the patient’s history for any contraindications to heparin therapy, such as a history of heparin-induced thrombocytopenia (HIT), recent trauma, or surgery. The ACCP guidelines recommend giving 5,000 units of I.V. heparin to patients with suspected DVT. Once DVT is confirmed, give another 80 units/kg, followed by a maintenance infusion of 18 units/kg. Check the patient’s aPTT level after 6 hours and adjust the heparin dosage to maintain a therapeutic level of 1.5 to 2.3 times the mean normal. Recheck the platelet count between days three and five.

Bleeding is the major risk with anticoagulant use, and increased heparin doses and age over 70 increase the risk. Most patients receiving anticoagulation are advised to take acetaminophen for pain or fever because of its relative safety compared with aspirin, which has an antiplatelet effect. Patients who’ve received epidural or spinal anesthesia, or who have an epidural catheter for analgesia, are at risk for developing epidural or spinal hematomas when on anticoagulants, so the ACCP recommends using anticoagulant prophylaxis or therapy with caution in these patients.

Another possible complication, HIT, is caused by an immune response to heparin that damages platelets. Heparin-induced thrombocytopenia may develop in 1 to 2 weeks in patients who haven’t been previously exposed to heparin; in patients who have been previously exposed, it may develop in as little as 24 hours.

Low-molecular-weight heparins (LMWHs), such as dalteparin and enoxaparin, are considered as safe and effective as unfractionated heparin. Because they don’t require I.V. access or aPTT or PT monitoring, they’re more convenient to use. Given subcutaneously (S.C.), the LMWHs have a more predictable dose-response relationship, offer weight-adjusted dosing without the need for lab monitoring, and can be given just once or twice a day on an outpatient basis to treat and prevent DVT.

Oral warfarin therapy should be started on the first day of LMWH therapy, with the dose adjusted to maintain the patient’s INR in the therapeutic range. After 4 or 5 days, the LMWH can be discontinued.

Before beginning therapy with an LMWH, obtain the same baseline serum lab values as for therapy with unfractionated heparin. The LMWHs are contraindicated in patients with HIT or other contraindications to heparin therapy. Although the LMWHs are less likely than unfractionated heparin to trigger HIT, you still must monitor for this and other possible complications. The ACCP recommends checking the patient’s platelet count between days three and five of LMWH therapy.

### A closer look at Virchow’s triad

<table>
<thead>
<tr>
<th>Common causes</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Changes in blood coagulability</strong></td>
</tr>
<tr>
<td>- Traumatic, burn, and surgical injuries, because of tissue damage, release of tissue factors, and activation of the extrinsic pathway of coagulation</td>
</tr>
<tr>
<td>- Cancer, because fibrinolytic activity may be reduced and because malignant tissue may promote coagulation</td>
</tr>
<tr>
<td><strong>Changes in the vessel wall</strong></td>
</tr>
<tr>
<td>- Atherosclerotic changes leading to rupture of plaque on the vessel wall exposes thrombogenic material, activating platelets and the coagulation cascade.</td>
</tr>
<tr>
<td><strong>Changes in blood flow</strong></td>
</tr>
<tr>
<td>- Stasis related to prolonged immobility, paralysis, varicose veins, or heart failure</td>
</tr>
<tr>
<td>- Increased blood viscosity</td>
</tr>
</tbody>
</table>

**After heparin, warfarin**

Initiate treatment with an oral anticoagulant, such as warfarin, within 24 hours after beginning treatment with unfractionated heparin or LMWH. You can give it through an enteric tube if the patient can’t swallow. After 4 to 5 days of combined therapy, heparin can be stopped if the patient’s INR is greater than 2 (the goal is an INR of 2.5; the INR should be in the range of 2 to 3). Warfarin stops clot formation by inhibiting clotting factors that are dependent on vitamin K. But it doesn’t take full effect for 3 to 4 days, which is why the patient needs treatment with heparin or an LMWH initially.

Typically, the patient takes an initial warfarin dose of 5 mg, followed by individualized doses as guided by the INR results. Most patients continue warfarin therapy for 3 to 6 months, although some—for example, those with recurrent DVT or a continuing risk factor such as cancer—may use it for 12 months or longer.

A recent study in *The New England Journal of Medicine* found that low-dose warfarin therapy with a target INR of 1.5 to 2.0 is highly effective in preventing recurrent DVT, without raising the risk of hemorrhage or stroke.

Like anticoagulants, warfarin may cause bleeding, so monitor the patient’s INR closely and watch for bleeding.

Fibrinolytic agents, such as streptokinase and tissue plasminogen activator, have been used with
heparin to treat some patients with venous thromboembolic disease. According to the ACCP, the best candidates are patients with hemodynamically unstable PE or massive ileofemoral thrombosis. Any systemic fibrinolytic therapy can cause bleeding.

Another option is catheter-directed fibrinolysis, in which the physician imbeds a catheter into the thrombus and infuses a fibrinolytic agent, avoiding the risks associated with systemic fibrinolytic therapy. Recently, percutaneous mechanical thrombectomy has been evaluated as an adjunct to catheter-directed fibrinolysis; this technique may be effective with a lower dose of fibrinolytic agent and a shorter infusion. When anticoagulant therapy is contraindicated or causes complications, or in cases of recurrent DVT despite adequate anticoagulation, the physician may place an inferior vena cava filter to prevent thrombi from migrating into the lungs. Complications include puncture site bleeding; PE and inferior vena cava occlusion are rare if the filter has been properly placed.

**Your role**
Because most patients with DVT are treated with anticoagulants, monitor closely for bleeding. Any change in level of consciousness may indicate intracranial bleeding. Also evaluate for minor bleeding in the urine or stool or from the skin or nose. Bloody vomit indicates bleeding in the upper gastrointestinal tract. If the patient is receiving heparin, make sure protamine sulfate is readily available to reverse heparin’s effect if excessive bleeding occurs. Also monitor the platelet count for signs of HIT.

If the patient will be receiving LMWHs as an outpatient, he (or a caregiver) must know how to give S.C. injections. Explain why he must continue the injections for the time ordered by the prescriber. Obtain a detailed history of all medications (prescription drugs, over-the-counter products, and herbal or nutritional supplements) for patients on warfarin because this drug interacts with many medications and foods.

If an interaction inhibits warfarin’s effect, the patient is at an increased risk for DVT and PE. If an interaction enhances warfarin’s effects, he’s at increased risk for bleeding. Teach him what he needs to know for safe, effective use of warfarin and tell him to talk with his health care provider before starting any new medication. He also needs regular follow-up testing.

Warfarin can cause potentially fatal necrosis of the skin and other tissues, although this is rare. This reaction usually occurs within 10 days of the start of therapy, so tell the patient to call his health care provider immediately if he notices any painful skin areas or sudden changes (such as bruising or darkening of the skin). Tissue damage occurs principally at sites with fatty tissue, such as the abdomen, breasts, buttocks, and thighs.

**Preventing DVT**
Because diagnosing DVT can be difficult, many providers order prophylactic therapy for patients at high risk, such as those undergoing major orthopedic surgery. One of the simplest ways to prevent DVT is by encouraging early ambulation after surgery. However, if the surgery lasts more than 45 minutes, thrombus formation may have a head start. Don’t rely on early ambulation alone to prevent DVT in a surgical patient, unless he’s under age 40, has no other risk factors, and will undergo surgery lasting less than 45 minutes.

To reduce the risk of DVT, apply graduated compression stockings before surgery and have the patient wear them continuously until he’s fully ambulatory. (These stockings also are used for patients after an acute DVT resolves, to increase venous flow and reduce swelling.) Another option for DVT prevention is intermittent pneumatic compression devices, which compress the leg and increase venous flow, decreasing venous pooling and stasis. The devices typically have two or three chambers imbedded in a sleeve that wrap around the leg. The devices mimic the venous pumping action of the calf muscles by alternately compressing the leg and then relaxing. Some of these devices use a sequential pattern of compression, starting at the ankle and moving up the leg. Correct sizing and application are crucial to successful use (see “Get Pumped Up to Prevent DVT” in the September issue of Nursing2002).

A relatively new device for the prevention of DVT is the venous plexus foot pump. The pump mimics the natural action of walking by intermittently compressing the sole of the foot and then relaxing. Some of these devices use a sequential pattern of compression, starting at the ankle and moving up the leg. Correct sizing and application are crucial to successful use. A relatively new device for the prevention of DVT is the venous plexus foot pump. The pump mimics the natural action of walking by intermittently compressing the sole of the foot and then relaxing. Some of these devices use a sequential pattern of compression, starting at the ankle and moving up the leg. Correct sizing and application are crucial to successful use.
Low-dose unfractionated heparin and LMWH also are used to prevent DVT. When using heparin prophylactically, the usual regimen is 5,000 units S.C. just before surgery and continued every 8 to 12 hours until the patient is discharged. This low-dose schedule of heparin administration doesn’t require lab monitoring because it has a very limited effect on the aPTT level and bleeding risk. Contraindications to heparin for DVT prevention include a previous hypersensitivity reaction to heparin or HIT.

An LMWH also can be given S.C. just before surgery. Therapy continues once or twice a day until the patient is discharged. Dosing regimens for each of the LMWHs are specific to each medication and vary according to patient risk level and the type of surgery or injury. Low-dose unfractionated heparin and LMWH can be used with mechanical methods in patients at moderate to high risk for DVT.

Warfarin, 5 mg, may be given the day of or the day after surgery. Subsequent daily doses are adjusted to achieve a target INR of 2 to 3 by the fifth day. The patient should continue warfarin for at least 6 weeks and possibly for as long as 6 months. Encourage your patient to engage in activity that will decrease the incidence of DVT, such as early ambulation and active leg exercises. Monitor for adequate fluid intake to prevent dehydration and changes in blood flow. Teach the patient to lower his risk of DVT by avoiding:

• any constricting clothing on the legs that might decrease venous flow
• sitting with knees bent or crossed for long periods
• standing for long periods.

Remind him that long car or airplane trips can increase the risk of DVT, so he should stay well hydrated and move around whenever possible or do leg exercises while sitting. By teaching your patient how to avoid problems, you may be able to help him avoid DVT in the future.

SELECTED REFERENCES

Michael W. Day is outreach educator and clinical nurse specialist for Northwest MedStar in Spokane, Wash., and a staff nurse in the intensive care unit of Sacred Heart Medical Center in Spokane.

University of Massachusetts Medical School Center for Outcomes Research
http://www.umassmed.edu/outcomes/dvt

Deep Vein Thrombosis Hub
http://www.projectlinks.org/thrombosis

Last accessed on April 1, 2003.

CE Test
Recognizing and managing deep vein thrombosis

Provider Accreditation:
This Continuing Nursing Education (CNE) activity for 2.0 contact hours and 0.5 pharmacology contact hour is provided by Lippincott Williams & Wilkins, which is accredited as a provider of continuing education in nursing by the American Nurses Credentialing Center’s Commission on Accreditation and by the American Association of Critical-Care Nurses (AACN 9722, CERP Category A). This activity is also provider approved by the California Board of Registered Nursing, Provider Number CEP 11749 for 2.0 contact hours and 0.5 pharmacology contact hour. LWW is also an approved provider of CNE in Alabama, Florida, and Iowa and holds the following provider numbers: AL #ABNP0114, FL #FBN2454, IA #75. All of its home study activities are classified for Texas nursing continuing education requirements as Type I.

Your certificate is valid in all states. This means that your certificate of earned contact hours is valid no matter where you live.

Payment and Discounts:
The registration fee for this test is $13.95.
• If you take two or more tests in any nursing journal published by LWW and send in your CE enrollment forms together, you may deduct $0.75 from the price of each test.
• We offer special discounts for as few as six tests and institutional bulk discounts for multiple tests. Call 1-800-933-6525, ext. 332, for more information.

Instructions:
• Read the article beginning on page 36.
• Take the test, recording your answers in the test answers section (Section B) of the CE enrollment form. Each question has only one correct answer.
• Complete registration information (Section A) and course evaluation (Section C).
• Mail completed test with registration fee to: Lippincott Williams & Wilkins, CE Dept., 16th Floor, 345 Hudson St., New York, NY 10014.
• Within 3 to 4 weeks after your CE enrollment form is received, you will be notified of your test results.
• If you pass, you will receive a certificate of earned contact hours and an answer key. If you fail, you have the option of taking the test again at no additional cost.
• A passing score for this test is 12 correct answers.
• Need CE STAT? Visit http://www.nursingcenter.com for immediate results, other CE activities, and your personalized CE planner tool.
• No Internet access? Call 1-800-933-6525, ext. 331 or ext. 332, for other rush service options.
• Questions? Contact Lippincott Williams & Wilkins: (212) 886-1331 or (212) 886-1332.

Registration Deadline: May 31, 2005
Recognizing and managing deep vein thrombosis

**GENERAL PURPOSE** To provide a comprehensive understanding of DVT. **LEARNING OBJECTIVES** After reading the preceding article and taking this test, you should be able to: 1. Explain the pathophysiology and clinical manifestations of DVT. 2. Identify diagnostic tests used to confirm DVT. 3. Outline management strategies for a patient with DVT.

1. Which statement is correct about DVT?
   a. The formation of a DVT is in itself life-threatening.
   b. If the clot embolizes to the lungs, it can cause a PE.
   c. DVT usually occurs in the arms.
   d. DVT frequently occurs in the absence of certain risk factors.

2. Which statement is correct about vein inflammation caused by DVT?
   a. Postthrombotic syndrome develops in 40% to 60% of patients with DVT.
   b. The term thrombophlebitis shouldn’t be used to describe the process.
   c. Inflammation doesn’t affect vein valves.
   d. Postthrombotic syndrome is an acute inflammation of the affected veins.

3. Which statement best describes clinical manifestations of DVT?
   a. 25% of DVTs don’t cause symptoms initially.
   b. The mortality rate associated with PE can be as high as 50%.
   c. A sudden onset of unexplained tachycardia, tachypnea, anxiety, and hypoxia may indicate a PE.
   d. DVTs are always symptomatic.

4. One of the most reliable physical findings in DVT is
   a. bilateral leg swelling.
   b. Homans’ sign.
   c. unilateral leg edema.
   d. pallor of the affected extremity.

5. Which statement is correct about Homans’ sign?
   a. It’s characterized by pain or tenderness in the thigh in response to movement or pressure.
   b. It’s elicited by forced plantar flexion of the foot.
   c. It’s a reliable diagnostic sign for DVT.
   d. Calf pain from muscular injury will also elicit Homans’ sign.

6. Which statement best describes duplex venous ultrasonography?
   a. It’s an invasive diagnostic study.
   b. It’s relatively complex to perform.
   c. Its accuracy doesn’t depend on the technican’s skill.
   d. It’s one of the simplest diagnostic studies to perform.

7. Which technique is considered the gold standard for diagnosing DVT?
   a. ultrasound imaging
   b. venography
   c. Doppler flow study
   d. MRI

8. Contrast medium extravasation during venography can have more serious consequences in patients with
   a. diabetes.
   b. hyperuricemia.
   c. arterial insufficiency.
   d. multiple myeloma.

9. Which statement is correct about a D-dimer test?
   a. Elevated levels are specific to DVT.
   b. Decreased levels indicate a thrombotic process.
   c. It’s a useful adjunct to noninvasive testing for DVT.
   d. It measures venous blood viscosity.

10. According to the ACCP guidelines, the goal of heparin therapy is to maintain the aPTT between
    a. 1.5 and 2.3 times the mean normal.
    b. 2.5 and 3.3 times the mean normal.
    c. 3.5 and 4.3 times the mean normal.
    d. 4.5 and 5.3 times the mean normal.

11. The ACCP guidelines recommend giving patients with suspected DVT
    a. 1,000 units of I.V. heparin.
    b. 3,000 units of I.V. heparin.
    c. 4,000 units of I.V. heparin.
    d. 5,000 units of I.V. heparin.

12. Once DVT is confirmed, the ACCP guidelines recommend a maintenance heparin infusion of
    a. 10 units/kg.
    b. 18 units/kg.
    c. 20 units/kg.
    d. 38 units/kg.

13. The major risk associated with anticoagulation use is
    a. bleeding.
    b. epidural hematomata.
    c. HIT.
    d. spinal hematomata.

14. Using LMWHs to treat a patient with DVT
    a. requires I.V. access for administration.
    b. offers weight-adjusted dosing without the need for lab monitoring.
    c. requires weekly PT monitoring.
    d. has a less predictable dose-response relationship.

15. Which statement is correct about oral warfarin therapy in DVT?
    a. It’s initiated 72 hours after beginning treatment with unfractionated heparin or LMWH.
    b. Heparin can be stopped after 4 to 5 days of combined therapy with warfarin if the patient’s INR is between 1.5 and 2.
    c. The typical initial dose is 5 mg, followed by individualized doses as guided by the INR results.
    d. Most patients continue therapy for 12 months or longer.

16. Which of the following mimics the venous pumping action of the calf muscles?
    a. inferior vena cava filter
    b. intermittent pneumatic compression device
    c. venous plexus foot pump
    d. graduated compression stockings

17. Cancer can cause changes in which component of Virchow’s triad?
    a. blood coagulability
    b. vessel walls
    c. blood flow
    d. blood viscosity

---

**Nursing2003, May, Recognizing and managing deep vein thrombosis**

**A. Registration Information:**

Last name ________________________ First name ________________________ MI ______

Address ________________________________________________________________

City __________________________________ State _________________ ZIP ____________

Telephone ______________________ Fax ______________________ E-mail ______________

Registration Deadline: May 31, 2005

Contact hours: 2.0 Pharmacology hours: 0.5 Fee: $13.95

**B. Test Answers:** Darken one circle for your answer to each question.

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th>b</th>
<th>c</th>
<th>d</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**C. Course Evaluation**

1. Did this CE activity’s learning objectives relate to its general purpose?  ❑ Yes  ❑ No
2. Was the journal home study format an effective way to present the material?  ❑ Yes  ❑ No
3. Was the content relevant to your nursing practice?  ❑ Yes  ❑ No
4. How long did it take you to complete this CE activity? ___ hours ___ minutes
5. Suggestion for future topics __________________________________________

---

**D. Two Easy Ways to Pay:**

❑ Check or money order enclosed (Payable to Lippincott Williams & Wilkins)
❑ Charge my ❑ Mastercard ❑ Visa ❑ American Express

Card # __________________________ Exp. date ______________

Signature ___________________________________________________________________

---

*In accordance with the Iowa Board of Nursing administrative rules governing grievances, a copy of your evaluation of the CE offering may be submitted directly to the Iowa Board of Nursing.*