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This Month

- **Venous thromboembolism prophylaxis in pediatric patients**

Key words: *pediatric patients, venous thromboembolism, prophylaxis.*

- **The Centers for Disease Control and Prevention surgical wound classification system**

Key words: *surgical wound, wound classification, clean wound, clean-contaminated wound, contaminated wound, dirty infected wound.*

- **Using the Surgical Wound Classification Decision Tree tool**

Key words: *surgical wound, wound classification, clean-contaminated wound, contaminated wound.*

- **Using cotton surgical masks**

Key words: *allergy, cotton surgical masks, fabric surgical masks, disposable surgical masks.*

- **Using povidone-iodine solution for surgical skin antisepsis before thyroid procedures**

Key words: *povidone iodine, thyroid, surgical skin antisepsis.*

- **Venous thromboembolism prophylaxis in pediatric patients**

QUESTION:

I work in a pediatric hospital and wonder if there are specific recommendations or guidelines for preoperative venous thromboembolism (VTE) prophylaxis in the pediatric population?

ANSWER:

The rarity of VTE events in children and the lack of controlled, trial-based evidence has led to few indi-

cations for VTE prophylaxis in the pediatric population.¹⁻⁶ Currently, much of what is known regarding VTE prophylaxis is based on findings from studies of adult patients that have been extrapolated for pediatric use.^{1,4,5,7-9} All hospitalized children should be assessed for risk of VTE,⁴ and mechanical methods of prophylaxis should be used when possible.³ Use of anticoagulant prophylaxis may

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be advisable for children considered to be at high risk based on underlying conditions and on the type and length of surgery.^{1,3,5}

The occurrence of VTE is approximately 10 times higher in adults than in children.^{1-4,6,10} The lower incidence of VTE in children is a result of, at least in part, the physiological differences in the coagulation systems of adults and children.^{1,2,4-7,9,11} However, VTE is occurring with greater frequency in the pediatric population.^{1,2,4,6} This is most likely a result of

- the increased survival rates of patients with complex conditions,
- improved diagnostic tools for identification of at-risk patients, and
- increased awareness of the need for prophylactic measures.^{1,2,6}

The pediatric patient population ranges from the newborn to the teenager. Within the overall pediatric population, the two age groups at greatest risk for VTE are infants and teenagers.^{1-7,11} These groups account for approximately 70% of pediatric VTE events.^{1,6} A VTE event in an infant typically is related to small blood vessels, an idiosyncratic clotting system, or the use of central venous lines (CVLs).^{4,11} In the teenage population, a VTE event is more closely aligned with factors associated with adult VTE (eg, smoking, oral contraceptive use, pregnancy, obesity).^{4,11} The incidence of VTE appears to be almost equally divided between male and female patients; however, there is a slightly greater frequency of events in teenage girls.⁶ Some of the guidelines for prevention of VTE in adult patients are adaptable to the pediatric population; however, the risks and benefits of intended prophylaxis measures should be carefully considered.^{3,5,6,11}

All pediatric patients should be assessed for VTE risk factors.^{2,4} Notably, the majority of VTE events in children are secondary to serious conditions, such as cancer, trauma, congenital heart disease, thrombotic disorders, and systemic lupus

erythematosus,^{2,4,10} or are related to predisposing factors, such as an indwelling venous catheter.¹⁰ The most common risk factor for VTE in children appears to be the presence of a CVL,^{1,2,4,7,9,11} especially when it is placed in the femoral vein,^{1,4,11,12} which suggests that the preferred sites for CVLs may be the brachial or jugular veins.^{9,11,12} Risk factors associated with VTE in infants, children, and adolescents include

- cancer and chemotherapy,^{2-4,6,10}
- cardiac catheterization,^{3,5}
- congenital heart disease and associated surgeries,^{3,4}
- CVLs,^{1-4,6,10}
- family history of VTE,³
- immobility or prolonged bedrest,^{3,4,10}
- infection and inflammatory syndrome,^{2-4,6,10}
- inherited thrombophilia,^{2-4,6,10}
- major burns,³
- major trauma,^{3,4,10,11}
- nephrotic syndrome,^{3,4}
- obesity,^{1,3,4,6,10}
- orthopedic and neurological surgery,^{3,10,11}
- pregnancy,^{1,3,6}
- previous VTE,^{3,4}
- smoking,^{1,3,4,6} and
- use of oral contraceptives.^{1,3,4,6}

Based on the pediatric patient's VTE risk factor assessment, the perioperative RN should consult and collaborate with surgical team members and members of other disciplines as appropriate regarding the need for and selection of prophylaxis within the organizational protocol.¹³

Implementing mechanical methods of prophylaxis such as early ambulation and adequate hydration is always appropriate for prevention of VTE.^{1,3,6} The use of graduated compression stockings and intermittent pneumatic compression devices also may be appropriate for VTE prophylaxis in the pediatric population, provided the equipment is properly sized and fitted^{1,3,6} and approved by the manufacturer for pediatric use.

Anticoagulant prophylaxis may be advisable for children considered to be at high risk, based on underlying conditions and type and length of surgery.^{1,3,4,6} The American College of Chest Physicians has developed guidelines based on existing evidence for pharmacologic antithrombotic prophylaxis in neonates and children.⁵ The guidelines recommend

- administration of vitamin K antagonists with a target international normalized ratio of 2.5 (range, 2.0-3.0) for children receiving long-term home administration of total parenteral nutrition through a CVL or port,^{3,5}
- administration of vitamin K antagonists with a target international normalized ratio of 2.5 (range, 2.0-3.0) for pediatric patients with cardiomyopathy,⁵ and
- administration of IV unfractionated heparin prophylaxis for neonates and children requiring cardiac catheterization through an artery.⁵

The guidelines do not recommend routine VTE prophylaxis for children with CVLs, including children with cancer or on renal dialysis.^{3-5,11} The available evidence does not support the routine use of heparin in pediatric and young adolescent trauma patients.^{3,5} When heparin is indicated, low-molecular-weight heparins are preferred over unfractionated heparin because of the more predictable bioavailability and decreased threat of thrombocytopenia and osteoporosis.^{1,11} Dose recommendations should not be extrapolated from adult doses but should be calculated based on the patient's age and body weight.¹

The rarity of VTE events in children and the lack of controlled, trial-based evidence has led to few indications for VTE prophylaxis in the pediatric population.¹⁻⁶ Risk assessment for VTE should be considered for all hospitalized children⁴ and the use of mechanical methods of prophylaxis implemented when possible.³ Anticoagulant prophylaxis may be advisable for children considered to be high risk based on underlying conditions and type and length of surgery.^{1,3,5} Further re-

search is needed to identify clear indications and clinical practice guidelines for VTE prophylaxis in children. **AORN**

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■ The Centers for Disease Control and Prevention surgical wound classification system

QUESTION:

We are having a disagreement at our facility about how certain procedures should be documented when using the Centers for Disease Control and Prevention (CDC) surgical wound classification system. Is there a listing of surgical procedures associated with each wound classification?

ANSWER:

There is no universal listing of surgical procedures with corresponding wound classifications. Each procedure should be evaluated and classified independently based on the specific contamination factors associated with the procedure.^{1,2} According to the CDC, wounds should be classified according to the likelihood and degree of wound contamination at the time of surgery.¹ Following are the definitions of the four CDC classifications:

[Class 1] *Clean wounds: These are uninfected operative wounds in which no inflammation is encountered and the respiratory, alimentary, genital, or uninfected urinary tracts are not entered. In addition, clean wounds are primarily closed, and if necessary, drained with closed drainage [eg, chest tubes]. Operative incisional wounds that follow nonpenetrating (blunt) trauma should be included in this category if they meet the criteria.*

[Class 2] *Clean-contaminated wounds: These are operative wounds in which the respiratory, alimentary, genital, or urinary tract is entered under controlled conditions and without unusual contamination. Specifically, operations involving the biliary tract, appendix, vagina, and oropharynx are included in this category, provided no evidence of infection or major break in technique is encountered [eg, spillage from gastrointestinal tract].*

[Class 3] *Contaminated wounds: These include open, fresh, accidental wounds, operations with major breaks in sterile technique [eg, procedure performed with unsterile instruments] or gross spillage from the gastrointestinal tract, and incisions in which acute, nonpurulent inflammation is encountered.*

[Class 4] *Dirty or infected wounds: These include old traumatic wounds with retained devitalized tissue and those that involve existing clinical infection or perforated viscera. This definition suggests that the organisms causing postoperative infection were present in the operative field before the operation.¹*

The surgical wound classification has been shown to be a predictor of the relative probability that a wound infection will occur.³ In addition, the classification allows for comparison of wound infection rates associated with different surgical techniques, surgeons, and facilities. The comparison may be useful for research and may also serve to alert infection prevention personnel to wounds at increased risk for infection, enabling health care providers to implement appropriate surveillance and preventative measures.³ Each surgical wound should be evaluated and classified independently. There is no universal listing of surgical procedures with corresponding CDC wound classifications. The wound classification is subject to change based on the specific contamination factors associated with the procedure; therefore, the wound classification should be assigned in consultation with the surgeon at the end of the procedure and documented in the perioperative record.⁴ **AORN**

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■ Using the Surgical Wound Classification Decision Tree tool

QUESTION:

Is there a tool available that we can use for help in determining how procedures should be classified according to the Centers for Disease Control and Prevention (CDC) surgical wound classification system?

ANSWER:

Perioperative nurses can use the Surgical Wound Classification Decision Tree provided in Figure 1 as a tool to assist in accurately classifying surgical wounds. This tool also can be found on the AORN web site at <http://www.aorn.org> by searching for “Surgical Wound Classification Decision Tree.” Essentially, the decision tree is an algorithm that presents organized, directed wound classification questions designed to lead the user to the appropriate classification. Using a critical thinking tool allows each step of the wound classification process to be methodically considered to determine the most accurate classification.

To use the Surgical Wound Classification Decision Tree, start with a specific surgical procedure; beginning at the top of the tree, ask the question presented in the first box: “Is there a wound?” If the answer is “No,” then there is no need to proceed. There can be no wound classification assignment if there is no wound. If the answer to the first question is “Yes,” then proceed to the next box. If the answers to all of the questions in the second box are “Yes,” then classify the wound accordingly. If the answer to any of the

questions is “No,” then proceed to the next box and continue until the correct wound classification is assigned.

For example, according to the Surgical Wound Classification Decision Tree,

- a cesarean birth procedure would be classified as class II (ie, clean-contaminated),¹
- a cataract procedure would be classified as class I (ie, clean),¹ and
- a closed reduction procedure (eg, closed reduction of a distal radius fracture) would have no classification because there is no surgical wound.

It is essential for perioperative nurses to understand that similar surgical procedures could be classified in different categories. This decision-making tool can help illustrate how this might occur. For example, a bilateral laparoscopic tubal ligation with uterine manipulation would be classified as class II.¹ However, a bilateral laparoscopic tubal ligation using silicone rings without uterine manipulation would be classified as class I¹ because the wound is clean and the genitourinary tract was not entered. A tonsillectomy would be classified as class II¹; however, if the tonsils were found to be purulent, then the procedure would be classified as class IV (ie, dirty, infected).¹ A total joint arthroplasty would be classified as class I¹; however, if it were discovered midway through the procedure that the instruments had not been properly sterilized, then the procedure would be classified as class III (ie, contaminated).¹ Similarly, a cholecystectomy

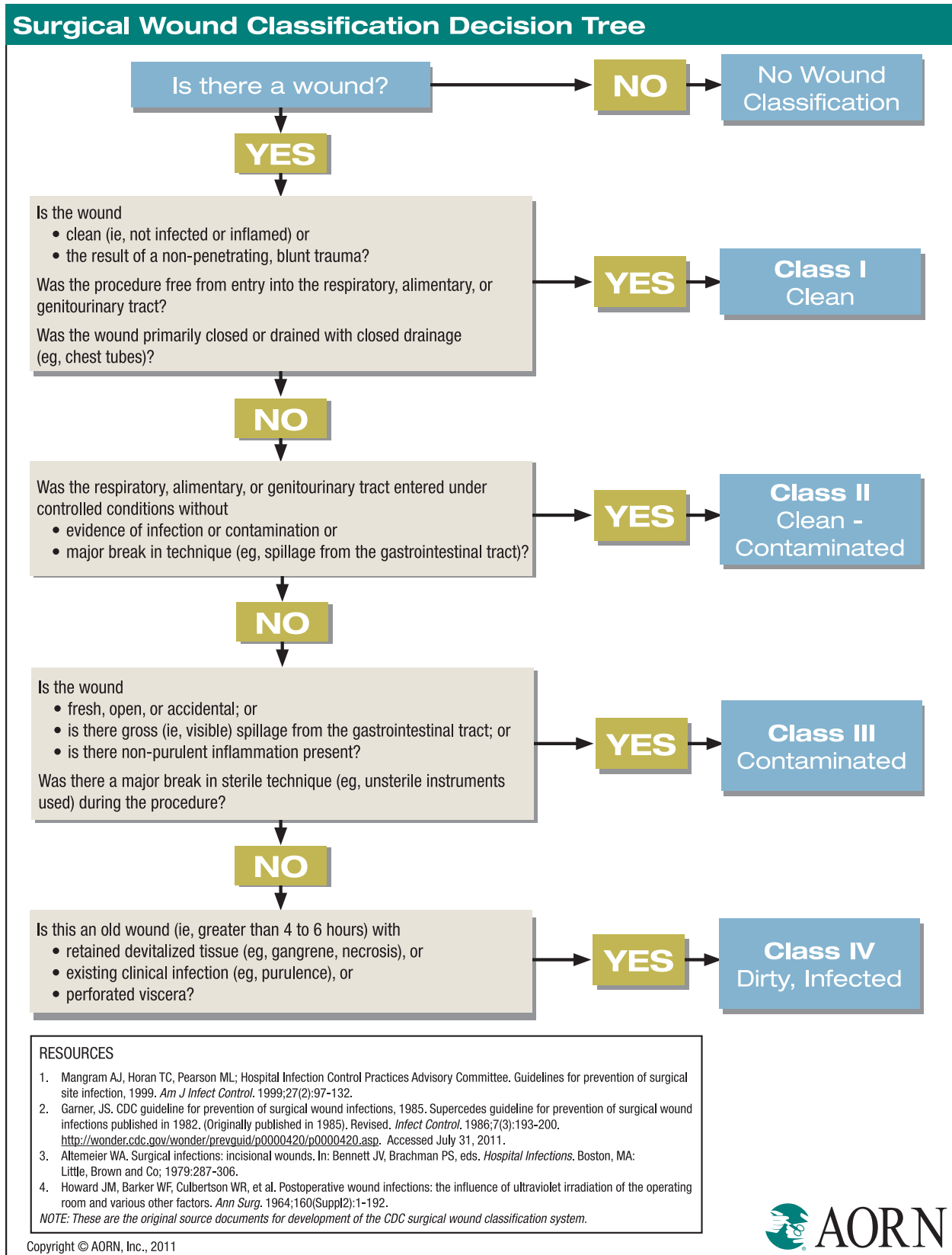


Figure 1. Surgical Wound Classification Decision Tree.

procedure would be classified as class II.¹ If gross (ie, visible) spillage of bile occurred, however, then the procedure would be classified as class III,¹ and, if the drainage from the gallbladder was purulent, then the procedure would be classified as class IV.¹

Perioperative nurses can use the Surgical Wound Classification Decision Tree to assist in accurate decision making for surgical wound classification. Using a critical thinking tool rather than a universal listing of categorized surgical procedures allows each step of the wound classification process to be methodically

considered to determine the most accurate classification. **AORN**

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■ Using cotton surgical masks

QUESTION:

One of our employees has developed an allergy to the disposable surgical masks available in our facility and would like to use a cotton fabric mask instead. Is this acceptable?

ANSWER:

Surgical masks made of cotton or other fabric materials are not acceptable for use in the perioperative environment. Cloth masks do not provide adequate protection for the health care provider and do not meet the US Food and Drug Administration (FDA) requirements for fluid resistance and flammability.^{1,2}

The purpose of a surgical mask is to cover the user's nose and mouth and to create a physical barrier to fluids and particulate materials.¹ A study involving 8,500 surgical procedures showed that 26% of exposures to blood were to the heads and necks of scrubbed personnel and that 17% of blood exposures were to circulating personnel outside the sterile field.³ The Occupational Safety and Health Administration Bloodborne Pathogen Standard requires that all health care workers wear appropriate personal protective equipment if they may be exposed to blood and other body fluids.⁴

Personal protective equipment will be considered "appropriate" only if it does not permit

*blood or other potentially infectious materials to pass through to or reach the employee's work clothes, street clothes, undergarments, skin, eyes, mouth, or other mucous membranes under normal conditions of use and for the duration of time [in] which the protective equipment will be used.*⁴

Surgical masks made of cotton or other fabric materials do not adequately protect perioperative team members from inadvertent splashes or splatters of blood and other body fluids.

Although the first surgical masks were made of muslin or linen, cloth masks were replaced in the early 1960s with synthetic materials that provide improved bacterial filtration. Surgical masks protect perioperative team members by filtering droplets greater than 5 micrometers in size.⁵ Examples of diseases that produce droplets include group A *Streptococcus*, *adenovirus*, and *Neisseria meningitides*.⁵

In the United States, surgical masks are categorized as a class II medical device requiring FDA clearance for marketing relative to fluid resistance and flammability.¹ Surgical mask material must be fluid resistant (ie, able to resist the penetration of blood and body fluids). Masks are tested on a pass/fail basis at three velocities, corresponding to

the range of human blood pressure (ie, 80 mm Hg, 120 mm Hg, 160 mm Hg).¹

The FDA recommends that class 1 and class 2 flammability materials be used in surgical masks intended for use in the OR because there are many potential ignition sources in the OR, including surgical lasers, electrosurgical units, endoscopic fiberoptics, and high-energy electromedical devices.¹ Cotton is considered a class 1 material; however, it cannot pass the flammability standards unless it has been treated with a flame-retardant chemical.²

A review of the literature reveals that there are situations in which reusable fabric masks may be required for public use during a pandemic (eg, severe acute respiratory syndrome [SARS], H1N1 flu) or other situations in which commercial masks might not be available.^{6,7} Any type of mask is likely to decrease microbial exposure and infection risk⁶; however, the level of protection afforded by reusable cloth masks is uncertain because of variations in material, assembly, and handling.⁷

If a perioperative team member appears to have an allergy to disposable surgical masks, then the appropriate action is to consult and collaborate with a member of the organization's infection prevention or employee health department regarding the possibility of testing for chemical allergens. When the specific allergen is identified, the surgical mask manufacturer can be contacted in an effort to identify and purchase masks that do not contain the offending agent. It is important that the team member be aware of any possible allergies because the chemical allergen may also be present in other items used within the department.

Cloth masks are inadequate to protect patients and personnel from exposure to infectious agents and other hazardous materials. Masks worn in the perioperative environment should be tested and manufactured according to FDA guidelines. **AORN**

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■ Using povidone-iodine solution for surgical skin antisepsis before thyroid procedures

QUESTION:

I was told by a colleague that povidone-iodine solutions should not be used for

preoperative surgical skin antisepsis in patients undergoing thyroid procedures. Is this correct?

ANSWER:

Use of povidone-iodine solution as the preoperative surgical skin antisepsis for a patient undergoing a thyroid procedure should be verified with the surgeon. In most thyroid procedures, there is no reason to restrict the use of povidone-iodine; however, because of the potential for iodine absorption, it may be prudent to restrict the use of povidone-iodine as a skin antiseptic in certain patients.

Cases of thyroid dysfunction related to transcutaneous absorption of povidone-iodine in infants¹⁻⁴ and burn patients^{5,6} have been reported in the literature. This is likely because of the thin, permeable skin of these patient populations¹⁻⁶; the skin of healthy adults is less permeable.⁷ In one study involving 68 adult patients diagnosed with thyroid carcinoma who were undergoing total thyroidectomy, however, the researchers found that a large amount of povidone-iodine was absorbed through healthy adult skin.⁷ The patients participating in the study were kept on an iodine-restricted diet, and a single, topical application of povidone-iodine was used for preoperative skin antisepsis.⁷ Postoperative urinary levels were found to be nearly seven times the preoperative levels.⁷ Furthermore, the amount of absorbed iodine correlated positively with the duration of surgery time.⁷ Based on the results of this study, it could be theorized that absorbed iodine has the potential to interfere with scintigraphy or radioactive iodine therapy or to cause thyroid dysfunction in susceptible adult patients.⁷

According to AORN's "Recommended practices for preoperative patient skin antisepsis," the patient should be assessed for consider-

ations affecting skin preparation and contraindications to specific skin-preparation agents.⁸

When it is necessary to limit serum iodine levels in a patient, it may be prudent to avoid surgical skin antisepsis with povidone-iodine and restrict iodine from the diet.⁷ The perioperative RN should verify with the surgeon the appropriateness of using povidone-iodine solution as the preoperative surgical skin antisepsis for a patient undergoing a thyroid procedure. **AORN**

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PURPOSE/GOAL

To educate perioperative nurses about providing safe nursing care throughout the perioperative continuum.

OBJECTIVES

To what extent were the following objectives of this continuing education program achieved?

1. Discuss practices that could jeopardize safety in the perioperative area.
Low 1. 2. 3. 4. 5. High
2. Discuss common areas of concern that relate to perioperative best practices.
Low 1. 2. 3. 4. 5. High
3. Describe implementation of evidence-based practice in relation to perioperative nursing care.
Low 1. 2. 3. 4. 5. High

CONTENT

4. To what extent did this article increase your knowledge of the subject matter?
Low 1. 2. 3. 4. 5. High
5. To what extent were your individual objectives met? *Low 1. 2. 3. 4. 5. High*

6. Will you be able to use the information from this article in your work setting?
1. Yes 2. No
7. Will you change your practice as a result of reading this article? (If yes, answer question #7A. If no, answer question #7B.)
- 7A. How will you change your practice? (*Select all that apply*)
 1. I will provide education to my team regarding why change is needed.
 2. I will work with management to change/implement a policy and procedure.
 3. I will plan an informational meeting with physicians to seek their input and acceptance of the need for change.
 4. I will implement change and evaluate the effect of the change at regular intervals until the change is incorporated as best practice.
 5. Other: _____
- 7B. If you will not change your practice as a result of reading this article, why? (*Select all that apply*)
 1. The content of the article is not relevant to my practice.
 2. I do not have enough time to teach others about the purpose of the needed change.
 3. I do not have management support to make a change.
 4. Other: _____
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