ABSTRACT

Technology is constantly changing, and it is important for perioperative nurses to stay current on new products and technologies in the perioperative setting. AORN’s “Recommended practices for electrosurgery” addresses safety standards that all perioperative personnel should follow to minimize risks to both patients and staff members during the use of electrosurgical devices. Recommendations include how to select electrosurgical units and accessories for purchase, how to minimize the potential for patient and staff member injuries, what precautions to take during minimally invasive surgery, and how to avoid surgical smoke hazards. The recommendations also address education/competency, documentation, policies and procedures, and quality assurance/performance improvement. Perioperative nurses should consider the use of checklists and safety posters to remind staff members of the dangers of electrosurgery and the steps to take to minimize the risks for injury. AORN J 95 (March 2012) 373-384.


Key words: electrosurgery, electrosurgical unit, ESU, active electrode, bipolar active electrode, dispersive electrode, monopolar electrosurgery, ultrasonic device, argon enhanced coagulation technology, surgical smoke, minimally invasive surgery, MIS.
ways that practice recommendations for electrosurgery might be implemented.

WHAT’S NEW?
Electrosurgery was introduced in the 1920s and is commonly used today. However, new safety features have been incorporated into current electrosurgical unit (ESU) and active and dispersive electrode designs. Electrosurgical unit devices present risks for patient injury; the most common form of patient injury is a burn at the dispersive electrode site. In addition to presenting a risk for patient injury, these devices can cause fires, electrical shock, or explosions and may interfere with other critical implanted electronic medical devices such as pacemakers. This RP document updates perioperative nurses on safe practices in electrosurgery.

RATIONALE
Patient safety is the number-one priority for perioperative nurses, and keeping patients and staff members safe during the use of ESUs is essential. Electrosurgical technology poses a very high risk to the patient and can cause permanent disfiguring injuries or death. In addition, there is a high degree of risk to personnel, such as shocks and burns, in the presence of this device.

The generator of the ESU is the electricity source. The monopolar electrosurgery circuit is composed of the generator, the active electrode, the patient, and the patient dispersive electrode (ie, return electrode) (Figure 1). The patient’s tissue provides impedance, and heat is produced as the electrodes overcome the impedance. In ground-referenced generators, alternative pathways to the ground may include the OR bed, stirrups, staff members, and equipment, providing a potential risk of alternate site injury. Isolated generators minimize this risk for injury because the preferred pathway return to the ground is through the generator.

This RP document addresses the safety measures that all perioperative personnel should use to minimize risk to both patients and staff members. The Association for the Advancement of Medical Instrumentation has established minimum safety and performance standards for using ESU systems, which have been approved by the American National Standards Institute and the International Electrotechnical Commission.

Figure 1. The monopolar electrosurgical circuit is composed of the generator, the active electrode, the patient, and the patient dispersive electrode.
DISCUSSION

Most perioperative nursing strategies for ensuring patient safety while electrosurgery is being used are task oriented. Working as a team and following patient safety protocols and checklists will help remind staff members of the key steps for electrosurgical safety. At times, nurses take for granted that patients are going to be safe. Electrosurgery is used every day in the OR, and it is easy to let one’s guard down. The use of tools such as a patient safety poster (Figure 2) can help perioperative personnel remember the key components of electrosurgery. Developing tools such as this one in individual practice settings reminds staff members that patient safety is a team responsibility.

Developing standardized protocols and checklists for each operating arena is another way to reinforce all of the key safety strategies. Protocols and checklists should be based on AORN’s recommended practices. An example of different protocols might be for patients who are undergoing general surgery versus those who are undergoing minimally invasive surgery. Protocols for patients undergoing minimally invasive surgery would have additional safety steps because of the risks involved with using distention media.

Recommendation I

“Personnel selecting new and refurbished [ESUs] and accessories for purchase or use should make decisions based on safety features to minimize risks to patients and personnel.”1(p99) Personnel involved in purchasing decisions should consider the following:

- The most frequently reported injury to patients is a burn at the site of the dispersive electrode.2
- Look for a dispersive electrode that will minimize this risk, such as through the use of return electrode contact quality monitoring.2,5
- Speak to vendors and get a detailed explanation of the safety features of the equipment being considered for purchase.
- Form an interdisciplinary group to ask questions and discuss the risks and benefits to patients of this type of equipment.
- Standardize equipment across the facility so there is no variation in practice, which helps ensure that all patients are treated with the same safety standards related to ESU use.

Recommendation II

“The ESU should be used in a manner that minimizes the potential for injuries.”1(p100) Patient injuries, user injuries, and fires do occur. Perioperative nurses should be knowledgeable of and diligent in adhering to the basic principles of ESU safety. Perioperative nurses should speak up and challenge other team members if patient safety issues arise or strategies are not consistently followed. Perioperative nurses should consider the following steps for creating a safe electrosurgical environment:

- Read and attach the manufacturer’s manual to the unit or cart on which the ESU sits.

Educational Resources


Web site access verified December 12, 2011.
It Takes a TEAM to:

Know how to:
Check the machine and accessories before use.
Avoid risks to patient and staff.
Solve simple problems.
Prepare the patient safely.
Assess the patient’s skin before and after electrosurgery use.

Understand:
What equipment you are using.
How to minimize risk.
Electrosurgery principles
Importance of letting the prep dry!
Why the active electrode is stored in a holster when not in use.

Every year patients and members of the surgery team are injured during cases where electrosurgical technology is used. Often times injuries occur due to operator error and not from the equipment itself. It takes a team to assure patients and staff are safe from injury! Everyone should understand the risks and take action to prevent a mishap from occurring.

Consider:
The patient’s weight, fat distribution, and age.
Active implants such as a pacemaker or ICD—patient cleared by cardiology.
Allergies.
The position of the return electrode and metal implants, patient position, operating site, scars and tattoos.

Be aware of:
The ESU has had proper maintenance, is in good working order with proper accessories.
The lowest power setting is being used.
The alarms, never silence them!
The potential for injury due to direct or capacitive coupling.
The correct accessories go with the correct machine.
How to report events and near misses.
The danger of activating the ESU while staff are in direct contact with the patient.
Special precautions with argon enhanced coagulation.

Safety doesn’t happen by accident!

Figure 2. A patient safety poster can remind staff members of precautions to take during electrosurgery.
Ensure that the ESU is mounted on a tip-resistant cart or shelf and is protected from liquids.

Do not silence alarms—all alarms and activation indicators should be operational, audible, and visible at all times. It is easy to become distracted and to experience “normalization of deviation” (eg, the acceptance of activities that would normally be deemed unacceptable). There is a natural human tendency to ignore safety standards and alarms over time when no event has occurred. Nurses should be aware of this phenomenon and always be diligent in ensuring patient safety.

Confirm the power settings with the operator before the ESU is activated and use the lowest setting to achieve the desired tissue effect.2,6-9 If the operator requests a continued increase in power, the nurse should check the entire ESU and accessories for cord connections and adequate placement of the dispersive electrode.6,10,11 If there is a continued request to increase power, this could indicate that there is a problem with the unit, the connections, or the placement of the grounding pad. Nurses should not assume that it is okay to increase power without stopping the procedure and checking the machine and the patient. Surgery should not continue if there is a concern that the machine is not working properly.

When cords and plugs are handled improperly, the insulation can become frayed or broken, which presents an electrical hazard. A survey of the ESU physical environment only takes a minute and should be a part of routine preparation for every procedure. The perioperative nurse should take the time to perform this critical survey and consider the following actions to protect patients and staff members:

Do not place tension on the cord and make sure the length is adequate; do not use extension cords.10

Place the ESU near the sterile field; the cord should reach the wall or outlet without stress and without blocking a traffic path.10

Do not allow kinks, knots, or bends in the cord.

Hold the plug, not the cord, when removing the ESU from the outlet.

Keep the cord dry.10

Check the cord for breaks, nicks, or cracks and remove it from use for repair or replacement if needed.10

Recommendation IV
“‘The active electrode should be used in a manner that minimizes the potential for injuries’”1(p101) (Figure 3). Incompatibility of the active electrode

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Resources for Implementation

- AORN Nurse Consult Line. 800-755-2676 or 303-755-6300, option 1.

Web site access verified December 12, 2011.
with the ESU as well as unintentional activation and incomplete circuitry pose safety hazards to patients and staff members.\textsuperscript{12,13} Perioperative nurses should be diligent in monitoring for unintentional activation, problems arising with the ESU, or unsafe practices, and they should speak up when patient safety is threatened. It is important to ensure that electrosurgery not be used in the presence of gastrointestinal gases\textsuperscript{12,14-17} or in an oxygen-enriched environment.\textsuperscript{14,18-21} Caution should be used when activating the active electrode near the head and neck region or in the presence of combustible anesthetic gases. The active electrode should be used as far away as possible from the oxygen source. Perioperative nurses can take the following actions to lessen risks:

- Coordinate with the anesthesia professional to minimize the oxygen concentration.
- Always visually inspect the active electrode at the field before use. Look for cord or handpiece damage and incompatibility of the accessories with the ESU.
- Observe the sterile field when the ESU is in use and, when necessary, remind the surgeon, technician, or assistant that the active electrode should be placed in a nonconductive safety holster when it is not in use.\textsuperscript{2,9,14,22}
- Place the foot pedal near the user of the active electrode to reduce the risk of unintentional activation by other team members.\textsuperscript{8,14}
- Remove accumulated eschar from the active electrode tip away from the incision.\textsuperscript{12,18}
- Follow fire safety measures,\textsuperscript{23} and consider using a checklist to make sure none of the following steps are accidentally missed:
  - Do not activate the active electrode in the presence of flammable agents.
  - Time alcohol-based prep agents so the minimum dry time recommended by the manufacturer is allowed to pass, and do not allow the surgical technologist or
surgeon to drape the patient until the prep agent has dried.

- Remove suture packets containing alcohol from the sterile field as soon as possible.
- Moisten sponges that are used near the active electrode tip.18,24,25
- Arrange surgical drapes to minimize the buildup of oxidizers (eg, oxygen, nitrous oxide).
- Always have a wet towel, saline, or water available on the sterile field to extinguish a fire.
- Be prepared to immediately extinguish flames should they occur.

**Recommendation V**

“When monopolar electrosurgery is used, a dispersive electrode should be used in a manner that minimizes the potential for injuries.”1(p104)

It is extremely important to make sure the dispersive electrode has uniform contact with the patient’s skin. The perioperative RN should verify this before surgery begins. If the nurse notes that there is poor contact, he or she should institute corrective actions, such as removing any oil, lotion, moisture, prep solution, or excessive hair that may be interfering with contact; moving the dispersive electrode to another site; or applying a new pad. The nurse should not use tape to hold the dispersive electrode in place.

The nurse should ensure that the patient does not contact any metal devices such as the bed, stirrups, positioning devices, or safety strap buckles to prevent a possible burn from directed current. Patient jewelry that is between the active and dispersive electrodes should be removed. Electrocardiogram electrodes should be placed as far away from the surgical site as possible. When removing the electrode, the nurse should hold the adjacent skin in place and peel the electrode back slowly to prevent denuding the skin.

The nurse also should implement the following as part of routine patient care:

- Assess the patient’s skin before and after ESU use to assess for any injuries.
- Use dual-foil electrodes to make sure there is no impedance through the patient’s tissue.6 If the impedance is too high, the ESU alarm will sound and the ESU will stop functioning, thus protecting the patient from harm.2
- A single-use dispersive electrode should be compatible with the ESU. Discard the electrode after it has been used. If repositioning is needed, discard the electrode and use a new single-use product.11,26 Never reposition a used electrode.
- Make sure to use the correct size of dispersive electrode for individual patients. There are different sizes, and they should not be folded, cut, or altered in any way.
- Identify the expiration date on a single-use dispersive electrode package before opening it and do not use it if it is past the manufacturer’s expiration date. Check the integrity of the product and do not use it if there are flaws, damage, discoloration, poor adhesive, or dryness, because these could prevent adequate contact.6,8,11,27
- Place the dispersive electrode on well-perfused muscle, which is a better conductor of electricity than adipose tissue.11 Also, place the electrode on clean, dry, and intact skin on the same side as the surgery and as close as possible to the site.
- Do not place the electrodes over bony prominences, scar tissue, hair, weight-bearing surfaces, potential pressure points, tattoos, or a metal prosthesis; distal to a tourniquet; or near a warming device.
- Place the dispersive electrode on the patient after final positioning. If the patient is repositioned during surgery, verify that the electrode is still in contact with the patient’s skin.

A capacitive coupled return electrode is a non-adhesive return electrode that is placed close to
the patient and forms a capacitor with the patient, returning electrical current from the patient back to the ESU. If a capacitive coupled pad is used, the nurse should ensure that the pad is the appropriate size for the patient and that there is adequate contact by confirming there are no materials, such as foam, gel pads, or extra linen, between the patient and the pad.

**Recommendation VI**

“Personnel should take additional precautions when using electrosurgery during minimally invasive surgery (MIS).”\(^1\)\(^{107}\) Specific patient injury can occur from direct coupling, insulation failure, and capacitive coupling.\(^6\) Perioperative RNs should understand these concepts and implement precautions to prevent patient injury.

Direct coupling is the contact of an energized active electrode tip with another metal instrument or object in the surgical field. This can occur when the surgeon or other user accidentally activates the ESU when the active electrode is touching another metal instrument, thus energizing that instrument. This energy will seek a pathway to the ground and can cause a significant patient injury. Capacitive coupling is the transfer of electrical current from the active electrode through intact insulation to adjacent conductive items (eg, tissue, trocars). This occurs when combination plastic and metal trocar systems are used.\(^28\)-\(^30\) A current can be generated from the conductor to the nonconductor and the current can seek a pathway through the patient’s tissues on its way to the return electrode.

The following safety measures are important to incorporate into nursing practice for MIS:

- Make sure the gas used for insufflation is nonflammable (eg, carbon dioxide).
- Make sure that conductive trocar systems are being used. This allows the current to flow safely between the cannula and the abdominal wall.
- Do not use hybrid trocar systems (ie, combination plastic and metal).
- Examine the electrodes used in MIS for insulation failure. If the insulation is not intact, an alternative pathway can be formed and can cause serious patient injuries.\(^28\),\(^31\)-\(^36\) There are multiple methods used to detect insulation failure. One is the use of two different colors on the active electrode. The insulation is a different color than the material of which the active electrode is made, so it is visible if the insulation fails, indicating the active electrode should not be used. Active continuous monitoring systems are another detection method that continuously monitor for insulation failure or capacitive coupling and automatically shut down when a breach is detected.
- Instruct patients to report symptoms of electrosurgical injury (eg, fever, abdominal pain, vomiting) after MIS, and remind them that symptoms can occur after discharge from the postanesthesia care unit.

**Recommendation VII**

“Bipolar active electrodes, including vessel occluding devices, should be used in a manner that minimizes the potential for injuries.”\(^1\)\(^{108}\) Unlike monopolar electrodes, bipolar electrodes have two poles. The current flows between the two poles and back to the ESU, so there is no need for a dispersive electrode (Figure 4). Only the tissue grasped is included in the electrical current and there is no chance of stray current or alternative pathways. The perioperative nurse should make sure that the monopolar and bipolar plugs on the ESU are differentiated, that proper accessories are used, and that the correct cord is plugged in to the correct bipolar plug. Bipolar active electrodes provide precise hemostasis because the current runs between the two tines of the electrode and not through the patient.

**Recommendation VIII**

“Ultrasonic devices should be used in a manner that minimizes potential injuries.”\(^1\)\(^{109}\) Ultrasonic devices do not create electrical energy. A generator is used to produce ultrasonic energy...
and mechanical vibrations that cut and coagulate, causing denaturation of protein and the formation of a coagulum. There is no need for a dispersive electrode. The biggest risk with ultrasonic devices is the risk to personnel who are operating the device. Inhalation of aerosols generated by the ultrasonic ESU should be minimized by using measures such as smoke evacuation systems and wall suction with an in-line ultra-low penetration air (ULPA) filter.

**Recommendation IX**

“Argon enhanced coagulation technology (AEC) poses unique risks to patient and personnel safety and should be used in a manner that minimizes the potential for injury.”¹(p109) This type of technology is a form of electrosurgery that uses radio-frequency coagulation from an ESU that is capable of delivering monopolar current through a flow of ionized argon gas. The argon gas carries the current from the active electrode to the tissue so the active electrode never has to actually come into contact with the tissue. This is useful for hard-to-reach places.

During the use of AEC, all manufacturers’ written instructions should be followed in addition to all of the safety measures for monopolar surgery. The perioperative nurse should implement the following actions to promote patient safety:

- Purge the air from the argon gas line by activating the system before use and after moderate delays between activations and between uses. Purging the gas line minimizes the risk of gas embolism. The gas flow should be limited to the lowest level possible that achieves the desired effect.

- Do not place the active electrode in direct contact with tissue and remove it from patient tissue after each activation. If there is direct contact with tissue, the gas can be forced into a vessel and cause gas emboli, which could be fatal to the patient.

- To prevent potential patient injury or death as a complication of argon gas technology, the perioperative RN should take the following steps as part of care:
  - Make sure that endoscopic insufflators have audible and visual over-pressurization alarms that cannot be deactivated. The AEC is a secondary source of gas inside the patient and can cause a rapid rise in
intra-abdominal pressure, possibly causing gas emboli to form.

- Monitor patients for gas emboli, specifically end-tidal carbon dioxide, during the procedure.

**Recommendation X**

“Potential hazards associated with surgical smoke generated in the practice setting should be identified, and safe practices established.”1(p110) The National Institute of Occupational Safety and Health recommends that smoke evacuators be used to reduce the potential adverse effects of surgical smoke to personnel and patients. Local exhaust ventilation (LEV) (eg, smoke evacuator, wall suction with in-line ULPA filter) should be used as the primary method of smoke evacuation. The suction wand of the smoke evacuation should not be farther than two inches from the source of the smoke. Nurses should evaluate the type of LEV needed in their practice settings for surgical procedures. The type of LEV is based on adequacy to ensure safe removal of the anticipated amount of surgical smoke. Perioperative nurses should use respiratory protection (ie, a fit-tested surgical N95 filtering facepiece respirator or high-filtration mask) as secondary protection.

**The Final Four**

The final four recommendations in each AORN RP document discuss education/competency, documentation, policies and procedures, and quality assurance/performance improvement. These four topics are integral to the implementation of AORN practice recommendations. Personnel should receive initial and ongoing education and competency validation as applicable to their roles. Implementing new and updated RPs affords an excellent opportunity to create or update competency materials and validation tools. AORN’s perioperative competencies team has developed the AORN Perioperative Job Descriptions and Competency Evaluation Tools37 to assist perioperative personnel in developing competency evaluation tools and job descriptions.

Documentation of nursing care should include patient assessment, plan of care, nursing diagnosis, and identification of desired outcomes and interventions, as well as an evaluation of the patient’s response to care. Implementing new or updated RPs may warrant a review or revision of the relevant documentation being used in the facility.

Policies and procedures should be developed, reviewed periodically, revised as necessary, and readily available in the practice setting. New or updated RPs may present an opportunity for collaborative efforts with nurses and personnel from other departments in the facility to develop organization-wide policies and procedures that support the RPs. The AORN Policy and Procedure Templates, 2nd edition,38 provides a collection of 15 sample policies and customizable templates based on AORN’s Perioperative Standards and Recommended Practices. Regular quality improvement projects are necessary to improve patient safety and to ensure safe, quality care. For details on the final four practice recommendations that are specific to the RP document discussed in this article, please refer to the full text of the RP document.

**AMBULATORY PATIENT SCENARIO**

Ms P, a 20-year-old female patient, underwent a routine excision of a large mass under her left arm. The procedure took approximately 40 minutes. The ESU was in use and initial settings were cut/coagulate at 30 watts. The dispersive electrode was placed on the patient’s left lateral thigh. During the procedure, the surgeon requested that the settings be increased because of an inadequate desired effect. The physician repeatedly requested that the settings be increased, and the last setting recorded was 70 watts. After the procedure, the circulating nurse noticed that the dispersive electrode was not in good contact with the patient’s skin but the skin appeared to be intact and free of injury.

During a routine postoperative skin check, the postanesthesia care nurse noted a ring in the patient’s navel that had not been removed before
surgery and a bright red area of skin injury around the ring. Further investigation revealed that the preoperative nurse had failed to discover the navel ring even though it was documented that all jewelry had been removed.

Preoperative care in the ambulatory setting can become a familiar routine, with the readying of patients, use of checklists, and use of common equipment such as the ESU. Often, simple steps and inquiries are overlooked because they are such a part of the routine care of patients. In this case, because the dispersive electrode did not adhere appropriately to the patient’s skin, the electric current sought an alternate pathway through the patient and through the metal on her skin, thus causing a burn.

When a surgeon repeatedly asks for an increase in settings, the procedure should be halted while the circulating nurse inspects the connections and electrodes. If all are intact and the problem continues, the unit should be removed from the room and tagged for inspection, and a new unit should be brought in for use. It is imperative to remember that nurses are advocates for patients who are unable to speak for themselves.

HOSPITAL PATIENT SCENARIO
Mr D, a 74-year-old married man, father of four, and grandfather of 11, underwent a digital rectal exam during a routine physical and had an elevated prostate-specific antigen (PSA) screening and a positive needle biopsy that indicated prostate cancer. He subsequently underwent a video-assisted laparoscopic prostatectomy with pelvic lymph node dissection. His surgery was completed in less than four hours. His estimated blood loss was minimal. Postoperatively, he was admitted to the urology unit floor to advance to discharge. On postoperative day one, Mr D reported pain at one of the single trocar incision sites. This incision did not show signs of erythematous or purulent drainage. His abdomen was distended. He had persistent bowel sounds. He reported nausea and had vomiting and diarrhea. However, he did not experience abdominal pain, his white blood count was within normal limits, and he did not have a fever. Overall, Mr D had an atypical presentation for an intra-abdominal abscess.

However, Mr D experienced a cardiovascular collapse from sepsis and died four days after surgery.

After an autopsy was performed, it was determined that during Mr D’s surgery, a laparoscopic instrument for which the protective insulated covering had worn off was used. This created a thermal injury to a portion of his bowel that was undetected during the surgery.

A laparoscopic thermal injury may occur in as little as two seconds. A laparoscopic thermal injury is the result of tissue death, which can occur if a temperature differential of 30° C is reached.

All perioperative personnel, including central sterile supply department staff members, surgical technologists, surgeons, and nurses, are responsible for maintaining the integrity of surgical instruments. If an instrument is suspected of having a defect, it must be removed from circulation until it can be repaired or replaced to prevent injuries.

CONCLUSION
Patients in the perioperative setting are in a highly technical, high-risk area. As the technology evolves, it is imperative that perioperative RNs understand not only the components of electrosurgery but also the potential risks to patients and personnel. Understanding these risks and implementing safety practices can significantly reduce the chance of injury. Nurses must be diligent about patient safety and make sure that safety precautions and practices are implemented in every case, for every patient, every time.

References


27. Dr Spruce has no declared affiliation that could be perceived as posing a potential conflict of interest in the publication of this article. Dr Spruce has no declared affiliation that could be perceived as posing a potential conflict of interest in the publication of this article.


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Implementing AORN Recommended Practices for Electrosurgery

PURPOSE/GOAL

To educate perioperative nurses about how to implement the AORN “Recommended practices for electrosurgery” in inpatient and ambulatory settings.

OBJECTIVES

1. Identify potential risks involved with the use of electrosurgery.
2. Discuss AORN’s practice recommendations for the use and care of electrosurgical equipment.
3. Discuss methods for implementing AORN’s practice recommendations for electrosurgery.

The Examination and Learner Evaluation are printed here for your convenience. To receive continuing education credit, you must complete the Examination and Learner Evaluation online at http://www.aorn.org/CE.

QUESTIONS

1. The most common form of patient injury during the use of electrosurgery is
   a. a burn at the dispersive electrode site.
   b. a positioning injury.
   c. a capacitive-coupling injury.
   d. an injury related to an electrosurgical fire.

2. In addition to the risk of patient injury, risks involved with using electrosurgery include
   1. electrical shock.
   2. explosion.
   3. fire.
   4. interference with a patient’s pacemaker.
      a. 1 and 2  b. 3 and 4
      c. 1, 2, and 3  d. 1, 2, 3, and 4

3. Activities that can help remind staff members of the key steps for electrosurgical safety include
   1. posting an electrosurgery-related patient safety poster.
   2. developing standardized patient safety protocols.
   3. using checklists.
   4. working as a team.
      a. 1 and 3  b. 2 and 4
      c. 2, 3, and 4  d. 1, 2, 3, and 4

4. In considering the purchase of new or refurbished electrosurgical units or accessories, perioperative nurses should
   1. speak to vendors about safety features.
   2. avoid products with return electrode contact quality monitoring.
3. form an interdisciplinary group to discuss the risks and benefits of the equipment.
4. help ensure equipment is standardized across the facility.
   a. 1 and 2  b. 3 and 4
   c. 1, 3, and 4  d. 1, 2, 3, and 4

5. It is permissible to disengage the activation indicator on the electrosurgical unit if it is interfering with the ability to hear the surgeon’s directions during surgery.
   a. true  b. false

6. In handling the electrosurgical unit (ESU) to minimize the potential for injury, the perioperative nurse should
   a. place the ESU near enough to the sterile field that the cord reaches the wall outlet without stress.
   b. tape down any kinks or knots in the cord to prevent trips and falls.
   c. use an extension cord if the ESU cord is not long enough.
   d. hold the cord when removing the ESU from the outlet.

7. To minimize injuries during use of the active electrode, the perioperative nurse can
   1. visually inspect the active electrode at the field before it is used.
   2. coordinate with the anesthesia professional to minimize the oxygen concentration.
   3. remind the surgeon, technician, or assistant to place the active electrode in a conductive safety holster when it is not in use.
   4. place the foot pedal between the surgeon and assistant so that either may activate the device as needed.
   5. moisten sponges that are used near the active electrode tip.
      a. 1 and 2  b. 1, 2, and 5
      c. 3, 4, and 5  d. 1, 2, 3, 4, and 5

8. During the use of monopolar electrosurgery, if there is not uniform contact between the patient’s skin and the dispersive electrode, the perioperative nurse should consider
   1. applying a new pad.
   2. repositioning the used dispersive electrode to another site.
   3. removing any oil, lotion, moisture, or prep solution that may be interfering with contact.
   4. removing excessive hair that may be interfering with contact.
   5. using tape to hold the dispersive electrode in place.
      a. 3 and 5  b. 1, 3, and 4
      c. 1, 2, 3, and 4  d. 1, 2, 3, 4, and 5

9. Conductive trocar systems and hybrid trocar systems are equally safe for use during minimally invasive surgery.
   a. true  b. false

10. To reduce the potential adverse effects of surgical smoke to personnel and patients, ____________ should be used as the primary method of protection.
    a. local exhaust ventilation
    b. fit-tested surgical N95 filtering facepiece respirators
    c. high-filtration masks
Implementing AORN Recommended Practices for Electrosurgery

This evaluation is used to determine the extent to which this continuing education program met your learning needs. Rate the items as described below.

OBJECTIVES
To what extent were the following objectives of this continuing education program achieved?
1. Identify potential risks involved with the use of electrosurgery. Low 1. 2. 3. 4. 5. High
2. Discuss AORN’s practice recommendations for the use and care of electrosurgical equipment. Low 1. 2. 3. 4. 5. High
3. Discuss methods for implementing AORN’s practice recommendations for electrosurgery. 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: _______________________

8. Our accrediting body requires that we verify the time you needed to complete the 2.8 continuing education contact hour (168-minute) program: _______________________

This program meets criteria for CNOR and CRNFA recertification, as well as other continuing education requirements.

AORN is accredited as a provider of continuing nursing education by the American Nurses Credentialing Center’s Commission on Accreditation.
AORN recognizes these activities as continuing education for registered nurses. This recognition does not imply that AORN or the American Nurses Credentialing Center approves or endorses products mentioned in the activity.
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Event: #12507; Session: #0001; Fee: Members $14, Nonmembers $28
The deadline for this program is March 31, 2015.
A score of 70% correct on the examination is required for credit. Participants receive feedback on incorrect answers. Each applicant who successfully completes this program can immediately print a certificate of completion.