

PROTOCOL FOR: Electrosurgical Unit (ESU) Safety

- POLICY:
1. All staff working with ESUs will be aware of and vigilant to the fire safety risk posed by the use of ESUs. Saline will be immediately available on the sterile field whenever ESUs are used.
  2. All staff working with ESUs will exert extra attention to the fire safety risk posed when it is used in oxygen-enriched atmospheres, especially those procedures involving the airway and the face.
  3. All ESU units will be inspected prior to use and removed if damaged or not working properly.
  4. The patient's skin integrity at the dispersive electrode grounding pad site will be evaluated before and after use.
  5. Patients will not be in contact with any metal or other alternate pathway to ground while ESU in use. Metal jewelry should be removed if it is within the activation range of the active electrode or if there is risk of digit compromise or a foreign body lodging in the airway. If there is any question or if a reusable capacitive coupled return electrode is used, the metal item(s) will be removed prior to use of electrosurgical equipment.
  6. The ESU should be operated at the lowest effective power settings for coagulation and cutting.
  7. The ESU will not be operated in the presence of flammable liquids; if alcohol is part of the prep, it must dry before ESU is activated.
  8. No alteration of active electrode tips will be allowed.
  9. Bipolar ESU only should be used if the patient has:
    - a. an implanted cardiac electronic device and use of a magnet is contraindicated or a magnet is not available, or
    - b. a cochlear implant.
  10. For patients who have implanted electronic cardiac devices (ICDs and pacemakers), refer to the protocol: Implanted Electronic Cardiac Devices: Perioperative Care of Patients with. For patients who are pacemaker-dependent, special care will be taken in the use of a magnet to inhibit tachy therapy and use of monopolar cautery, as pacing inhibition due to electromagnetic noise may result in pacer inhibition.
  11. The risk of surgical plume will be minimized by use of smoke evacuators and wall suction, as appropriate.

12. All ESUs will be used according to manufacturer's recommendations.

**DESIRED PATIENT OUTCOME:** The patient will have no electrical injury, as evidenced by no thermal burns at the dispersive grounding pad site or any other alternative pathway to ground site.

**CLINICAL ASSESSMENT AND CARE:**

1. Assess patient for presence and location of metallic prostheses, pacemakers or automatic implanted cardioverter-defibrillator (AICD).
2. Assess patient for optimal placement of dispersive grounding pad.
3. Prepare dispersive grounding pad site and apply pad following completion of positioning according to procedure.
4. Following completion of surgical procedure, remove dispersive grounding pad and assess skin integrity.
5. Document skin condition at grounding site preoperatively and postoperatively in nursing record.

**EQUIPMENT:** Monopolar electrosurgical units  
Monopolar electrosurgical dispersive grounding pad (pediatric and adult)  
Bipolar electrosurgical units  
Ultrasonic electrosurgical units  
Argon enhanced electrosurgical devices  
Reusable active electrodes  
Disposable active electrodes

**PROCEDURE:** Basic Electrosurgery  
Action

Points of Emphasis

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| <ol style="list-style-type: none"><li>1. Inspect the ESU unit(s) prior to use; if foot pedal to be used, place in plastic bag if wetness is anticipated.</li><li>2. Confirm that fluid is available to immediately extinguish flames should they occur.</li><li>3. Inspect the patient for metal jewelry and remove as necessary.</li><li>4. Assess patient for presence and</li></ol> | <ol style="list-style-type: none"><li>3. Low profile earrings, wedding bands, necklaces with religious medallions, and piercings or other metal items of similar sentimental value may be worn into surgery as long as no reasonable expectation of harm to the patient is anticipated.</li><li>4. With an ICD, ESU can foster</li></ol> |
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location of metallic prostheses, pacemakers or ICD. For patients who have ICDs who need surgery for non-cardiac reasons, the manufacturer representative should be contacted when the surgery is scheduled.

inappropriate antitachycardia pacing, inadvertent countershocks and permanent damage to the pulse generator.

Follow these recommendations if patient has an implanted cardiac electronic device:

a. if surgical site is remote from the device, (e.g. hernia with device implanted in subclavian area) and the grounding pad can be applied to leg or bipolar ESU can be used, a magnet should be placed over the device site to inhibit tachytherapy;

b. if surgical site is within 6 inches of the device (e.g., carotid endarterectomy with subclavian device placement), the device should be disabled / reprogrammed prior to surgery;

c. if surgery is emergent, bipolar electrosurgery is preferred over monopolar, as the body does not conduct current with that mode. If monopolar cautery must be used, use should be limited to short bursts no longer than 3 seconds and use the lowest possible power setting.

The patient must be attached to an external defibrillator and their heart rhythm must be monitored to determine if defibrillation is indicated during the procedure. The manufacturer's representative should be notified and available to interrogate the device post operatively.

d. The Electrophysiology APRN is available in house as a resource for questions, but should not be used in place of contacting the manufacturer's representative.

5. Select a dispersive electrode grounding pad site in following

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- order of priority:
- a. large muscle mass as close to incision as possible;
  - b. lack of scar tissue or any bony prominence;
  - c. lack of metal prosthesis beneath site;
  - d. clean, dry, and minimal hair;
  - e. avoiding areas where blood and body fluids may pool; and
  - f. as far away from EKG electrodes as possible.
6. Apply dispersive pad once positioning is completed, with the long side of the pad oriented optimally towards the operative site, cord trailing away from operative site. For small neonates, place pad vertically under as much of body as possible.
  7. Inspect active electrode wiring prior to use; inspect insulation on reusable active electrodes.
  8. Confirm that all replacement tips seat firmly. Correct connection is evidenced by the insulated portion of the tip advancing 3 - 10mm into the hand piece and a snug fit between the two components.
  9. Keep ESU unit free from clutter and away from liquids.
  10. Position cords so they present no tripping hazard; do not roll equipment over cords.
  11. Minimize coiling of active and dispersive electrode cords.
  12. Document the ESU used by the clearly visible identification number.
  13. Prevent unintentional
- a. muscle disperses current better than fat;
  - b. scar tissue and bone impede current flow;
  - c. metal impedes current flow;
  - d. maximizes contact between skin and pad;
  - e. fluids may release contact;
  - f. electrodes may provide alternate pathway to ground
6. Never cut or alter dispersive grounding pad. In accordance with manufacturer's instructions, two dispersive electrodes may be used in unique situations when high impedance is reasonably anticipated (eg, very obese patients) or during prolonged application of current at high power settings (eg, ablation).
  8. Firm connections between tip and the active hand piece minimize or eliminate the risk of alternate site burns. Any tip that does not seat firmly into the hand piece will not be used.  
  
Gripping the active electrode with wet surgical gloves may increase the likelihood than an electrode is not seated properly.
  9. Spills may cause malfunctions.
  11. Coiling increases leakage of current.
  13. If active electrode does not

activation of the active electrode when not in use by using secured, insulated safety holster or reapplying protective cap if battery-powered, hand-held cautery is used.

fit into safety holster, electrode should be placed in a designated location with tips away from flammable material (e.g., drapes).

14. Moisten sponges used close to the active electrode tip to prevent unintentional ignition and do not use dry sponges to clean the active electrode.

14. Fires have resulted from ignition of dry sponges near the incision site and when they are used to clean the active electrode.

15. If active electrode is being used in a fluid-filled cavity, use fluid that is electrically inert, near isotonic solution (e.g., dextran 10, dextran 70, glycine 1.5%, sorbitol, mannitol) unless the manufacturer of the equipment instructs otherwise.

15. Using an electrolyte solution instead of a non-conductive medium may render the active electrode less effective, thereby increasing the risk of burns at the dispersive electrode site.

16. Repeated requests for increased current levels which seem inappropriate for the application or other malfunction should be investigated as follows:

- a. check connections of active and dispersive electrodes and wall connection of unit;
- b. check the contact between patient and grounding pad;
- c. provide new active electrode;
- d. use new dispersive ground electrode;
- e. follow policy statement #4, as necessary.

17. During oropharyngeal surgery:

- a. use suction as near as possible to any potential breathing gas leak to scavenge the gases from the oropharynx of an intubated patient;
- b. wet any gauze or sponges used with uncuffed tracheal tubes to minimize leakage of gases into the oropharynx, and keep them wet; and
- c. keep all sponges, gauze, pledgets, and their strings moistened throughout the procedure to keep them ignition

resistant.

18. During procedures involving the head or face, coat facial hair (including eyebrows, beard, and mustache) near the surgical site with water-soluble lubricating jelly to make the hair non-flammable.
- If administering oxygen in an open system (e.g., nasal prongs), tent drapes or use scavenging system to prevent build-up of oxygen under drapes.
19. Be aware of the flammability of tinctures, solutions, and dressings (e.g., benzoin, phenol, collodion) used during surgery and take steps to avoid igniting their vapors.
20. Take special precautions when using ESU during laparoscopic procedures:
- a. inspect all electrodes for impaired insulation before use;
  - b. verify that the insufflation gas is nonflammable (ie, carbon dioxide);
  - c. select lowest effective power settings to reduce likelihood of insulation failure and electrical capacitive-coupling injuries.
21. Assess patient's skin integrity after removing dispersive electrode and document any alterations or compromises.
22. If unit fails to work properly during operation, all items used in the circuit (dispersive electrode and cord, active electrode) must accompany the unit to Clinical Engineering.
18. Active electrode should not be used in an oxygen-rich environment; anesthesia care providers will follow their own protocol to deliver oxygen at a reduced concentration to minimize risk of flammability.
- All members of the team should communicate
20. Patients should be instructed to immediately report any signs or symptoms infection, excessive pain, bleeding or inability to void, which may be symptoms of laparoscopic electrical injury and which can occur days after discharge.
- Instrument Room personnel will follow regular schedule of monitoring laparoscopic instrumentation for current leakage through insulation.
- If patient or personnel injuries or equipment failure occurs, the ESU and the active and dispersive electrodes must be handled in compliance with the Safe Medical Devices Act of 1990.

APPROVAL: Nursing Standards Committee  
Electrophysiology Dep't.

EFFECTIVE DATE: 12/90

REVISION DATE: 5/93, 7/97, 6/00, 6/03, 3/04, 2/06, 1/08, 7/08, 12/08