International Federation of Perioperative Nurses

IFPN Guideline for Electrosurgery Safety

Purpose:

Monopolar electrosurgery is high radio frequency electrical current. It is routinely used to cut and coagulate patient tissue. Proper care and handling of this equipment is essential to ensure patient and personnel safety. If used inappropriately, the electrosurgical unit (ESU) has the potential to cause injury to the patient, Perioperative personnel, and damage to other equipment.

Recommendations:

A. The ESU, active electrode, and patient return electrode should be used in accordance with the manufacturers' recommendations.
    1. A detailed manual of operating instructions (Users Manual) should be obtained from the manufacturer and be readily available in the practice setting. A brief set of operating instructions should be attached to the ESU.

       Rationale: Important information and specific operating instructions for the ESU are contained in the Users Manual. Equipment should not be used in a manner that is not in accordance with the manufacturers' written instructions.
B. Personnel should demonstrate competence in the use of the ESU.
    1. Personnel should be instructed in the proper operation, care, and handling of the ESU.

       Rationale: Instruction followed by a return demonstration by the employee in the proper ESU usage assists personnel in learning and understanding new equipment, preventing potential injury, and can extend the life of the equipment.
    2. Electrosurgical equipment should be inspected before use. Equipment that is damaged or not working properly should be removed from service and inspected by biomedical/equipment specialist personnel.

       Rationale: Equipment is checked to assure it is in good working order. The manufacturer's written safety precautions are followed for the well-being of the patient and personnel involved in the procedure.
    3. The ESU should be assigned an identification or serial number.

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Rationale: A specific number identifying each ESU allows for tracking of service and function of the unit and documentation of maintenance.

C. The ESU should always be used safely and in a manner that reduces any potential for injury.
    1. The ESU cord should be long enough to reach the wall outlet without stress on the cord or use of an extension cord. The cord should lie flat and be free of kinks or knots. The ESU plug should be used to insert and remove the cord from the wall outlet. Frayed or damaged cords or plugs should not be used.

       Rationale: Tension on the cord can cause it to become disconnected or frayed. Cords that do not lie flat can cause tripping. Tension on the ESU cord whether from tripping or pulling on the cord can cause breakage. Damaged or frayed cords or plugs represent a safety hazard.
    2. ESU safety features, such as lights, and activation sound indicators, should be tested before each use, and be operational during surgical procedures.

       Rationale: Inspection of the ESU and its safety features ensures that the unit is functioning. The volume of the activation sound indicator should be at a level that can be heard by personnel so that inadvertent activation of the active electrode can be immediately recognized.
    3. The ESU should not be used in the presence of flammable agents (e.g. alcohol, ether-based solutions, oxygen)

       Rationale: The intense heat generated at the tip of the active electrode can result in ignition of the flammable agents causing injury to patients and personnel.
    4. Power setting should be confirmed between the surgeon user and operating suite personnel. They should be determined by the size of the patient, type of active electrode, proximity of the patient return electrode to the operative site, and recommendations made by the manufacturer. The power setting should always be set at the lowest level to achieve the desired tissue effect.

       Rationale: Excessively high power settings can lead to patient and/or personnel burns.
    5. Fluids should not be placed on top of the ESU. It should be protected from spills and fluid invasion. The ESU foot pedal should also be enclosed in a plastic bag to prevent fluid invasion.

       Rationale: Fluid invasion into the generator can cause a malfunction including unintentional activation of the active electrode. Fluid invasion into the foot pedal can cause malfunction and be difficult to decontaminate.

6. When the active electrode is not in use while on the sterile field, it must be placed in a safety holster recommended by the manufacturer.

   Rationale: A safety holster designed by the manufacturer to be used with an active electrode is meant to shield the patient from the inadvertent activation of the active electrode. Other containers such as plastic drapes, folded towels, or paper bags attached to the drapes to organize items on the sterile field cannot protect the patient if the active electrode is activated.
7. After use, the ESU should be turned off and cleaned according to the manufacturer's recommendations. The unit should not be saturated or have fluids poured over it.

   Rationale: If fluids enter the ESU, the fluids can cause the unit to malfunction, and can cause permanent damage to the electrical circuitry.

D. The patient return electrode should be used in a manner that promotes patient safety and reduces any potential for patient injury.
   1. The patient's skin integrity should be evaluated prior to placement of the patient return electrode and when the patient return electrode is removed.

      Rationale: Pre and post operative assessment of the patient's skin will allow perioperative personnel to determine if any injury has occurred during the use of electrosurgery.
   2. The patient return electrode should be placed as close to the operative site as possible on a large muscle mass. It should not be placed over scar tissue, hairy areas, near metal implants, bony prominences, in areas of vascular insufficiency or where it may be invaded by fluid. A patient return electrode should be selected that is the correct size for each patient (ex. Neonate, pediatric, adult). Once it is placed, the patient return electrode should never be repositioned.

      Rationale: Placing the patient return electrode close to the operative site will allow the surgeon to use lower power settings since the distance the electrical current has to travel is shorter. Muscle is the best conductor of the electrical current. All other patient tissues are higher in resistance and can impede safe removal of the electrical current from the patient, thereby creating the potential for patient injury.
   3. All jewelry should be removed from the patient.

      Rationale: Jewelry should be removed to reduce the possibility of an inadvertent patient injury from any leakage electrical current present during the use of radio frequency electrosurgery generators.

4. Excessive hair should be removed before applying the patient return electrode. Clipping is preferable to shaving if possible.

   Rationale: Excessive hair at the patient return electrode site can prevent complete contact with the patient's skin and interfere with safe removal of the electrical current from the patient's body.
5. The patient return electrode should uniformly contact the patient's body. The patient return electrode should not gap or tent, and should be placed in an area to avoid fluid invasion. Be cautious to use the patient return electrode as recommended by the manufacturer. Some electrodes require that the long axis of the pad face the surgical site. This is to avoid a leading edge effect during use which could result in a patient burn.

   Rationale: Uniform contact between the return electrode and the patient's skin will help to maintain low current density at the pad site and help reduce the likelihood that a pad site injury could occur. Turning the long axis of the pad toward the surgical site spreads the electrical current out over a wider area then the short edge. Some manufacturers do not have this requirement, so the Perioperative nurse must carefully read and follow the instructions for use.
6. The patient return electrode should never be cut or altered. Single use patient return electrodes should be stored according to the manufacturer's recommendations. Single use patient return electrodes should be discarded after one use. Reusable patient return electrodes should be cleaned after each use and inspected before each use to insure that no damage has occurred.

   Rationale: Changing the size or the configuration of the patient return electrode can impact on how well the electrical current is removed from the patient. Patient return electrodes must be stored in a way that will not cause them to dry out; when they are removed from the protective pouch too long before use, drying may occur and a dry patient return electrode increases the risk of a patient burn.
7. The patient return electrode should be checked if tension is applied to the cord. The patient return electrode should never be repositioned. If it pulls away from the patient's skin, it should be replaced or readjusted is the patient return electrode is reusable.

   Rationale: Tension on the return electrode cord could affect the quality of the contact between the pad and the patient, which could interfere with the safe current dispersion of the electrical current. A patient return electrode that is

repositioned may not adhere as well (single use plates only), which can also affect proper function of the patient return electrode.

8. The patient return electrode should be removed carefully while supporting the patient's tissue. The return electrode site should be inspected to assure that no injury has occurred.

   Rationale: Removing the patient return electrode carefully will prevent denuding the skin during removal.

E. Bipolar electrosurgery functions differently than monopolar electrosurgery. It should be used in accordance with the manufacturer's written instructions.

1. When bipolar ESU is used, a patient return electrode is not needed. Care should be taken to use bipolar active electrodes as they are intended to be used.

   Rationale: When bipolar ESUs are used, the bipolar forceps contains both an active pole and a return pole within the handset. The electrical current does not flow through the patient's body. Therefore, a patient return electrode is not needed. Care should also be taken to assure that bipolar instruments are plugged into the proper receptacles on the bipolar ESU.

References:

- ACORN (2018) Australian College of Perioperative Nurses: **Standards for Perioperative Nursing in Australia.**

- AfPP (2016) Association for Perioperative Practice: Harrogate UK: **Standards and Recommendations for Safe Perioperative Practice.**

- AORN (2019) American Operating Room Nurses Association: Denver USA: **Guidelines for Perioperative Practice.**

- ORNAC (2017) Operating Room Nurses Association of Canada**: Standards for Perioperative Nursing Practice**

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