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Operating Room

SS - 4 - 4030

POLICY

Laser Safety/Administration

Purpose

To protect patients, visitors, staff and physicians from hazards associated with laser systems by ensuring the safe use of laser systems.

Policy

Laser procedures will be performed, as outlined below, in a safe environment for patients and staff during testing, normal operation and maintenance.

General Requirements (Holmium and CO₂)

- Designs, symbols, and wording on the warning signs shall be specific and consistent for the type of laser in use.
- Warning signs must be displayed conspicuously at all entrances to the areas where lasers are used.
- Optical Density sufficiently high enough to protect against the wave length of the laser in use will be posted and shall be worn by all personnel in the laser controlled area.
- Designated Laser OR theaters are Holmium laser – OR #7 and CO₂ laser – OR # 2, 6, 9 and one OR gynecology laser theater in gynecology ambulatory care clinic.
- The laser key shall never be left in the laser during storage. Only authorized personnel shall have access to the key. The laser key will NOT be left unattended in the laser machine. Upon completion of laser surgery the laser key will be returned to the locked brown box at OR front desk.
- The laser nurse allows the laser to run through a self check program noting any errors. Errors will be documented and the laser will be taken out of service until cleared by biomedical staff.
- Prior to bringing the patient into the room test-firing must be completed according to manufacturer's recommendations. If unable to test fire prior to patient entering the room, then test fire shall be completed prior to applying the laser to the patient.
- Laser-safe eye protection with appropriate wavelength filtration and optical density must be worn by all health care workers and all patients and labeled to protect against improper use.
- Inspect personal protective equipment (PPE) prior to use and clean eye protection after each use.
- During laser use, the patient's eyes and eyelids must be protected from the laser beam. The patient must wear appropriate laser safety eyewear. The anaesthetized patient's eyelids will be closed, covered with saline

moistened pads and the appropriate laser safety goggles. The awake patient will wear appropriate laser safety goggles.

- Laser-protective eyewear must be available near the posted warning sign(s).
- All viewing windows in the laser room must provide adequate protection specific to the laser wavelength. (CO₂ – no coverings required, Holmium – coverings required).
- The laser must be in standby mode when not in use.
- Exposed tissues around the operative site must be protected with saline- or water-saturated materials (e.g. towels, sponges, nonflammable material) when thermally intensive lasers are being used. These materials shall be remoistened periodically to ensure proper protection.
- Dull, ebonized, or non-reflective anodized instruments must be used in the NHZ.
- Plume and noxious fumes must be evacuated through a plume scavenging device. Colposcopy – stackhouse smoke evacuation, laparoscopy – AMT endoscope smoke evacuation.
- Laser masks which are high filtration must be worn for all laser cases. N95 masks must be worn for all colposcopy cases.
- Flammable or combustible anesthetics, prep solutions, drying agents, ointments, plastic resins, or plastics must not be used near the laser site. Drying times for prep need to be adhered to.
- Flame resistant drapes or moistened fabrics must be used to drape the operative site.
- A basin of water or saline and an ABC fire extinguisher must be readily available.
- Liquids must not be placed on the laser unit. The laser foot pedal must not be placed on or near liquids.
- The foot pedal must be operated only by surgeon during the use of the laser.
- Perioperative personnel assigned to the laser must have no responsibilities other than to the laser.
- The circulating nurse must keep a record of each laser procedure (i.e. laser log) Laser log book is kept with the lasers.
- All health care personnel working with in the laser controlled area must be credentialed as per the Laser Safety Committee every (two) 2 years.

Inclusion Criteria

All procedures requiring laser.

Definitions

Associated Health Care Professionals: Health care personnel are all individuals within the laser controlled area that are not directly involved with operation of the laser, but have a function in the clinical management of the patient and is recredentialled every two years.

CO₂ Laser: The carbon dioxide laser wavelength is 10.6 micrometers which falls in the infrared spectrum. The CO₂ wavelength has the optimal energy for gynecological surgery with highly predictable tissue effects and low thermal impact to non-target tissue. It is used in gynecology procedures in the Operating Room and Gyne Laser.

Holmium Laser: The holmium laser wavelength is 2.1 micrometers which falls in the near-infrared region of the electromagnetic spectrum. This wavelength is strongly absorbed by water in tissue which is very effective for vaporization of soft tissue when in direct contact. It is used in urology for procedures involving the disintegration of stones.

Laser: A device that produces an intense, coherent, directional beam of light by stimulating electronic or molecular transitions to lower energy levels - an acronym for Light Amplification by Stimulated Emission of Radiation (LASER).

Laser Committee: Oversees the laser safety program at Grand River Hospital.

Laser Perioperative Registered Nurse: A perioperative registered nurse who has successfully completed a credentialed laser operators' course and is recertified every two (2) years.

Laser Safety Officer (LSO): Is a resource person for all staff in laser procedures. Maintains the best practice standard for laser safety in laser procedures.

Nominal Hazard Zone (NHZ): The space within which the level of the direct, reflected, or scattered radiation during normal operation exceeds the applicable MPE. Exposure levels beyond the boundary of NHZ are below the appropriate MPE level.

Plume: Laser smoke.

Procedure

Equipment Required:

- "Laser" warning signs for entrance doors to Operating Room (OR) theatre and gynecology laser rooms
- Laser-safe eye protection with appropriate wavelength filtration and optical density
- A basin of water or saline and ABC type fire extinguisher (all-purpose) shall be readily available
- Dull, ebonized, or nonreflective anodized instruments must be used near the laser site
- Plume scavaging systems
- Laser masks (high-filtration) or N95 masks
- An endotracheal tube inflated with saline
- Flame-resistant drapes or moistened, reusable fabrics
- Non-reflective metal garbage can with lid

A. Test-Firing CO₂ Laser for Laser

Purpose:

The CO₂ laser will be test-fired by a credentialed Laser Nurse through the coupler or microslad micromanipulator and alignment of the aiming beam to the treatment verified, prior to laser procedures to affirm equipment is in proper working order.

Credentialed Laser Nurse:

- Arrange to test-fire laser in designated laser room in the OR prior to use (once per day before first case of the day)
- Post laser warning signs (prior and during use) and CO₂ laser glasses outside all doors.
- Position laser next to OR bed, checks electrical cords for defect and plugs laser into column outlet.
- Attaches laser to coupler with articulating arm positioned over OR bed.
- Position dry wooden tongue depressor on a wet towel on the OR bed.
- Verify that all staff and patients are wearing laser goggles.
- Activate CO₂ laser and select ultrapulse power to 10 Watts at 100msec.
- Place laser on ready and aim Diode beam at tongue depressor, from a distance equivalent to laser endoscope. Aiming beam should be round.
- Depress foot pedal to fire laser, ensuring the aiming beam and burn spot exactly align.
- Place laser on standby when not in use.
- If beam is not aligned with CO₂ beam (i.e. burn spot, immediately notify Biomedical, LSO, Resource Nurse and Surgeon).

B. Laser Shut Down

Shut down the laser IMMEDIATELY in the event of:

- Fluid leakage in the area of laser
- Fire in Laser Room
- Shutter failure
- Electrical hazard (e.g. feel of electrical shock)
- Faulty or damaged electrical cord
- Unexplained abnormal operation
- Unsafe use
- Non-application of safety regulations in accordance with this policy
- Surgeon request
- Absence or miss alignment of aiming beam

Credentialed Laser Nurse:

- Responsible for identifying any of the hazards stated above. If any of the above hazards presents themselves the Laser Nurse has the authority to "shut down the laser" immediately.
- If the equipment failure appears to be the cause, Biomedical Engineering will be immediately notified by OR Staff.
- Immediately notify the Laser Safety Officer (LSO).

Documentation and/or Communication

Laser Safety Checklist (see [Appendix A](#)) will be completed by the circulating nurse in order to document and verify the following:

- Laser signs and goggles at all doors
- Staff wearing appropriate eye protection and appropriate mask
- Eyewear in good condition
- Patient eye protection in place
- ABC CO₂ fire extinguisher in room
- Non-reflective metal garbage can in room

- Basin of water in room
- Test fire the laser
- Smoke evacuator tested
- Doors kept closed at all times
- Remove all reflective instruments and highly reflective material furniture

Laser Perioperative Registered Nurse will record pertinent data during procedure in HSM and on the Laser Log (see [Appendix B](#)).

Documentation will include:

CO₂ Laser

- Patient's name, hospital number, date and physician's name, per patient sticker
- Procedure
- Mode of operation; continuous or pulse
- Power/Energy setting; watts and millijoules
- Duration of exposure
- Unusual events occurring during the procedure
- Nursing staff present during procedure
- Name of person who test fired the laser prior to procedure
- Accessory equipment used
- Completion of laser safety checklist indicated
- Signature of recording laser nurse

Holmium Laser

- Patient's name, hospital number, date and physician's name, per patient sticker
- Type of procedure being performed
- Power – watts, duration, energy – joules and total energy used
- Maximum watt setting
- Unusual events occurring during the procedure
- Nursing staff present during the procedure
- Completion of [Laser Safety Checklist](#)
- Signature of recording laser registered nurse

Educational Requirements

Laser perioperative Registered Nurses shall be credentialed or re-credentialed every two years to operate the laser and must follow any laser specific safety procedures for the laser they are operating. The laser certification course consists of laser physics and laser tissue interaction, laser type, classifications, clinical applications, laser safety issues for the patients and operating laser hazards and a hands-on experience for the laser user. Training will be documented and monitored by the Laser Safety Committee.

All credentialed physicians operating lasers must complete general laser safety training as specified by GRH Laser Safety Committee and must follow any laser-specific safety procedures for the laser they are operating. Re-credentialing will be every two years and coordinated with the physicians through the Chief of Staff's Office with the support of the Laser Safety Officer and Education Practice Lead for the Operating Room.

A laser safety review/credentialing/re-credentialing in-service to promote continued awareness and competence among all laser operators and associated health professionals will be offered through on-line education modules and hands-on experience with the laser safety nurse and supplier yearly.

Related Documents

[Appendix A: Laser Safety Checklist](#)

[Appendix B: Laser Log](#)

[Appendix C: Laser Glasses Cleaning & Inspection Instructions](#)

References

CSA. Standard Z386-14. *Safe Use of Lasers in Health Care Facilities*.

ORNAC. (2015). *Standards, Guidelines and Position Statements for Perioperative Registered Nursing Practice*.

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