

	<p><b>POLICY</b></p> <p>Number: 7311-60-010 Title: Laser Safety</p>
<p>Authorization</p> <p>[ ] President and CEO [X] Vice President, Finance and Corporate Services</p>	<p>Source: Chair(s), Laser Safety Committee and Director for Surgical Services Cross Index: 7311-95-005 Date Approved: February 2001 Date Revised: June 20, 2014 Date Effective: June 25, 2014 Date Reaffirmed: Scope: Acute Care</p>

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## OVERVIEW

The Laser Safety Committee coordinates all activities of laser safety in Saskatoon Health Region (SHR). Laser safety resource staff are available to provide laser safety support. This policy applies to all Class IIIB and Class IV lasers used in SHR.

## DEFINITIONS

**All staff** means employees, professional staff and students.

**Laser** means a device which produces an intense, coherent, directional beam of light by stimulating electronic or molecular transitions to lower energy levels.<sup>1</sup>

**Laser Operator** means the individual who handles the laser equipment and is responsible for setting up the laser prior to use and who operates the console to control the laser parameters under supervision of the user. The operator may also be the user.<sup>2</sup>

**Laser User** means the individual who controls the application of the laser radiation at the working area and is applying the laser energy for its intended purpose within their scope of practice.<sup>3</sup>

### 1. PURPOSE

The purpose of this policy is to establish Saskatoon Health Region's (SHR's) requirements regarding the safe use of lasers in SHR facilities.

### 2. PRINCIPLE

Education, training and safe laser use contributes to patient and staff safety.

<sup>1</sup> American National Standard, ANSI, Z1136.3-2011, page 13.

<sup>2</sup> Ibid

<sup>3</sup> Ibid, page 14

### 3. POLICY

- 3.1** All laser users and operators must have appropriate and complete training in the use and function of lasers, care and safety of lasers and related equipment, prior to operation and use.
- 3.1.1 All staff who participate in laser procedures must complete an approved medical laser safety course every five (5) years<sup>4</sup> and complete a laser safety review annually.
- 3.1.2 All physicians using lasers must have appropriate and complete training in the use and function of the laser<sup>5</sup>.
- 3.1.2.1 Physicians must apply for laser privileges (see procedure 2.2).
- 3.1.2.2 Physicians must attend a manufacturer's in-service particular to the laser that he/she intends to use.
- 3.2** Use of the Laser Safety Checklist (Appendix A) is required prior to each use of the laser.
- 3.2.1 Laser Safety Operator, nurse or designate verbally confirm Laser Safety Checklist.
- Exception:** The Laser Safety Checklist is not required in the Eye Centre(s).
- 3.3** All procedures that require laser technology must be documented (see procedure 2.3).
- 3.4** Any adverse event involving lasers must be reported (see SHR Policy: Safety Reporting).
- 3.5** All lasers must receive preventative maintenance every six months (or at more frequent intervals if prescribed by the manufacturer).
- 3.6** All laser operators and laser users are expected to be familiar and comply with the SHR Laser Safety Handbook (see Appendix B).
- 3.7** SHR will retain a list of all laser users and operators; this list will be centralized with the Laser Safety Committee.
- 3.8** A current list of all SHR lasers and their location shall be attached to this policy; the list shall include reference to classification, name/type, wavelength, facility, unit and special precautions related to the laser (see Appendix C).

### 4. ROLES AND RESPONSIBILITIES

- 4.1 Laser Safety Officer (LSO)**
- 4.1.1 Direct, organize and coordinate activities related to laser safety.
- 4.1.2 Evaluate educational needs of staff involved with laser use.
- 4.1.3 Collaborate with physicians and staff to ensure standardized education is provided to meet learning needs.

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<sup>4</sup> ANSI Z136.3-2011, page 31.

<sup>5</sup> Ibid

- 4.1.4 Assist units/departments in the development of specific laser safety protocols, safety audits and standardized logs.
- 4.1.5 Initiate, maintain, and evaluate quality control mechanisms.
- 4.1.6 Remain current in laser technology and laser regulations and communicate recommended changes to the laser safety committee and staff.
- 4.1.7 Ensure all lasers are labeled by the manufacturer to indicate the appropriate classification
- 4.1.8 Ensure control measures as prescribed by the laser manufacturer are in effect.

#### **4.2 Clinical Nurse Educator (CNE)**

- 4.2.1 Evaluate educational needs of staff involved with laser use.
- 4.2.2 Organize in-services and continuing education for staff on lasers and laser safety.
- 4.2.3 Organize safety audits of laser safety and discuss results with Laser Safety Committee.
- 4.2.4 Function as a laser resource to physicians and staff.
- 4.2.5 Remain current with new laser technology and ensures new information is shared with staff.
- 4.2.6 Collaborate with the LSO to monitor laser safety activities and address issues as they arise.

#### **4.3 Laser Safety Site Contact (LSSC)**

- 4.3.1 Implement laser safety activities in their specific department. The LSSC position title is used to describe the Clinical Nurse Educators, the Clinical Resource Nurse/Technicians, and the Clinical Engineers who have credentialing in laser safety.
- 4.3.2 Performs the role of Equipment Resource Technician (ERT), in the absence of an ERT in the department.

#### **4.4 Equipment Resource Technicians (ERTs)**

- 4.4.1 Function as a laser resource; participates in the planning and implementation of laser technology specific to department.
- 4.4.2 Troubleshoot technical issues in collaboration with Clinical Engineering (when required).
- 4.4.3 Collaborate with LSO and other departmental LSSC's when new technology is purchased to ensure appropriate education and credentialing is organized.
- 4.4.4 Collaborate with the LSO to monitor laser safety activities and address issues as they arise.
- 4.4.5 Assist with equipment inventory and maintenance.
- 4.4.6 Ensure cleaning and disinfection follows manufacturer's guidelines and is completed at the required frequency with the correct technique.
- 4.4.7 Report any problems or concerns involving the safe use of lasers to the LSO.
- 4.4.8 In collaboration with Laser Safety Committee, monitors and orders safety equipment as necessary.

#### **4.5 Clinical Engineering**

- 4.5.1 Assign an identifier and attaches to the Laser.
- 4.5.2 Monitor and conduct preventative maintenance, service and repair of lasers; troubleshoots technical issues as these arise.
- 4.5.3 Consult with manufacturers for complex equipment malfunctions.

- 4.5.4 Collaborate with ERT's to facilitate repairs and acquisition of loaner equipment if necessary.
- 4.5.5 Maintain a log book with records of maintenance and repairs for each laser for departmental access.
- 4.5.6 Evaluate laser equipment and systems and makes recommendations for upgrades or changes.

**5. POLICY MANAGEMENT**

The management of this policy including policy education, monitoring, implementation and amendment is the responsibility of the Chair(s), Laser Safety Committee and the Director for Surgical Services.

**6. NON-COMPLIANCE/BREACH**

Non-compliance with this policy may result in a review of the situation by the Laser Safety Committee. Repeated non-compliance may result in disciplinary action, up to and including termination of employment and/or privileges with SHR.

**7. REFERENCES**

ANSI Z136.3 – 2011, American National Standard for Safe Use of Lasers in Health Care, Laser Institute of America

## PROCEDURE

Number: 731-60-010  
Title: Laser Safety

### Authorization

President and CEO  
 Vice President, Finance and Corporate Services

Source: Chair(s), Laser Safety Committee and Director for Surgical Services  
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Scope: Acute Care

## 1. PURPOSE

The purpose of this procedure is to establish the various processes associated with Laser credentialing, documentation, reporting and maintenance.

## 2. PROCEDURE

### 2.1 Credentialing – Staff

- 2.1.1 Obtain Manager approval to attend Medical Laser Safety Course.
- 2.1.2 CNE organizes in-services and continuing education for approved staff on lasers and laser safety.
- 2.1.3 Individual attends the course.
- 2.1.4 CNE provides copy of certificate/proof of attendance to Laser Safety Committee.
- 2.1.5 CNE retains attendance records.
- 2.1.6 Laser Safety Committee reviews certificates/proof of attendance and approves individual as an SHR laser user and/or operator.

### 2.2 Credentialing - Physicians

- 2.2.1 Physicians apply for privileges through Practitioner Affairs.
- 2.2.2 Physicians validate their claim of proficiency in laser use by:
  - providing a certificate of completion from a recognized medical laser safety course <sup>6</sup> and/or
  - providing details regarding laser education and/or training in a letter or application format.
- 2.2.3 Practitioner Affairs forwards letter/application to Department Head for review.
- 2.2.4 Department Head approves/rejects laser privileges and advises Practitioner Affairs.
- 2.2.5 Practitioner Affairs advises Laser Safety Committee of physicians with approved laser privileges.
- 2.2.6 Laser privileges are added to the physician's privileges.

### 2.3 Laser Safety Checklist and Documentation

- 2.3.1 Complete laser safety checklist prior to the start of each laser procedure.
  - The logs are to be kept in a binder specific to the laser used and kept with the laser at all times.

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<sup>6</sup> ANSI Z136.3-2011, page 31

- 2.3.2 For laser procedures in operating rooms, the following information must be recorded on the laser log:
- Patient information (addressograph)
  - Type of laser/serial #
  - Laser settings/total energy used
  - Safety measures implemented during laser use
  - Surgical procedure
  - Time on/off (laser activation)
  - Patient protection.
- 2.3.3 One copy in the laser log binder and one in the patient chart.

## **2.4 Laser Safety Reporting**

- 2.4.1 Report all incidents involving lasers (see SHR Policy: Safety Reporting).
- 2.4.2 If an exposure to a laser beam occurs, staff must:
- 2.4.2.1 Seek first aid immediately.
  - 2.4.2.2 Have an eye exam by an ophthalmologist
  - 2.4.2.3 Ensure an incident report is completed after exposure.
  - 2.4.2.4 The Manager advises the LSO for follow-up.
- 2.4.3. The LSO brings it to the Laser Safety Committee who will investigate the causes of the incident and will report back to those involved on methodology for future prevention.

## **2.5 Maintenance and Service** (see SHR Policy: Medical Equipment – Management, Inspection, Maintenance and Repair)

- 2.5.1 Whenever a problem arises with a laser, contact the ERT. The ERT will contact Clinical Engineering to determine needs for type of service or repair.
- 2.5.2 Clinical Engineering retains records of preventative maintenance and repair of lasers.
- 2.5.3 Clinical Engineering attaches a sticker to the laser containing the most recent maintenance/repair date.

## **3. PROCEDURE MANAGEMENT**

The management of this procedure including procedures education, monitoring, implementation and amendment is the responsibility of the Chair(s), Laser Safety Committee and the Director for Surgical Services.

## **4. NON-COMPLIANCE/BREACH**

Non-compliance with this procedure may result in a review of the situation by the Laser Safety Committee and or Manager/Department Head.

## **5. REFERENCES**

Canadian Standards Association (CSA)  
ANSI Z136.3 – 2011, American National Standard for Safe Use of Lasers in Health Care,  
Laser Institute of America

**LASER SAFETY CHECKLIST**

- Windows covered and doors closed
- Signs posted
- Goggles outside door
- Reflective surfaces covered
- Fire extinguisher, water basin and 60cc syringe in the room
- Appropriate eyewear on all staff and patient
- Test fire complete and satisfactory (CO2 lasers only)
- Laser mask and smoke evacuator (if applicable)

**FOR LASER OF UPPER AIRWAY**  
**include the following safety checks:**

- Patient eyes covered with wet eye pads
- Wet green towels covering patient face
- Laser tube with methylene blue
- O2 flows low as possible
- Moistened gauze around laser tube



# Laser Safety Handbook

## 1. Protective Equipment

### 1.1 Eye Protection - Staff

- 1.1.1 All staff will wear protective eyewear within the controlled area (specific to wavelengths of lasers before the laser is activated) and whenever using laser technology.
- Eye protection must state: OD and wavelength.

- 1.1.2 When using the microscope, persons looking through the eye piece do not require protective eyewear.

**NOTE:** Prescription glasses, safety glasses, splash shields or contact lenses are not acceptable forms of eye protection.

### 1.2 Eye Protection – Patients (except ophthalmology patients)

- 1.2.1 All patients will be provided eye protection appropriate to the laser wavelength in use.
- 1.2.2 Whenever possible, the patient will wear the same eye protection as personnel.
- 1.2.3 For patients undergoing general anesthesia, the eyes will be covered in the following manner:
- Gently close the lid and secure with tape (the use of eye lubricant is optional; if used, only use water-based gel).
  - Use goggles specific for the laser in use or
  - saline-moistened eye pads
- 1.2.4 For procedures around the face and eyelids, corneal protectors (not plastic) internally coated with water-based lubricant are recommended.
- 1.2.5 Staff will check for proper positioning of the eye protectors periodically to prevent inadvertent exposure to patient's eyes.

## 2. Environmental Controls

### 2.1 Controlled area

**The laser nurse assigned to a case will create a safe controlled area.**

- 2.1.1 Post specific laser signage to all entries.
- 2.1.2 Light up warning signs (if equipped).
- 2.1.3 Close doors.
- 2.1.4 Place protective coverings or close blinds over all windows (if required by the laser in use).
- 2.1.5 Place goggles at the entrance/door of laser suite.
- 2.1.6 Restrict access to the controlled area to authorized personnel.
- 2.1.7 Position laser, electrical cables and laser articulating arm or fibers in such a way to avoid any accidental falls or breakage.
- 2.1.8 Cover reflective surfaces/avoid reflective instruments.

### 2.2 Instruments within proximity of lasers

- 2.2.1 All instruments that are used in the surgical field or near laser beam will be of an ebonized, brush finished or covered with a black non-reflective material.

- 2.2.2 Plastic instruments (i.e., suction, smoke evacuation hose) will be kept away from laser beams.

### **2.3 Laser Settings and Storage**

- 2.3.1 Lasers will be set on inactive mode when not in actual use.
- 2.3.2 Lasers will remain in designated areas in department of use.
- 2.3.3 Keys to activate SHR lasers will be located in a secure area separate and apart from the laser.

## **3. Laser Testing**

### **A laser test is required prior to use of any laser.**

- 3.1 The laser user shall test the laser before use as per manufacturer recommendations.
  - 3.1.1 Verify coaxial alignment of aiming beam with laser beam.
  - 3.1.2 Verify power reading of fiber delivery system by calibration.
  - 3.1.3 The laser operator completes laser safety check list during surgical safety check.
  - 3.1.4 The laser user will constantly check all safety devices in order to protect the patient and staff.
  - 3.1.5 The laser user is responsible for selecting laser parameters. Each time the laser is activated, the laser operator will announce: "laser on" or "laser ready", and the parameters at which the laser is set (e.g., laser on continuous mode at 50 watts). Each time the laser is turned on standby, the laser nurse will announce "laser standby". The laser will be activated at the laser user's request only.
  - 3.1.6 The laser user and operator will always be aware of the status of the laser and or beam when laser is active.

## **4. Electrical Hazards**

### **All staff involved with laser usage will be prepared and aware of the associated electrical hazards.**

- 4.1 All lasers are powered with electricity – basic principles will be followed.
- 4.2 Always check power cords for integrity prior to plugging into outlet.
  - 4.2.1 If unit breaker or main breaker triggers, call LSO, LSSC, or Clinical Engineering.
- 4.3 Never open any panel on laser units.
  - 4.3.1 Most lasers are cooled internally and sometimes externally. If any leaks are noted once the unit is started, shut it off immediately; water and electricity combined are dangerous.
  - 4.3.2 If any abnormality occurs during use, shut off laser and call LSO, LSSC, or Clinical Engineering.
- 4.4 Fire extinguishers must be in the room where the laser is being used.

## **5. Endotracheal Tube Fire (Airway Fires)**

### **All staff involved with laser usage will be prepared in case of an endotracheal tube fire.**

Steps to be taken in the event of an endotracheal tube fire include:

- 5.1 Anesthesia shall disconnect the breathing circuit from the tube immediately. Extinguish fire with a 60 cc syringe or bulb syringe filled with normal saline.

- 5.2 Anesthesia shall remove endotracheal tube after deflating cuff and any parts of burned tubing that remains in the airway.
- 5.3 Anesthesia shall re-establish airway.
- 5.4 Airway shall be examined by anesthesia for extent of damage and treat patient accordingly.
- 5.5 An incident report shall be completed stating facts of fire.

**NOTE:**

- A tracheotomy set should be available in room
- The burned tube should be saved for examination

**6. Smoke Evacuation**

**Appropriate smoke evacuation equipment will be used during a laser case that produces plume.**

**Plume Evacuation**

- 6.1 All staff working with lasers in SHR will wear a properly fitted laser mask during a procedure that produces plume. Patients who are awake shall also wear a mask when feasible.
- 6.2 In cases producing minimum amount of plume, a disposable plume filter may be used. Always place the filter between the regulator and the collection bottle following the path of smoke shown on the filter.
- 6.3 Two rules to follow for evacuating plume:
  - The collecting hose must be within 2 cm of the operative site.
  - Use just enough suction power needed to collect plume.
- 6.4 When plume evacuation unit is used, check:
  - Integrity of electrical cords (power and foot switch) for any breaks.
  - Filters – ensure filter is checked for proper functioning prior to use. If necessary change filter if indicated on machine. Old filters are considered biohazardous waste and must be discarded as such (see SHR Policy: Waste Management).
- 6.5 All filtering equipment (hoses, reducers, disposable plume filters) are contaminated and must be discarded as biohazardous waste.
  - 6.5.1 Masks must be changed when needed or after each case.

## SHR Laser List and Classification

<b>Class 1</b> A class 1 laser is safe under all conditions of normal use. This means the maximum permissible exposure (MPE) cannot be exceeded.				
<b>Name</b>	<b>Type</b>	<b>Wavelength</b>	<b>Location (Facility/Unit)</b>	<b>Special Precautions</b>
<b>CLASS 2:</b> A Class 2 laser system emits in the visible portion of the spectrum and eye protection is normally afforded by the aversion response. A Class 2M laser system emits in the visible portion of the spectrum and eye protection is normally afforded by the version response for unaided viewing, but is potentially hazardous if viewed with certain optical aides. Many laser pointers are class 2.				
<b>Name</b>	<b>Type</b>	<b>Wavelength</b>	<b>Location</b>	<b>Special Precautions</b>
<b>CLASS 3:</b> Class 3R laser systems are divided into 2 subclasses, 3R and 3B. 3B laser is hazardous if the eye is exposed directly, but diffuse reflections such as from paper or other matte surfaces are not harmful. Protective eyewear is typically required where direct viewing of a class 3B laser beam may occur. Class-3B lasers must be equipped with a key switch and a safety interlock.				
<b>Name</b>	<b>Type</b>	<b>Wavelength</b>	<b>Location</b>	<b>Special Precautions</b>
Nidek YC1600	YAG Diode	1064nm 630-680nm	SCH EC	
Nidek YC1600	YAG Diode	1064nm 630-680nm	SCH EC	
Coherent Opal	Diode	689nm	SCH EC	
Coherent Selecta	NDYAG	532nm	SCH EC	
Chattanooga Intellect 800	Diode		SCH REHAB	
<b>CLASS 4:</b> Class 4 lasers include all lasers with beam power greater than class 3B. By definition, a class-4 laser can burn the skin, in addition to potentially devastating and permanent eye damage as a result of direct or diffuse beam viewing. These lasers may ignite combustible materials, and thus may represent a fire risk. Class 4 lasers must be equipped with a key switch and a safety interlock.				
<b>Name</b>	<b>Type</b>	<b>Wavelength</b>	<b>Location</b>	<b>Special Precautions</b>
Coherent Ultrapulse	CO2	10 600nm	SCH OR	
Coherent Ultrapulse	CO2	10 600nm	SCH OR	
Coherent Ultrapulse	CO2	10 600nm	SCH OR	
AMS Greenlight	KTP	532nm	SCH OR	
Coherent VP-Select	Holmium	2100nm	SCH OR	
Constellation	Diode	635nm	SCH OR	
Constellation	Diode	635nm	SCH OR	
SLX Oculite	Diode	810nm	SCH OR	
Optimedica Pascal	YAG	532nm	SCH EC	
CoherentNovus	Krypton	521-647nm	SCH EC	
Nidek DC-3300	Diode	808nm	SCH EC	
Carl Zeiss Visuals53	Diode	620-650nm	SCH EC	
Coherent	Holmium	2100nm	SPH OR	
COMING SOON	CO2	10 600nm	SPH OR	