

Guideline for laser safety.

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Association of periOperative Registered Nurses (AORN)

Burlingame BL. Guideline for laser safety. In: 2021 guidelines for perioperative practice. Denver (CO): Association of periOperative Registered Nurses (AORN); 2020 Jul 29. p. 421-442. [90 references]

[View Original Guideline](#)

Overview

Guideline Objective

To provide guidance to the perioperative team on the safe use of lasers, the roles and responsibilities of personnel, and the educational requirements for personnel involved with use of a laser system for medical procedures

Patient Population

Any patient undergoing operative or other invasive procedures

Recommendations

Recommendation Statements

Note: The original guideline provides guidance to the perioperative team on the safe use of lasers, the roles and responsibilities of personnel, and the educational requirements for personnel involved with use of a laser system for medical procedures.

The following topics are outside the scope of this document: general fire safety (refer to the AORN [Guideline for a Safe Environment of Care](#)); surgical smoke safety (refer to the AORN [Guideline for Surgical Smoke Safety](#)); credentialing and educational requirements for physicians and allied health practitioners; laser use in the dental setting; the selection of lasers; the selection of a method of ventilation; and power and energy settings.

Refer to the original guideline for additional recommendation statements.

Precautions to Mitigate Hazards

1.1. Laser warning signs must be placed in visible locations at all entrances to the room when lasers are in use. (**Regulatory Requirement**)

Eye Protection

2.1. Eye protection applicable to the specific wavelength and optical density of the laser in use must be worn in the nominal hazard zone. (**Regulatory Requirement**)

Fire Prevention

3.1. Use only accessories compatible with the laser system, and use them in accordance with the manufacturer's instructions for use (IFU). (**Recommendation**)

Laser Shared Airway Procedures

4.1. Use a U.S. Food and Drug Administration (FDA)-approved, laser-retardant endotracheal (ET) tube during laser procedures involving the airway. (**Recommendation**)

Fiberoptic Procedures

5.1. Cover the end of the laser fiber with a moist sponge or towel when the laser is not in use. (**Recommendation**)

Instrumentation

6.1. Minimize the use of reflective surfaces during laser surgery. (**Recommendation**)

Foot Pedal

7.1. Place the laser foot pedal in a position convenient to the user and in a position where it will not be confused with other foot pedals. **(Recommendation)**

Service and Maintenance

8.1. Lasers must be inspected, tested, and maintained. **(Regulatory Requirement)**

Laser Safety Program

9.1. Develop and implement a laser safety program that:

- Applies to all owned, leased, rented, or borrowed laser equipment;
- Applies in any location where lasers are used; and
- Includes the following components:
 - Description of the interdisciplinary laser safety committee, which may be the same as a facility-wide safety committee;
 - Usage criteria and authorized procedures for all health care personnel working in laser nominal hazard zones;
 - Laser hazards and applicable controls (e.g., beam and non-beam);
 - Requirements for monitoring compliance with applicable administrative, engineering, and procedural control measures;
 - The type and frequency of medical examinations for personnel;
 - Education requirements (e.g., competency verification, certification, participating personnel qualifications);
 - Description of quality processes, including audits; and
 - Policies and procedures covering use of lasers.

(Recommendation)

Health Care Organization Responsibilities

10.1. The health care organization should:

- Define the qualifications for the laser safety officer (LSO);
- Appoint the LSO;
- Provide to the LSO a letter of "authority to suspend, restrict, or terminate the operation of a laser system if he/she deems that the laser hazard controls are inadequate";
- Appoint a deputy laser safety officer (DLSO) and laser safety site contact (LSSC) if these positions are determined to be required;
- Appoint a health care professional trained in laser safety (i.e., a laser safety specialist) to supervise every laser treatment–controlled area;
- Appoint a specific laser safety committee or assign the responsibilities of the laser safety committee to an associated committee;
- Delegate the administration of the laser program to the laser safety committee and LSO or designated alternates;
- Credential and maintain a list of the credentialed personnel involved with laser delivery;
- Establish a plan for handling accidental exposure incidents;
- Provide education and training to all personnel that is commensurate with the job description and applicable to the lasers used in the facility; and
- Define the scope of responsibilities for those credentialed to perform laser procedures.

(Recommendation)

Laser Safety Committee

11.1. Form an interdisciplinary laser safety committee, which may be a portion of the facility-wide safety committee, that includes the following individuals or departmental representatives:

- Administrators,
- The LSO,
- A biomedical engineer and/or clinical/biomedical engineer,

- A physician representative from each specialty group that uses lasers,
- Anesthesia professionals,
- Perioperative services administrators,
- A perioperative educator,
- Medical staff education/credentialing personnel,
- Quality department personnel,
- Surgical technologists,
- The laser safety specialist, and
- A DLSO if deemed necessary.

(Recommendation)

Laser Safety Officer (LSO)

12.1. Establish the qualifications for the LSO, which may include:

- Education and experience in laser operations, clinical applications, and safety;
- Completion of a formal medical laser safety course;
- Completion of a formal medical laser safety officer course; or
- Certification as a medical laser safety officer.

(Conditional Recommendation)

Deputy Laser Safety Officer (DLSO)

13.1. The DLSO may function as the laser safety officer in the absence of the LSO. The DLSO may also be the laser user, laser operator, or other trained individual. **(Conditional Recommendation)**

Laser Safety Site Contact (LSSC)

14.1. Delegate the following responsibilities to the LSSC:

- Overseeing laser use for each site when lasers are used in multiple sites in a health care organization (e.g., ambulatory surgery unit, eye clinic),
- Troubleshooting equipment malfunctions,
- Monitoring compliance with laser policies and procedures,
- Reviewing laser-related documentation (e.g., logs, laser manufacturers' IFU),
- Acting as a resource to personnel,
- Assessing needs for continuing education and training, and
- Assisting with data gathering and quality monitoring for the facility (e.g., education, credentialing, licensure).

(Recommendation)

Laser Safety Specialist

15.1. Delegate the following responsibilities to the laser safety specialist:

- Overseeing the safety of laser use in each room where a laser is used,
- Supervising laser usage in a room,
- Acting as a liaison between the clinical laser users and the LSO,
- troubleshooting equipment problems,
- Monitoring compliance with the health care organization's laser policies and procedures,
- Reviewing laser-related documentation (e.g., logs, laser manufacturers' IFU),
- Acting as a resource to staff members and laser users, and
- Assessing needs for continuing education and training.

(Recommendation)

Laser Operator

16.1. Assign a laser operator who has no competing responsibilities that would require leaving the laser unattended to every procedure in which a laser is used, including when

the laser has a foot pedal with an activation button. **(Recommendation)**

Laser User

17.1. The laser user must be credentialed by the health care organization as applicable to laser used. **(Regulatory Requirement)**

Audits

18.1. Complete a laser safety audit at least annually, or more frequently as determined by the LSO. **(Recommendation)**

Unintentional Exposure/Equipment Failure

19.1. When patient or personnel injuries or equipment failures occur:

- Remove the device from service;
- Retain all accessories and packaging if possible;
- Report the adverse event details according to the health care organization's policy and procedures, including device identification and maintenance and service information; and
- Follow organizational policy and procedures for seeking medical care for laser-related injuries.

(Recommendation)

Third-Party Laser Vendors

20.1. Apply all components of the laser safety program to all situations in which a laser is brought into the facility by a third-party laser vendor. **(Recommendation)**

Education and Competency Assessment

21.1. Education, training, and competency verification must be completed for all individuals involved in laser use. Education must be specific to the laser used and procedures performed; applicable to the job responsibilities; and performed periodically and when new laser equipment, accessories, or safety equipment is brought into the practice. **(Regulatory Requirement)**

Documentation

22.1. Document in the patient's medical record in a manner consistent with the health care organization's policies and procedures, and include the:

- Wavelength used,
- Safety measures implemented during laser use,
- Total energy used if available and applicable,
- Total activation time if available,
- On and off time for head and neck procedures,
- Laser device identification (e.g., serial or biomedical number), and
- Patient protection used (e.g., type of eyewear, eye shield).

(Recommendation)

Evidence Rating Scheme

AORN Hierarchy of Evidence

Research	I	• Systematic review – all studies randomized controlled trials (RCTs) • RCT
	II	• Systematic review – all studies quasi-experimental or a combination of RCTs and quasi-experimental • Quasi-experimental
	III	• Systematic review – all studies non-experimental or a combination of RCTs, quasi-experimental or a combination of

		RCTs and quasi-experimental and non-experimental; any or all studies qualitative • Non-experimental • Qualitative
Non-research	IV	• Clinical practice guideline • Consensus or position statement
	V	• Literature review • Case reports • Expert opinion • Organizational experience

AORN Evidence Rating Model

	High	Moderate	Low
Evidence Rating	IA or IB IIA or IIB	IIIA or IIIB	IC, IIC, or IIIC VA, VB, or VC
	• Wide range of studies with no major limitations • Little variation between studies	• Few studies and some have limitations but not major flaws • Some variation between studies	• Studies have major flaws or there are no rigorous studies • Important variation between studies

Recommendation Rating Scheme

Recommendation Rating

Recommendation

- Benefits clearly exceed harms
- Supported by high- to moderate-quality evidence
- May be based on low-quality evidence or expert opinion when
 - High-quality evidence is impossible to obtain
 - Supported by a guideline, position statement, or consensus statement

Conditional Recommendation

- Benefits are likely to exceed harms
- May be supported by any level of evidence when
 - Indicated for a specific patient population or clinical situation
 - Impact of the intervention is difficult to separate from other simultaneously implemented interventions (e.g., "bundled" practices)
 - Benefit-harm assessment may change with further research or not be consistent
 - Benefit is most likely if used as a supplemental measure

No Recommendation

- There is both a lack of evidence and an unclear balance between benefits and harms.

Implementation

Regulatory Requirement

- Perioperative team members "must" implement the recommendation in accordance with regulatory requirements.

Recommendation

- Perioperative team members "should" implement the recommendation, unless a clear and compelling rationale for an alternative approach is present.

Conditional Recommendation

- Perioperative team members "may" implement the recommendation.
- The degree of implementation may vary depending on the benefit-harm assessment for the specific setting.

No Recommendation

- Perioperative team members will need to evaluate whether or not to implement the practice issue.

Related Content

Supporting Documents

- [AORN Guideline for Laser Safety Evidence Table; 2020.](#)
- [Guideline for Laser Safety Evidence Review and PRISMA.](#)
- [AORN Evidence Rating Model; 2019.](#)
- [AORN Hierarchy of Evidence; 2015.](#)
- [AORN Non-research Evidence Appraisal Tool; 2015.](#)
- [AORN Research Evidence Appraisal Tool – Study; 2015.](#)
- [AORN Research Evidence Appraisal Tool – Summary; 2015.](#)

- [AORN Evidence Appraisal Companion Guide and Definitions.](#)

Implementation Tools

- [Guideline Essentials.](#)
- [Clinical Resources.](#)

Patient Education

No patient education materials available.

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TRUST Scorecard

Composition of Guideline Development Group (GDG)

Multidisciplinary GDG Members

Yes

Methodologist Involvement

Yes

Incorporation of Patient and Public Perspective



Systematic Review of Evidence

Literature Search



Study Selection



Evidence Synthesis



Foundations for Recommendations

Strength of Evidence Grade



Description of Benefits and Harms of Recommendations



Summary of Evidence Supporting Recommendations



Strength of Recommendations Rating



Clear Articulation of Recommendations



Funding Source

Yes

Disclosure and Management of Financial Conflicts of Interests



External Review



Updating

