

# OSHA & Worker Safety

## Laser Beam Safety Scheme

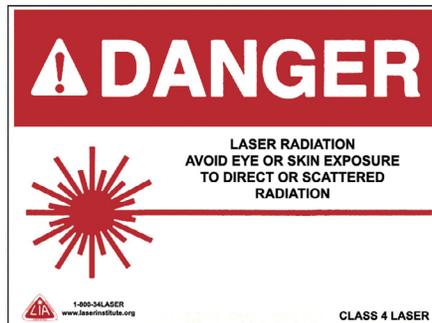
*Why your health care organization needs to implement an effective medical laser safety program*

In just a few short decades, lasers have evolved from the stuff of science fiction to a trenchant tool of choice commonly used today in science and medicine.

But whether the setting is a hospital, an outpatient clinic, or a laboratory, lasers that aren't properly maintained, monitored, and operated can lead to serious injury—including corneal damage, skin burns, and patient airway fires—and even death to patients and staff alike. In fact, the ECRI Institute reports that an estimated 550 to 650 surgical fires occur in the United States each year, many of them involving lasers as an ignition source.<sup>1</sup>

Approximately 12 laser systems, rated as either Class 3B or 4, are found in everyday medical use.<sup>2</sup> Although a Class 3B laser system is typically not a fire hazard or diffuse reflection threat (wherein the laser is reflected off a surface and scattered at many angles rather than at just one angle), it can be hazardous whenever the laser is viewed directly or specularly (as a mirrored reflection off a surface).<sup>2</sup> However, a Class 4 laser system, primarily used in surgery as well as procedures within many different specialties—including ophthalmology, urology, dermatology, otolaryngology and cardiology—carries extra risk because Class 4 is considered the most hazardous laser class and, therefore, has the most safety control measures (see “How Class 4 Lasers Can Harm Humans,” right).

The good news is that health care organizations are armed with more knowledge, safety standards, and protec-



Safety signage warning occupants of the dangers of medical lasers used on site should be posted and highly visible.

tive tools than ever before to reduce laser dangers. The bad news is that too many organizations have not implemented a proper medical laser safety program, which is essential to minimize risks, safeguard staff and patients, and reduce liability.

### False sense of security

Medical laser safety programs are particularly lacking in health care organizations that don't own their own lasers or don't frequently perform laser-assisted procedures, according to Gus Anibarro, education director with the Laser Institute of America (LIA), Orlando, Florida. In many cases, these organizations rent their lasers from third-party vendors and incorrectly assume that the laser rental company is responsible for laser safety in the operating room or treatment area—leading to a false sense of security.

“On the contrary, it is the employer's fundamental responsibility to ensure the safe use of lasers owned by and/or operated in facilities under its control,” says Anibarro, citing the revised standard

### How Class 4 Lasers Can Harm Humans

Class 4 is considered the most hazardous laser class because it poses more potential hazards to humans, including:

- Putting eyes and skin at risk from the direct beam
- Creating a diffuse reflection threat (in which the beam is reflected off a surface and scatters at many angles) or fire danger
- Generating unsafe levels of plasma radiation (which is normally safe in some circumstances)
- Producing laser-generated airborne contaminants that can spread viruses, bio-aerosols, gaseous toxic compounds, dead and live cellular material, particulates, and metal fumes, producing upper respiratory tract irritations, vision problems, and other serious side effects<sup>2</sup>

ANSI Z136.1–2014, “Safe Use of Lasers” (<http://www.lia.org/store/ANSI/106>)—one of several laser safety standards for users in the United States developed by the American National Standards Institute's (ANSI's) Accredited Standards Committee and its publisher, the LIA.

Furthermore, per standard ANSI Z136.3–2011, “Safe Use of Lasers in Health Care” (<http://www.lia.org/store/ANSI/113>), it is the employer's duty to provide a laser safety officer (LSO) and laser safety program consisting of policies, procedures, and training to ensure that personnel are responsible laser users. “It's vitally important for

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health care organizations to institute a medical laser safety program because they have an obligation to protect their patients,” says Anibarro. “Furthermore, under the Occupational Safety and Health Act, employers are responsible for providing a safe and healthy workplace. When investigating an unsafe workplace claim, OSHA [Occupational Safety and Health Administration] may also check to see if the facility was properly following ANSI laser safety standards. Plus, the hospital is at greater risk of litigation and malpractice when it lacks a laser safety program.”

To help run such a program, many health care organizations designate a staff member to serve as an LSO. An LSO is needed for Class 3B or 4 laser systems if a company decides to voluntarily comply with the ANSI standard. Yet only seven states—Arizona, Florida, Georgia, Illinois, Massachusetts, New York, and Texas—currently require health care facilities utilizing a Class 3B or 4 laser system to have an assigned LSO who is properly trained, Anibarro says. Nevertheless, he recommends it for every health care organization because the facility could be cited by OSHA if it doesn't have an LSO in place.

In addition, Joint Commission–accredited hospitals are expected to comply with Environment of Care (EC) Standard EC.02.02.01, which states “the hospital manages risks related to hazardous materials and waste,” and its Element of Performance 7, which states “the hospital minimizes risks associated with selecting and using hazardous energy sources.”

### Ten steps to laser safety

Instituting an effective medical laser safety program requires a strong commitment of resources and support from health care administrators who are determined to decrease laser risks and shield employees and patients from harmful

## Ten Steps to Laser Safety

The Laser Institute of America (LIA), Orlando, Florida, recommends the following 10 steps for starting a medical laser safety program:

1. **Appoint a laser safety officer (LSO)** and define this person's roles and responsibilities. This person is typically given the authority and responsibility to implement, monitor, and enforce the program. Often, health care organizations choose a clinical engineer, radiation safety officer, operating room nurse, or surgical technician to serve as the LSO because that person has previous experience operating, maintaining, or calibrating one or more laser systems within the facility. (An LSO is required for Class 3B and 4 laser systems if a company decides to voluntarily comply with ANSI standards. Also, some US states require that an organization identify its LSO.)
2. **Train the LSO properly** by enrolling this person in a course taught by a trusted organization (such as LIA).
3. **Draft a laser safety policy statement** and establish the details of your organization's laser safety program.
4. **Conduct an inventory of all Class 3B and Class 4 lasers.** Find these most hazardous types of lasers throughout the facility.
5. **Distinguish which lasers** are current on their preventive maintenance and which lasers are compliant with the Food and Drug Administration's Center for Devices and Radiological Health (CDRH) federal requirements (see <http://www.fda.gov/MedicalDevices/DeviceRegulationandGuidance/Overview/>). Contact the manufacturers of any lasers that are not CDRH compliant.
6. **Complete a laser hazard assessment** for each operating room, carefully following ANSI Z136.3.
7. **Examine, document, and control non-beam hazards**, including laser-generated air contaminants caused by laser plume.
8. **Write standard operating and maintenance procedures** for all laser systems on your inventory and implement measures for the control of beam and non-beam hazards.
9. **Authorize laser personnel and employ training** appropriate for the degree of hazard.
10. **Audit the program** to ensure that it is effective and the controls and standard operating procedures for the hazards are actively keeping people safe.

exposure. Top management has to be invested in the program and its goals for it to work properly.

“To ensure success, everyone has to be on the same page in terms of how safety standards are followed, precautions are taken, staff are educated on the issue, and systems and protocol are monitored and evaluated,” says Anibarro. “An effective program requires collective effort and consistent vigilance, but when you consider how vulnerable human beings can be to these powerful lasers, the time and work involved is well worth it, and an unsafe environment is

simply not acceptable.”

The LIA recommends 10 steps for starting a medical laser safety program (see “Ten Steps to Laser Safety,” above.)

### Understanding safety standards

When executing a medical laser safety program, health care organizations will want to abide by and stay up to date with the latest industry standards, especially ANSI Z136.3–2011. Compliance with this standard is on a voluntary basis for hospitals and other health care organizations; however, if an organization chooses

## Laser Appraisers

Check out these helpful links for more tips and information on laser safety:

- *Laser Safety Information Bulletin* (Laser Institute of America and OSHA): <http://content.yudu.com/Library/A2wzks/LaserSafetyInformati/resources/index.htm?referrerUrl=http%3A%2F%2Ffree.yudu.com%2Fitem%2Fdetails%2F1993747%2FLaser-Safety-Information-Bulletin>
- Laser effects on the human eye (Laser Institute of America and OSHA): <https://de356l4tocdyu.cloudfront.net/pdf/OSHAEyeFactSheet.pdf>
- Use of medical lasers (OSHA): <http://www.osha.gov/SLTC/etools/hospital/surgical/lasers.html>
- Laser hazards (OSHA): <https://www.osha.gov/SLTC/laserhazards/index.html>
- Optical radiation: Laser protection (OSHA): [http://www.osha.gov/SLTC/etools/eyeandface/ppe/laser\\_safety.html#Selection](http://www.osha.gov/SLTC/etools/eyeandface/ppe/laser_safety.html#Selection)

to comply with this standard, then there is an expectation to implement what is required for Class 3B and 4 lasers. “One of these requirements is that an organization must appoint a laser safety officer if it has Class 3B and 4 lasers or laser systems,” says Anibarro.

Like all other ANSI safety standards, ANSI Z136.3 undergoes a revision process every five to seven years. As part of that process, the subcommittee members

update the document, making changes to reflect any safety issues that have been identified since the last revision. Key alterations made during the last revision process in 2011 included eliminating the term *laser assistant*, more clearly defining the terms *laser operator* and *laser user*, and relaxing the requirement to wear laser safety glasses when using a laser device with a properly shielded/armored fiber.

Another set of suggested guidelines

is AORN’s Perioperative Standards and Recommended Practices for Inpatient and Ambulatory Settings (<http://www.aornstandards.org>), which includes practice definitions and recommendations on patient and worker safety. For additional resources, see “Laser Appraisers,” left. 

### References

1. ECRI Institute. Preventing surgical fires: Important new recommendations released. News release, Oct 22, 2009. Accessed Dec 31, 2014. <http://www.prnewswire.com/news-releases/preventing-surgical-fires-important-new-recommendations-released-65589412.html>.
2. US Department of Labor, Occupational Safety and Health Administration. Surgical suite: Use of medical lasers. Accessed Dec 30, 2014. <https://www.osha.gov/SLTC/etools/hospital/surgical/lasers.html>.

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