SESLHD PROCEDURE COVER SHEET

Health
South Eastern Sydney Local Health District

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AUTHOR	Brent Rogers, District RSO, SESLHD Erin McKay, RSO, St. George Hospital
POSITION RESPONSIBLE FOR THE DOCUMENT	District Radiation Safety Officer SESLHD-RadiationSafetyOfficer@health.nsw.gov.au
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SUMMARY	Procedures to ensure that medical lasers are used safely

1. POLICY STATEMENT

The South Eastern Sydney Local Health District (SESLHD or the LHD) is committed, through a risk management approach, to protecting employees, contractors, students, volunteers, patients, members of the public and the environment from unnecessary exposure to laser radiation, arising from the systems and processes which use lasers within its facilities.

This document provides procedures to ensure that lasers are used safely and appropriately.

2. BACKGROUND

2.1 Introduction

The word "LASER" is an acronym for "Light Amplification by Stimulated Emission of Radiation". Laser devices emit an intense, coherent and highly directional beam of light which may or may not be visible, depending on the type of laser.

Laser devices are sources of non-ionising radiation (NIR). This form of radiation is distinguished from ionising radiation by a different mechanism of interaction with matter. Non-ionising radiation is so called because it does not carry enough energy to ionise atoms. Instead, it interacts with matter by, for example, generating heat.

Many different materials may be used as the laser medium and the laser type is commonly known by the particular medium used. Each medium produces light of a particular wavelength, or, in terms of visible light, colour. Table 1 lists some common medical lasers including the region of the electromagnetic spectrum represented by the laser light.

Laser	Wavelength (nm)	Colour
Excimer	193	Ultraviolet (UV)
Argon	488 – 515	Blue/green
KTP:YAG	532	Yellow
Krypton	530 – 680	Yellow/green
Dye (various)	400 – 900	UV to IR
Diodes (various)	515 – 1700	Visible to IR
Neodymium:YAG	1064	Near Infrared
Holmium:YAG	2100	Far Infrared
Erbium:YAG	2940	Far Infrared
Carbon Dioxide (CO_2)	10600	Far Infrared

Table 1 – Some common medical lasers

2.2 Properties of Lasers

Lasers emit electromagnetic radiation (light) which is monochromatic and has low divergence.

Monochromaticity

Each laser produces light of one or just a few distinct colours, or wavelengths, of light. By contrast, light produced by incandescence, like sunlight, is made up of a continuous spectrum of wavelengths. The interaction of light with matter depends on wavelength, so the interactions observed with laser light are qualitatively different to those seen with light from conventional sources.

Low divergence

Unlike thermal light sources, a laser typically emits its light in one direction only in a near parallel beam. This low divergence allows the entirety of the laser beam's power to be focussed in a tiny area, yielding a very high power density. The ability to concentrate the beam makes lasers powerful tools but also gives laser radiation a far greater potential to cause injury than light from any other source.

2.2.1 Modes of Operation

Most lasers used in medicine deliver their energy to the target either continuously or in a sequence of equal-sized pulses. By adjusting the delivery mode, different clinical effects may be obtained.

Continuous wave

In this mode, the beam is present continuously whilst in operation. The amount of energy delivered to the target is simply equal to the beam power multiplied by the exposure duration. Lasers operating in this way are used at high energy to cut tissue by thermal ablation or to denature large volumes of tissue. Lower energies may be used to induce photochemical changes in a target volume.

Pulsed mode

The laser output is not continuous, but is delivered in a series of pulses. High-energy pulsed lasers can produce extremely high peak power output over very small time scales, and can cause tissue damage in less than a nanosecond. Such pulses (superpulses) can create shockwaves in target material and are typically used for breaking down stones (lithotripsy). At slightly lower energies, photo-ablative effects can be used to break down small volumes of tissue without excessive heating.

2.2.2 Laser Delivery Systems

All lasers require a means of transmitting the radiation to the treatment site – this is known as a delivery system. The laser wavelength determines the type of delivery system. Four types are in common use:

- Direct delivery
- Articulated arm
- Hollow flexible waveguide
- Optical fibres

In general, ultraviolet, visible and near infrared lasers (up to about 2000 nm) can use optical fibres, while longer wavelengths can only be transmitted by the other methods.

The divergence of laser light delivered by optical fibre is usually much larger than the native laser divergence, typically around 25°. This is because light travels down the fibre by a process of total internal reflection and the wavelength and material-dependent reflection angle (the *Brewster angle*) dominates the native beam divergence.

This increased divergence can be beneficial as it reduces the laser's Nominal Ocular Hazard Distance (q.v.) and allows the power density at the target to be adjusted by moving the fibre tip towards or away from the surface. However, it does prevent the laser beam from being focussed down to the smallest possible spot size.

The divergence of light delivered by the other methods is not necessarily greater than the native beam divergence.

2.3 Tissue Effects of Lasers

The interaction of light with human tissue is complex. The potential for injury depends upon the laser wavelength, the exposure duration, the beam intensity and the site of exposure. Note that exposure of the body to laser radiation at any wavelength can cause injury, often in the form of serious burns, both to the skin and to the eye, where the consequences can be particularly severe.

As the eye focuses visible light, increasing its power density, serious damage to the interior tissues of the eyes (especially the sensitive retinal layer), *including permanent loss of vision*, can result from the viewing of even quite low power lasers within the visible and near-infrared band. This can occur with exposure levels that, at the front of the eyes and at the skin, are completely harmless.

2.3.1 Photothermal Interaction

The most common result of exposure to laser radiation is the production of heat which, because of the highly intense nature of the laser beam and its ability to be finely focused, can generate very high temperatures, easily sufficient to coagulate or evaporate small volumes of tissue.

2.3.2 Photochemical Interaction

Absorbed optical radiation can directly modify the chemical structure of certain tissue components (chromophores). Normally, this photochemical effect is desirable - both vision and the tanning of skin are dependent on it. However, when exposure duration or repetition rate is excessive the normal recovery processes may be inhibited and longer term damage, such as the formation of cataracts, may be initiated. Photochemical effects are most likely to occur at short wavelengths (i.e. towards the ultraviolet end of the spectrum).

2.3.3 Photoablation

This involves the use of short wavelength laser beams capable of directly breaking molecular bonds. Thermal energy is carried away in a plasma plume, causing little or no damage to the material around the target site. Ultraviolet radiation is very strongly absorbed by biomolecules so penetration depths are small, of the order of a few micrometres.

2.4.4 Photomechanical Interaction

Photomechanical effects arise with the use of very short duration, high energy pulses, where there is insufficient time for thermal diffusion to spread the energy around the target tissue. Instead, the tissue expands rapidly, generating an acoustic shockwave that causes mechanical disruption to cellular structures. Laser lithotripsy relies on this effect to disintegrate calculi in the renal pelvis and gall bladder.

2.5.5 Biostimulation

Low intensity lasers produce a stimulating effect in tissue. Biostimulation lasers, operating in the red or infra-red region, have been reported to produce microcirculatory effects and to stimulate certain cellular processes, and may be used in physiotherapy to promote tissue healing.

2.3 Hazard Classification of Lasers

Lasers are grouped into hazard classes under the scheme described in IEC AS/NZS 60825.1.

EVERY LASER MUST BE CLEARLY MARKED WITH ITS HAZARD CLASS

Class 1

Lasers of this class are safe for use under all conditions of exposure.

Class 1M

These lasers can be hazardous if the beam is viewed with magnifying optical instruments.

Class 2

These are low-powered lasers that may require some administrative controls but present little hazard (for example, normal blink and aversion responses usually provide sufficient eye protection). Most laser pointers will belong to this class.

Class 2M

As Class 2, but the laser beam is not safe to view with optical magnifiers.

Class 3R

These lasers produce visible and invisible light that is hazardous under direct viewing conditions. There is low risk for eye injury provided the exposure time is short. There is no risk for skin injury. Aiming beams for clinical lasers are often of this type.

Class 3B

These lasers produce visible or invisible light that is hazardous under direct viewing conditions; either they are powerful enough to cause eye damage in a time shorter than the human blink reflex (0.25 seconds) or the blink reflex is bypassed due to the invisibility of the beam. Laser products with power output in the upper range of Class 3B may also cause skin burns.

Class 4

Class 4 lasers are high power devices capable of causing both eye and skin burns, their diffuse reflections may also be hazardous and the beam may constitute a fire hazard. All surgical lasers belong to this class.

2.4 Hazards of Lasers

2.4.1 Eye Exposure

The principal hazard is damage to the eye. Laser radiation in the visible and near infrared wavelength regions can penetrate the eye and damage the retina, usually permanently, while ultraviolet laser radiation and far infrared radiation can damage the surface of the eye. Damage from Class 4 lasers can occur in a fraction of a second, far quicker than the eye can blink to interrupt the beam. The hazard can arise from direct exposure to the laser beam or accidental reflections of the beam from shiny objects.

The mechanisms of laser-induced damage are illustrated in Figure 1.

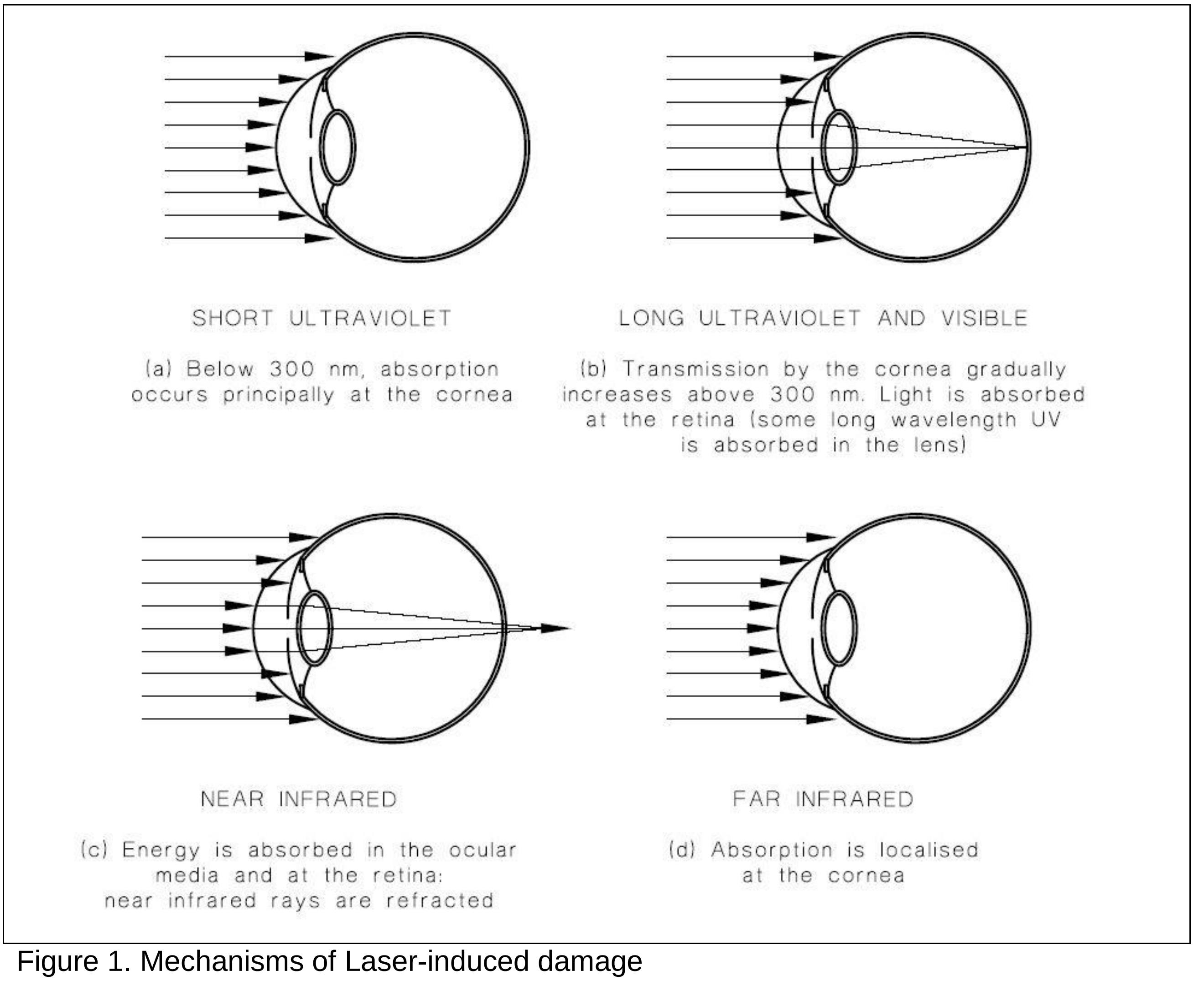

Figure 1. Mechanisms of Laser-induced damage

For staff using lasers it must be stressed that eye damage is most likely immediate and often permanent - thus the local safety rules must be understood and adhered to by all staff involved. The risks of a laser accident occurring may be very small, but the consequences are often serious.

2.4.2 Skin Exposure

The penetration of optical radiation into the skin is dependent on its wavelength and is generally greater in the visible and near infra-red regions of the spectrum. As the penetration depth increases, so does the volume of tissue exposed and the amount of radiation required to cause injury is consequently higher. Ultraviolet and mid to far infra-red radiations do not penetrate the skin significantly and deliver all of their energy to the surface, thus a very brief exposure can cause serious harm. For most acute laser injuries to the skin a localised laser burn will be the result.

Repeated or extended exposure to low intensity ultraviolet radiation can induce erythema, a photochemical reaction resulting in reddening of the skin, similar to severe sun-burn. Prolonged exposure over time can initiate long term degenerative processes including premature ageing of the skin and skin cancers.

2.4.3 Other Hazards

Apart from the hazards associated with direct exposure to the laser beam, there are several other ways in which lasers can cause harm.

Fire

Class 4 lasers can easily ignite flammable materials, which are abundant in operating theatres. Alcohol, anaesthetic gas, bowel gas, cloth drapes and many plastics are all flammable, some explosively so. It is essential to consider and mitigate the risk of fire in a laser theatre, bearing in mind that the fire may be on or within the body of the patient.

Electroshock

Lasers require high voltage power sources which have the potential to cause lethal electric shocks. Operators should avoid creating any conductive path to the laser cabinet. In particular, fluids should not be used or placed near the laser system. Fires on or near the laser cabinet must be treated as electrical fires.

Electrocution is most likely to occur when the protective covers are removed or interlocks are defeated to allow access to active components during installation or service.

Plume

The smoke generated by lasers used for tissue ablation is potentially harmful, due to the possible presence of toxic chemicals and live viral material in the plume.

3. RESPONSIBILITIES

3.1 The Laser Safety Officer (LSO) will:

- Monitor appropriate use of safe work practices, safety equipment and control measures when laser procedures are performed;

- Stop any unsafe operations or proposed actions involving laser radiation that come to their attention;
- Periodically review the documentation maintained by Departments where lasers are used regarding safe use, credentialing and training;
- Investigate and report on incidents or accidents involving lasers and implement any necessary urgent actions following the occurrence of a laser accident;
- Survey all new laser facilities for safety hazards before operations commence. The LSO shall be consulted in the planning stages of any new laser facility, including procurement of new lasers, to ensure appropriate environmental hazard management;
- Approve the designation of particular employees as Laser Safety Supervisors;
- Liaise with the site Medical Credentials Committee concerning the credentialing of laser practitioners;
- Maintain laser policies, procedures and business rules, particularly with respect to hazard evaluation, signage and control measures, consequent to site inspections and audits;
- Provide periodic reports to the site laser safety committee on laser incidents, compliance with training requirements, practitioner credentialing and audits of laser areas and personal protective equipment; and
- Assist National Standards and NSW MoH WHS audit preparation, in conjunction with the Radiation Safety Officer (RSO).

3.2 Line Managers will

- Ensure that all employees, contractors and visitors in their Department comply with this Laser Safety Policy;
- Ensure that all employees in their Department receive appropriate induction and continuing laser safety training, and that records of this training are maintained;
- Ensure that all staff who may be exposed to laser radiation have access to the appropriate personal protective equipment (PPE);
- Ensure that all laser incidents are investigated to determine preventative and/or corrective actions; and
- Ensure that only those practitioners who are credentialed to use lasers within the facility undertake work involving lasers.

3.3 Laser Safety Supervisors (LSS) will:

- Liaise with the Laser Safety Officer on such matters as hazard evaluation and medical surveillance;
- Ensure that all new employees required to work with the laser are adequately instructed on safety measures appropriate for their role;
- Ensure that an adequate supply of protective eyewear for each laser used in the area is available to staff;
- Ensure that all required documentation relating to the use of the laser is completed;
- Manage follow-up of laser incidents and accidents in his/her area in conjunction with the LSO;

- Arrange any required medical examinations for staff involved in laser accidents; and
- Assist the LSO with Laser Safety audits of his/her area.

3.4 Laser Safety Delegate (LSD) will:

- Identify themselves to the Laser Operator and Practitioner prior to the commencement of a procedure;
- Only permit operation of the laser when there is adequate control of laser hazards;
- Set up the laser equipment, ensuring correct laser, signage, eye protection and any required laser barriers are in place;
- Ensure that all staff in the laser area are equipped with appropriate PPE for the laser being used;
- Report of known or suspected accidents or incidents both directly to the LSS and through the hospital incident reporting system (IIMS); and
- Ensure that all documentation relating to the use of the laser is completed.

3.5 Laser Operators and Practitioners will:

- Ensure that a LSD is present if required and is identified to other staff in the procedure area;
- Confirm with the LSD that there is adequate control of laser hazards in the area before commencing the procedure;
- Ensure satisfactory completion of any required tests of the laser and delivery system prior to anaesthetising the patient; and
- Inform all staff in the procedure area when the laser is in operation.

The Laser Practitioner is additionally responsible for:

- Providing direct supervision to non-accredited medical staff in the procedure area, including during training in laser operation.

The Laser Practitioner may operate the laser themselves in particular circumstances, to be approved by the LSO, where only the Laser Practitioner and patient are present (e.g. ophthalmology).

3.5 All employees will:

- Comply with the requirements of this Laser Safety Policy;
- Wear any protective equipment provided by the facility;
- Promptly report any incident, near miss or perceived hazard involving a laser to their Department Manager or Laser Safety Supervisor and enter into IIMS within the appropriate timeframe;
- Attend any laser safety training required by the organisation; and
- Advise their Department Manager or Laser Safety Supervisor of any laser safety equipment which may be malfunctioning.

4. PROCEDURES

4.1 Laser Area Qualification

Any area where class 3 or 4 lasers are to be used must first undergo a laser safety assessment. This will be performed by the site Laser Safety Officer, possibly in conjunction with biomedical engineering and/or the designated Laser Safety Supervisor for the Department that controls access to the area.

The Laser Safety Assessment will review:

- Access to the area and whether engineering or administrative controls are sufficient or appropriate;
- Fixed and removable signage available for the area to warn of general or specific laser hazards;
- Light confinement within the area, with consideration of the wavelengths and NOHDs of lasers that might be used in that area;
- Laser hazards within the area, particularly reflective surfaces, flammable materials, conductive materials and laser plume evacuation.

If the LSO determines that lasers may be safely used in the area then a qualification report will be issued, detailing the features of the area reviewed and describing any restrictions placed on laser use in the area (e.g. only lasers with NOHD < 2 m).

4.2 Setting up a Laser Theatre

4.2.1 Signage

Warning signs must be placed at all entrances to a room where a laser is in use. These must include an illuminated sign that indicates when the power to the laser is on, and that the laser may be used at any time.

In addition, signs are required on the laser device itself and at all points on the laser where laser radiation is accessible.

The signs must be black on yellow background and the wording must comply with the requirements of AS/NZS 2211.1:2004. The sign must include:

i. The international symbol for laser radiation
ii. The laser type
iii. The laser class
iv. That eye protection must be worn

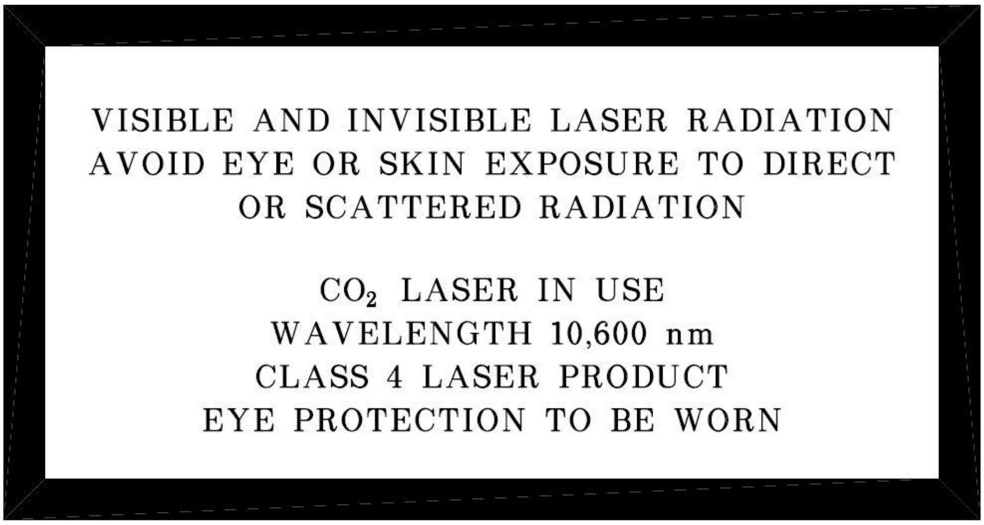

Figure 1. A sample laser warning sign including the international symbol for laser radiation

The warning signs must be removed from all doors once the laser is no longer in use, and the key is returned.

A sign must be attached to or around each laser generating device describing what eyewear is necessary. It must use the system specified in AS/NZS 1337.4:2011 so that a user can check their eyewear against it and thus verify they have the proper protection.

4.2.2 Window Coverings

Visible and near visible laser beams (effectively all except CO_2 lasers) will pass through window glass, and opaque coverings must be placed on windows when these lasers are used.

Opacity may be wavelength-dependent or reduced by damage, so if coverings are used they must be qualified for the purpose by the LSO in consultation with the provider. This may require penetration testing to be performed. Coverings should be inspected when deployed to ensure integrity.

4.2.3 Eye Protection

Eye protection appropriate to the laser type in use must be worn within the nominal ocular hazard area (NOHA). It is important to note that there is no universal protective eyewear, and that staff must check that the correct protection is available (the wavelength for which the eyewear is designed is marked on the frame).

AS/NZS 1337.4:2011 outlines the marking system for protective eyewear. The type, wavelength, scale number, and optionally, the damage resistance shall be marked on the eyewear.

Type of laser is indicated by:

D – use with a continuous wave laser

I – use with a pulsed laser

R – use with a Q-switched laser

No letter – use with all types

Wavelength of laser - wavelength regions in nanometres will be marked on the eyewear. All wavelengths that the laser produces must fall within the regions marked for the eyewear to be appropriate for use.

The scale number is equivalent to optical density (OD) and indicates the level of protection the eyewear provides. This ranges from L1 (least protection) to L10 (maximum protection). An OD of 1 attenuates light by a factor of 10, with each step in OD reducing transmission by an additional factor of 10. Every laser is different, but for most class 4 lasers, an OD of at least 5 will be required. It is essential to check the operator manual to determine the minimum OD required. If at all unsure, confirm with the Department LSS or site LSO.

The protective eyewear must provide a good fit to the face, with side protection equivalent to the lenses, be resistant to mechanical damage and provide short-term protection against direct laser effects such as melting/burning of the lens.

Water and mild detergents may be used to clean the eyewear. Never use alcohol to clean them as this may irreparably damage the dielectric film that provides protection.

Eyewear should be periodically inspected and replaced if damaged.

4.2.4 Reflective Materials

Reflections of class 4 lasers are as hazardous as the incident beam. Restrict the use of reflective materials around the operating area, particularly mirrors or mirror-like surfaces. Note that metal surfaces may produce mirror-like reflections in the infra-red region of the spectrum even if they appear dull on inspection.

Class 4 lasers can also produce hazardous reflections from rough surfaces, including skin.

4.2.5 Fire Precautions

Many lasers have the ability to ignite flammable materials, including alcohol, anaesthetic gas, bowel gas and plastics, so staff must be aware of the location of a nearby fire extinguisher. Note that most fire extinguishers are not appropriate for use on humans, so a supply of sterile water should be made available if there is any possibility of human combustion.

Any materials used in or around the laser target area should be carefully selected, with non-flammable or laser-safe materials used wherever available. Flammable drapes should be kept away from the laser target area or, if considered essential, dampened with sterile water to supress ignition.

If operating in the endotracheal region it is essential that staff are familiar with the airway fire management protocol.

4.2.6 *Electrical Hazard*

High powered lasers present a significant electrical hazard and conductive fluids (such as water) should be kept away from the laser equipment. Water-based fire extinguishers should be avoided.

4.2.7 *Laser Plume*

Laser plume may contain both toxic and carcinogenic chemicals and live biological material (e.g. human papilloma virus). The plume must be captured and filtered as described in NSW Health Guideline GL2015_002 *Work Health and Safety – Controlling Access to Surgical Plume*.

4.3 Controlling Access to the Laser

The key for each laser shall be kept at in a secure place when not in use, and should only be used to activate the laser under the supervision of a designated Laser Safety Delegate.

A laser key log book shall also be kept by the Laser Safety Supervisor to record when the key was taken and returned and by whom. Laser procedure logs created by the Laser Safety Delegate will be reconciled against the laser key log book periodically by the LSS. The reconciled records will be audited periodically by the LSO.

4.4 Maintenance

Maintenance shall only be performed on the laser by appropriately authorised and trained persons, and these persons shall ensure that the laser is left in a safe condition following maintenance.

The Laser Safety Supervisor will maintain a service history for each laser device in their area of responsibility.

4.5 Records

The following records are to be maintained by the Laser Safety Supervisor:
- Inventory and location of laser equipment
- Safety devices, personal protective eyewear inventory
- Quality assurance, preventative maintenance and equipment repair reports
- Laser training records
- Laser procedure logs
- Laser incident / accident reports

4.5.1 *Laser procedure logs*

Access Log

Use of surgical lasers is managed by controlling access to laser keys. The duty LSS keeps the keys when not in use and is responsible for ensuring that they are only taken by authorised persons (LSDs, service engineers, trainers or solo Laser Practitioners) for use in qualified areas for approved purposes.

The LSS shall maintain a logbook detailing:

- Date and time of key disbursement;
- Person to whom the key was entrusted;
- Purpose of the laser access (either clinical, training or service);
- Number of clinical cases (if any) performed; and
- Time of key return (must be the same day).

Procedure Log

A record of each procedure (the 'Laser Log Sheet') must be completed before and after operation of the laser. The log will be kept with the machine and be available for audit. It provides pre- and post-procedure safety checklists and details:

- Patient and procedure;
- Laser Safety Delegate;
- Laser Practitioner and Operator;
- Supervising Practitioner, if any;
- Laser and settings used (power, pulse settings); and
- Laser theatre used.

4.6 Procurement

The LSO and Biomedical engineering will be consulted prior to the procurement (purchase or loan) and use of any Class 3 or higher laser at SESLHD facilities to ensure appropriate environment hazard management.

4.6.1 Lasers Brought into the Hospital for Trial Purposes

This practice has a particular hazard, in that staff may not be aware of any special precautions of the type of laser being trialled, nor of any special protective eyewear required. The following guidelines must be followed:

- The Laser Safety Officer must be informed of any laser being brought in on trial before the laser is delivered.
- Biomedical Engineering must be similarly informed so that any necessary electrical safety testing can be performed.
- Staff who will be working with the trial laser must be informed as to the features, hazards and protection required for the laser.
- Medical staff who are to use a trial laser for a new application must be trained in its use, or a trained person must supervise the procedure.

4.7 Training

SESLHD is responsible for providing training and induction of all employees who may be exposed to laser radiation in the work place. Training and induction programs must be documented. Employees and or students receiving such training and induction must have their attendance recorded. The level of training required is dependent on the role to be fulfilled.

All new staff and trainees should be made fully acquainted with the laser apparatus and ancillary devices before use. Only persons who have received training to an appropriate level should be permitted to work with or control Class 3 or Class 4 lasers.

Role	Training Elements
<u>General staff</u> General staff are those who may be indirectly involved in a laser procedure or who may work in the vicinity of a laser hazard area. It is essential that they have an understanding of the hazards associated with laser exposure and have sufficient knowledge to protect themselves and avoid creating a danger for others in the area.	• Characteristics of laser beams • Laser eye and skin hazards • Laser classification scheme • Properties of different lasers • Beam reflection hazards • Selecting protective eyewear • Controls & controlled areas
<u>Support staff</u> Support staff are those working in the Laser area whilst the laser is active. The major emphasis for these staff is safety during a procedure and an overall understanding of the various potential hazards associated with laser use. It is essential that they have a basic knowledge of laser science, particularly terminology, tissue interactions and biological effects, as this will help in identification of potential hazards that might arise.	As for General Staff, plus: • Delivery systems and applicators • Fire hazards • Electrical hazards • Laser plume hazards • Hazards related to anaesthesia & management of the shared airway
<u>Laser Safety Delegates (LSD)</u> A LSN must be designated for each laser procedure and is expected to be present throughout. The LSN has primary responsibility for laser safety of staff associated with that procedure.	As for Support Staff, plus: • Laser hazard assessment; • Laser access control; • Setting up the Laser; • Laser procedure checklists & logs.
<u>Laser Safety Supervisors (LSS)</u> Each Laser-using Department designates a LSS who has delegated operational responsibility for laser safety within that Department.	As for Laser Safety Delegates, plus: • Introduction to standards, regulations and guidelines; • Incident investigation, management and reporting.
<u>Laser Operators</u> Laser operators are responsible for controlling the laser device during a procedure, in conjunction with a Laser Practitioner.	As for Laser Safety Nurses, plus: • Familiarisation with system- specific operating procedures; • Laser system quality assurance; • Laser-Tissue interactions.

Laser Practitioners Laser Practitioners direct the laser beam during a procedure. They have primary responsibility for the safety of their patient throughout.	As for Laser Operators, plus: • Facility credentials for the Laser procedure being performed.
Laser Safety Officer (LSO) The LSO is responsible for managing the Laser safety program and ensuring that it conforms with relevant standards, regulations and guidelines.	As for Laser Safety Supervisors, plus: • Familiarity with Laser safety and related standards, regulations and guidelines; • Laser area qualification; • Laser classification.

4.8 Credentialing

Each Laser-using Department must establish a credentialing procedure for Laser practitioners. This must be done in consultation with the facility Medical Credentials Committee and with the approval of the site LSO.

Endoscopy, Urology & ENT

Approval to use LASERs for clinical applications in Endoscopy, Urology & ENT within the SESLHD is contingent upon a successful application to the appropriate Site Medical Credentials Committee. This application is a 5-step process:

1. Accreditation for the relevant therapeutic procedure is first to be confirmed by the College or Society, where relevant, or as otherwise acceptable to the relevant Site Credentials Committee; and
2. Satisfactory performance is required at an examinable Laser Safety Course approved by the site Laser Safety Officer; and
3. Specific training is to be undertaken to familiarise the practitioner with the correct use of the particular laser device as relevant to the clinical procedure; and
4. Laser expertise specific to the modality for which credentials are sought shall be demonstrated:
    a. A medical officer with limited previous laser experience shall perform a total of five (5) laser cases under the direct supervision of an appropriately credentialed consultant or staff specialist. Certification of competence for the use of laser is to be provided by the supervisor’s signature on the log of cases performed.
    b. A medical officer with extensive laser experience may submit a logbook detailing their previous 2 years of relevant clinical laser practice together with a signed letter from their Head of Department accepting this as fulfilling the requirement of laser procedures performed.
5. Application for approval is to be made to the relevant Site Credentials Committee, via the site LSO, with documentary evidence of (1) to (4) above.

4.9 Laser Incidents and Accidents

A laser incident is an incident adversely affecting, or likely to adversely affect, the health or safety of any person because of exposure to laser radiation.

The following procedures must be followed in the event of actual or suspected malfunction of a laser or the exposure of a person to the laser radiation.

- If exposure to the eye(s) is known or suspected the affected eye should be protected and an ophthalmic examination should be undertaken as soon as possible.
- The Laser Safety Supervisor is to document the incident (with photographs if possible), including details of all persons and equipment in the room.
- An incident report must be submitted to IIMS by the LSD or by the staff member involved. A full investigation of the cause of the incident must be undertaken. This may require an investigation team to be established including the LSS and LSO. The incident report should include:
    - A full description of the incident including details of the laser involved, the procedure being performed and staff present at the time of the incident;
    - Circumstances of any injury, including presence/absence of eye protection, laser wavelength and pulse duration and the distance of the victim from the laser source at the time of injury;
    - Action taken to re-establish a safe working environment;
    - Proposals to prevent a recurrence.

In addition, if the incident involved a malfunction of the laser device:

- The user is to switch off the equipment at the main supply;
- The LSD is to remove the key and place a DO NOT OPERATE label on the equipment; and
- The equipment must not to be used until the unit is repaired.

5. DOCUMENTATION

- Application form for Laser Credentials
- Laser Key Control Log Sheets
- Laser Procedure Log Sheets
- Local airway fire protocol

6. AUDIT

The following documentation must be maintained and audited on at least an annual basis:

- Training records of all staff who may use or be present during the use of the laser, including safety and operational training.
- Clinical credentials of all staff who will use the laser – non-credentialed registrars/fellows MUST be supervised by a credentialed surgeon.

- Laser procedure records and laser key log sheets.
- Maintenance records of the equipment.

7. REFERENCES

- AS/NZS 4173:2017 *Safe use of lasers and intense light sources in health care.*
- IEC AS/NZS 60825-1 2014 *Safety of Laser Products.*
- AS/NZS 1336 2014 *Eye and face protection—Guidelines*.
- AS/NZS 1337-4 2011 *Eye and face protection—Filters and eye protectors*.
- ACORN Standard 2010, S8 *Laser Safety*
- Work Health and Safety Act 2011 No 10
- Work Health and Safety Regulation 2011
- NSW PD2009_039 Risk Management – Enterprise-wide Policy and Framework – NSW Health
- SESLHDPD/082 OHS Risk Management
- SESIAHS Area PD 076 Contractors – managing OHS training
- SESLHDPD/162 Procedure to Manage the Hazards from Lasers
- NSW Health Guideline GL2015_002 *Work Health and Safety – Controlling Access to Surgical Plume.*

8. REVISION AND APPROVAL HISTORY

Date	Revision No.	Author and Approval
Sept 2011	Draft	Richard Smart, Radiation Safety Officer in conjunction with the Laser Safety Officers
Apr 2012	0	Approved by SESLHD Clinical and Quality Council
Apr 2018	1	Review undertaken Radiation Safety Officer
July 2018	1	Endorsed by Executive Sponsor
August 2018	1	Endorsed by Clinical and Quality Council