### Laser Safety

<table>
<thead>
<tr>
<th>Description</th>
<th>Interpretation</th>
<th>Rationale</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>A. Describe basic safety using lasers in the operating room.</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
| 1. Education is required for both physicians and staff for safe laser operation. | a. Surgeon’s complete:  
1. Didactic lecture on both laser and clinical  
2. Applications  
3. Hands-on experience with laboratory models  
4. Preceptorship with experienced operators  
5. Residency training in University Hospitals  
6. Staff complete:  
1. Didactic lecture on basic laser physics and laser safety  
2. Operational training with return demonstration and validation. | 1. Education is required for safe laser operation.  
2. A nominal hazard zone should be identified to prevent unintentional exposure to the laser beam.  
3. Warning signs should be placed conspicuously to alert bystanders of potential hazards.  
4. Lasers are high-voltage equipment that should be protected against short circuiting associated with spillage or splatter. |
| 2. Warming signs should be placed on all doors leading to the OR.          | 3. Always place eye protection on all doors leading into the operating room.   |                                                                          |
| 3. The nominal hazard zone is considered to be the procedure room.        | 4. The nominal hazard zone is considered to be the procedure room.            |                                                                          |
| 4. Before the procedure, laser will be test fired (COS) and/or calibrated prior to patient entering the OR. If the laser does not function properly: | a. Obtain another laser of the same wavelength.  
 b. Notify attending physician if no other laser is available. |                                                                          |
| 5. Keep floor dry around the laser.                                       | 6. Keep floor dry around the laser.                                            |                                                                          |
| 7. Avoid placing liquids on top of the laser.                              | 8. Avoid placing liquids on top of the laser.                                 |                                                                          |
| **B. Describe injuries to eyes and prevention measures.**                  |                                                                               |                                                                          |
| 1. All safety eyewear must be wavelength specific for each laser regardless of color. | | 1. Unprotected eyes can become injured in the cornea and retina. |
| 2. For both open and closed procedures, appropriate eye protection is required for all viewers within the nominal hazard zone. | | 2. Scattered, diffuse, and reflected laser beams in addition to direct exposure from misdirected and damaged fibers can cause eye injuries. |
| 3. Eye protection for the patient includes: | a. When anesthetized CO2 Laser, eyes are taped and lubricated  
 b. Saline saturated eye pads applied to eyes and covered by aluminum foil if the wavelength specific goggles interfere with surgery.  
 c. Awake patients may wear wavelength specific laser goggles  
 4. All wavelength lasers:  
 a. Require wavelength specific glasses/goggles with side guards  
 b. Surgeon wears glasses or uses special filter lens on all scopes  
 c. All wavelength lasers require all viewing windows be covered/closed except for the CO2. | 1. Light reflection can result in injuries.  
 2. Anodized, dull, non-reflective, or matte-finished instruments decrease the reflectivity of laser beams. |
| **C. Describe preventive measures for skin injuries.**                    |                                                                               |                                                                          |
| 1. Laser light can be reflected off any shiny surface causing a variety of skin injuries. Methods to prevent light reflection include: | a. Use ebonized or dull finished instruments.  
 b. Modified laryngoscopes and bronchoscopes.  
 c. Special micro laryngeal instruments. | 1. HPV has been isolated in CO2 plume.  
 2. Personnel working in the laser environment should avoid exposure to smoke plume generated during laser surgery. |
| **D. Describe preventive measures for risks associated with laser plume.** |                                                                               |                                                                          |
| 1. Lasers produce plume (smoke) containing hazardous components which may cause: | a. Eye, nose and throat irritation  
 b. Nausea, vomiting, and flu-like symptoms. | 1. HPV has been isolated in CO2 plume.  
 2. Personnel working in the laser environment should avoid exposure to smoke plume generated during laser surgery. |
| 2. Staff should wear PPEs, including special high filtering masks.         |                                                                               |                                                                          |
| 3. Adequate Plume (Smoke) Evacuation includes: | a. Double suction set-up  
 b. Place disposable filters in suction lines.  
 c. Use a separate smoke evacuator with disposable filter and tubing. | 1. HPV has been isolated in CO2 plume.  
 2. Personnel working in the laser environment should avoid exposure to smoke plume generated during laser surgery. |
| **E. Describe fire prevention strategies specific to laser use.**          |                                                                               |                                                                          |
| 1. Fire prevention with Laser use includes: | a. Airway  
 b. Non-combustible endotracheal tubes  
 c. Cuff is inflated with methylene blue.  
 d. Cottonoids are packed around cuff so if laser light punctures cuff, the methylene blue leaks onto the cottonoids.  
 e. Anesthesia may use jet ventilation as an alternative to intubation. | 1. Standard endotracheal tubes are combustible and should not be used.  
 2. Fire is one of the most significant hazards of laser use. |
| 2. Airway Fire protocol (when ignition occurs): | a. Notify attending physician if no other laser is available  
 b. Disconnect oxygen supply  
 c. Flood area with water or saline  
 d. Immediately extubate the patient  
 e. Secure a new airway |                                                                          |
 b. Always keep a bowl/syringe of sterile saline/water on back table to extinguish a fire |                                                                          |
| F. Describe safety considerations during laser operation. | 1. Surgeon directing the laser should be in control of the foot pedal.  
2. Place laser on stand-by each time the surgeon takes his/her foot off the foot pedal.  
3. Check all electrical components of laser before plugging unit into wall.  
4. Troubleshooting includes:  
   a. Check Power Source  
   b. Check all connections  
   c. Turn laser off and back on  
   d. Call charge nurse of the service line  
   e. Call Laser Safety Officer- Moeseval Moralde. | 1. Attention to proper placement of the foot switch and use of the standby switch can reduce unintended activation of the laser beam and potential injury to the patient, operator, and/or bystanders. |
|---|---|---|
| G. Describe Laser Documentation. | 1. Documentation includes:  
   a. Which laser is used.  
   b. Safety measures taken.  
   c. Time laser is used.  
   d. Document in OR nursing record (VPIMS) and Laser Log if unit requires. | 1. Documentation provides a record of type of laser used and safety measures taken. |