

Guidance on the safe use of Laser & Energy Based Devices taking into consideration COVID-19/SARS-CoV-2

Australia and New Zealand have to date successfully followed their hibernation to reduce COVID-19 active infection levels in the community and amongst health care works. What happens over the next year in regard to COVID-19 in our communities however remains unknown.

The ASCD provides the following information as guidance for reducing staff and patient risks when lasers and energy-based devices are utilized for your dermatology treatments. What you as a health professional decide to provide to your patients will be dependent on a number of factors including your patient, their presenting problem, your personal preferences and clinic circumstances including levels and type of PPE available, any staff members deemed more vulnerable to a severe COVID-19 infection and changes in the level of community transmission and their associated risks along with any government and regulatory requirements.

As COVID-19 testing improves to include serology tests and the wider availability of testing what services and treatments you provide may also change and evolve. At present all patients and staff need to be considered both potentially infective & susceptible to infection. Screening of patients and general clinic considerations have been well covered such as by the Australasian College of Dermatologists (https://www.dermcoll.edu.au/wp-content/uploads/2020/04/Practice-Environment_09042020.pdf)

The COVID-19 pandemic provides us with a good opportunity to review our clinics infectious disease precautions including our Laser & energy-based devices and how we handle any associated plumes / smoke. Published reports fortunately reaffirm the benefits of appropriate medical infection control measures and their effectiveness for controlling spread of COVID-19. The basic principles of cleaning & disinfecting also similarly hold for SARS-CoV-2 and your level of PPE precautions needs to take into account you, your patient, the procedure and device risks involved.

If you don't have access to appropriate PPE consider carefully your reputational and medicolegal risks should a staff member or patient contract COVID-19 at your clinic. There remains no specific proven therapy making containment and prevention of spread still crucial. Nosocomial COVID-19 disease in healthcare works in China and around the world highlight transmission risks of SARS-CoV-2 in medical settings.

Many of our treatments are focused on the face. The face and especially around the nose, mouth and mucosal surfaces represent areas of high risk of SARS-CoV-2 exposure. and neck area and involve prolonged periods of close proximity (15+min). This associated with the known risks of aerosol generating procedures in other medical areas and their potential for superspreading need to be considered and appropriate precautions taken with aerosol or plume generating treatments.

Human-to-human spread is via droplets (& nosocomial aerosols where the virus can survive for hours) and their inhalation or deposition on mucosa along with contaminated hands with virus that can persist and survive on surfaces (fomites for hours to days and possibly weeks) and postulated self-inoculation of mucous membranes of the nose, eyes or mouth.

Generally, SARS-CoV-2 is less stable on porous fomites (e.g. paper, wood and cloth remaining infective for hours) vs more stable on smooth surfaces (e.g. plastic, glass and metal remaining infective for up to 9 days is reported).

Regular hand washing (>20 seconds) with soap and water remains our key method to reduce virus transmission (and/or 70% alcohol hand rubs). This needs to be done before and after patient contact including after removal of PPE including gloves (latex & nitrile are preferable to vinyl, but all are penetrated by viral particles). Also avoid touching eyes, nose & mouth (face).

Cleaning and disinfection of surfaces and medical equipment also remains key for clinic safety. Ideally surfaces and equipment need to be cleaned first by a detergent then disinfected (e.g. alcohol of around 70-80% or sodium hypochlorite 0.05-0.1%). Some alternative biocidal products are available (many combine both detergent action plus disinfection): <https://echa.europa.eu/covid-19> & <https://www.epa.gov/pesticide-registration/list-n-disinfectants-use-against-sars-cov-2>. Surfaces must stay wet for the entire contact or dwell time on the label for all these products.

ALCOHOL IS APPROPRIATE FOR MOST LASER AND EBD SURFACES (SODIUM HYPOCHLORITE OR BLEACH CAN DAMAGE MEDICAL EQUIPMENT).

Do check with your device provider regarding its compatibility for use of cleaning and disinfecting agents.

For low touch / minimal organic matter contamination surfaces such as laser touch screens their cleaning between each patients with a disinfectant such as alcohol may be appropriate.

Skin preparation is important for addressing potential contamination particularly before any potential plume or aerosol generating treatments.

First clean the skin of areas to be treated of creams, make up etc as normal and have the patient wash their treatment areas with soap or cleanser and water for >20 seconds, but also treat using a biocidal agent particularly when treating the hands (forearms) or head and neck. Alcohol (isopropyl- or ethyl- 70%) +/- chlorhexidine 0.05-0.1% or povidone iodine (7.5-10%) have proven COVID-19 actions with standard dwell times. Other alternative agents include hypochlorous acid 0.01% (or 5% povidone iodine or benzylkonium chloride 0.05-0.2%) for safety reasons such as around the eyes or mucosal areas.

Povidone iodine is a chromophore and needs to be thoroughly removed after adequate dwell time with sterile water when using a 532-1064nm laser device.

Potential aerosol generating dermatology procedures include:

- All laser plumes and electrosurgical treatments
- Air/Cryo & humidified cooling systems including dynamic in built or free standing systems are in many of our devices such as hair removal lasers, pulse dye, Nd:Yag, NAFL (erbium glass & thullium) laser, AFL (CO₂), and LED lights such as Aktilite.
- Medical gases such as nitrous oxide delivered using a mask system also poses greater risks than e.g. single use mouth piece demand systems.

Plumes produced by vaporising tissue and in particular ablative lasers (CO₂, Er:YAG & Er:YSGG) need special consideration including the risks of biomicroparticles and their potential to transmit viable virus. The importance of reducing risks of inhalation of particulate matter in medicine is highlighted by its proven health risks and postulated increased COVID-19 severe infection risks (PM_{2.5} air pollution) reported in countries more severely affected by the COVID-19 pandemic. Use of a laser rated mask or N95/P2 mask need to be considered in these circumstances. Also use a plume scavenging system (suction nozzle \leq 5cm from treatment site) and ideally consider having a HEPA filter included in your AC system or your laser lab air purifier. Also ensure you follow good infection control precautions when handling and changing these filters.

For non-aerosol and laser plume generating treatments normal surgical masks in reports still appear to provide some SARS-CoV-2 protection but should not be relied on for higher risk exposures or procedures.

In addition to your protective eye wear consider a face shield particularly with ablative lasers and PICO laser or devices requiring potential aerosol-generating air cooling systems. You should also consider wearing surgical caps, work scrubs (and disposable gowns for significant aerosol generating procedures), & gloves. Ensure all your staff are trained and up to speed in using PPE correctly including its safe removal and disposal.

If wearing masks and you have a beard, consider a facial hair free COVID-19 year for added safety.

Other points:

Acetone is not a skin anti-sepsis agent (it is a defatting agent with some microbial actions). When used for skin preparation this should be combined with a separate treatment with e.g. isopropyl-alcohol.

Encourage patients to wash areas being treated prior to attending for their treatments (+/- their hair etc) and refrain from touching their face or treatment area from then until their therapy. Other patient considerations include ensuring all eye protection used is either disposable (disposable eye shields) or disinfected between patients but avoid using shared elastic straps and avoid using chlorhexidine for disinfecting metal eye shields due to potential eye toxicity.

We wish you, your clinic, your staff and patients well in what will be a year to remember. The ASCD will continue to update you regarding safety during this time as this situation and our knowledge rapidly evolves.

Otter JA, Donskey C, Yezli S, Douthwaite S, Goldenberg SD, Weber DJ.. *J Hosp Infect* 2016;92:235e50. [5]

Dowell SF, Simmerman JM, Erdman DD, Wu JS, Chaovavanich A, Javadi M, *et al.* *Clin Infect Dis* 2004;39:652e7.

Wang W, Xu Y, Gao R, Lu R, Han K, Wu G, *et al.* Detection of SARS-CoV-2 in Different Types of Clinical Specimens. *JAMA*. 2020.

vanDoremalen N, Bushmaker T, Morris DH, Holbrook MG, Gamble A, Williamson BN, *e tal.* Aerosol and Surface Stability of SARS-CoV-2 as Compared with SARS-CoV-1. *New England Journal of Medicine*. 2020.

Chin AWH, Chu JTS, Perera MRA *et al.* Stability of SARS-CoV-2 in different environmental conditions. *The Lancet Microbe*. 2020 [https://doi.org/10.1016/S2666-5247\(20\)30003-3](https://doi.org/10.1016/S2666-5247(20)30003-3)

Mowbray N, Ansell J, Warren N, *et al.* Review Is surgical smoke harmful to theater staff? a systematic review. *J Surg Endosc*. 2013; 27(9):3100-7.

Barrett WL, Garber SM. Surgical smoke: a review of the literature. Is this just a lot of hot air? *Surg Endosc*. 2003; 17(6):979-87.

Lee SJ, Chung PS, Chung SY, Woo SH. Respiratory Protection for LASER Users. *Korean Society for Laser Medicine and Surgery*. 2019;8(2):43-49 <https://doi.org/10.25289/ML.2019.8.2.43>

John Sullivan
Greg Goodman
Philip Bekhor