

INFECTION CONTROL AND HYGIENE IN OROFACIAL MYOLOGY

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High standards of infection control, hygiene and cleanliness must exist in the office of the orofacial myologist for the benefit of patient and clinician alike. Numerous serious infectious diseases are found in dentistry which the clinician should not ignore. These diseases include viruses such as AIDS, hepatitis A and B, hepatitis (non-A and non-B), hepatitis Delta, herpetic conjunctivitis, herpes simplex II (HSV-2), herpetic whitlow, chicken pox, the common cold, infectious mononucleosis, influenza, German measles, Rubeola (measles), mumps and viral pneumonia. They include bacterial diseases such as gonorrhea, legionellosis, bacterial pneumonia, staphylococcus infections, streptococcus infections, syphilis, tetanus and tuberculosis. The CDC estimates that in a dental practice of 20 patients daily, an estimated average of at least two patients with oral herpes, one carrier of hepatitis B, and an unknown number of patients infected with the AIDS virus are seen in seven working days. Dental personnel cannot always identify carriers and may be exposed to them unknowingly. In fact, the clinician may be exposed unknowingly to all of the above-mentioned diseases.

Orofacial myologists must consider each patient as potentially infectious and employ infection control procedures. In a dental (and, similarly, an orofacial myology) practice, contamination may occur in three ways: Transmission from staff to patient, transmission from patient to staff, transmission from patient to patient. Transmission of microorganisms may be direct or indirect through personnel or dental instruments. The degree of risk depends on the type of microorganism, national and local factors, and changes in the numbers of infected patients. A checklist for infection control includes immunization, sterilization of intraoral instruments, high level disinfection of therapy equipment, correct storage of sterilized items, surface disinfection, hand washing and use of gloves and other protective attire, correct disposal of waste material, careful handling of contaminated items and communication of procedures to co-workers in the office. In addition, the clinician's own hygiene and office cleanliness must reflect exemplary standards.

HEPATITIS B: The following information directly affects the orofacial myologist. *Hepatitis B infection is the most critical infectious occupational hazard for the dental professional. Dental health care workers have a five to ten-fold greater chance of acquiring the infection than the general population. Hepatitis B infection may be a severe or even fatal acute illness resulting in possible work*

loss, infection of one's family, and/or the development of a carrier state. A carrier state can result in chronic liver disease, cirrhosis, and/or primary hepatocellular carcinoma. Dental health care workers with acute or chronic hepatitis B infection may transmit the infection to their patients, although this is a relatively rare occurrence (CDC, 1986).

Unfortunately, as many as two-thirds of individuals infected with hepatitis B are asymptomatic and unaware that they have the disease, although they can transmit it. Approximately one-in-ten of all infected individuals remain carriers, usually for a lifetime. According to the CDC, the United States had 800,000 to 1,000,000 carriers of hepatitis B in 1984. An increase of 20,000 cases annually is expected.

Hepatitis B is transmitted via blood and other body fluids through percutaneous or mucosal contact. The virus is highly concentrated in the blood. As little as one millionth of a milliliter of blood can transmit hepatitis B. Hepatitis B is relatively stable when exposed to environmental stresses and can survive on surfaces at room temperature for one week or perhaps much longer.

The CDC reports that the risk of transmission from staff to patient is very small relative to the total number of patients treated. However, the risk of transmission from patients to staff is much higher. Risk groups are patients and staff in hemodialysis and hematology/oncology units, patients requiring frequent or large-volume blood transfusion or clotting-factor concentrates (e.g., patients who have hemophilia, thalassemia), residents and staff of institutions for persons with severe handicaps, those who have household and sexual contacts among persons with persistent hepatitis B antigenemia, morticians and embalmers, blood bank and plasma fractionation workers, persons at increased risk because of sexual practices, drug users who share needles, prisoners and international travelers. In addition, populations with high incidence of the disease are Alaskan Natives, Indo-Chinese refugees, Haitian refugees, Native Pacific Islanders and Sub-Saharan Africans.

Tests can detect the hepatitis B virus in the blood, the degree of infectivity, previous infection and immunity to hepatitis B. Hepatitis B vaccine can eliminate risk of acquiring hepatitis B and is best administered during professional preparation. Three doses usually assure immunity: the initial dose is followed with doses at 1 month and 6 months after the first; a booster is probably necessary every 5 years. The vaccine has been proven safe and serious side effects have not been found.

The CDC cautions that vaccinations are no reason to relax strict adherence infection control procedures. Because the clinician is frequently exposed to spatter and since it may contain microscopic amounts of blood, the clinician may wish to ask a physician about immunization.

AIDS: Acquired immunodeficiency syndrome, first identified in 1981, is a severe viral disease caused by the human T-lymphotropic virus type III, or lymphadenopathy-associated virus (HTLV-III/LAV). AIDS is a serious and usually fatal complication of infection. High risk groups include homosexual men, intravenous drug abusers and hemophiliacs. By June 1986 nearly 21,000 cases were reported with the number expected to double every 13 months (CDC, 1986).

Transmission routes are sexual, and via exposure to blood, blood components, and products such as clotting factor concentrates, or perinatally. The virus has been found in the saliva of a few men and the tears of one woman, but the role of saliva or tears in the transmission of HTLV-III/LAV has not been established. Although the possibility of infection with HTLV-III/LAV is "almost certainly less" than with hepatitis B or herpes, the large number of potential exposures make AIDS a concern to the clinician.

A screening test, licensed by the Food and Drug Administration, is designed to detect antibody to HTLV-III. Further testing procedures can detect false positive results. People with positive test results should be notified by the blood bank after verification of results. Only a small percentage of those infected with the HTLV-III/LAV virus have actually developed AIDS, or AIDS related complex (ARC). Asymptomatic infected individuals can transmit the virus to other persons sexually, through blood, or perinatally. Oral signs and symptoms of HTLV-III/LAV infection include unexplained oral candidiasis and lymphadenopathy, among the earliest initial manifestations. Kaposi's sarcoma of the mouth is usually diagnostic of AIDS in high risk groups. The mouth or skin of the head and neck are often the first affected by bluish-purple hemorrhagic lesions in AIDS patients. Severe oral herpes simplex and oral hairy leukoplakia are commonly associated with HTLV-III/LAV infection. Oral hairy leukoplakia is a distinct corrugated white lesion, usually apparent on the lateral borders of the tongue (CDC, 1986).

Although dental professionals are a "sentinel population," they are in little danger of acquiring HIV infection in their work. However, only a small percentage of dental professionals have been evaluated. Clinicians should stay informed and follow established infection control procedures.

HERPES: Virtually everyone becomes contaminated with this virus and about 50 percent of Americans have reactivated herpes simplex. Except for the common cold and influenza, herpes infection may be the most common viral infection. Antibodies to herpes simplex virus 1 (HSV-1) are nearly universally present in the adult population. The CDC reports that nearly all adult dental patients

have been exposed to herpes. Primary acute gingivostomatitis is the first manifestation. Small red vesicular lesions may appear on any or all oral tissues, including the palate, buccal mucosa and lips, which are usually the most severely involved. Infection often begins when children are below age 6, usually 3 to 6 years old. The acute infection can last up to 14 days. Complications of primary gingivostomatitis can include death from encephalitis or visceral dissemination, but this is very rare. The most common complication is recurrent herpes simplex infection. Allergy, stress, fatigue, illness, or menstrual cycle may precipitate recurrent infection. Contact with the fluid from these vesicles, or with saliva or blood, transmits herpes. About 5% of asymptomatic oral herpes patients may shed virus in saliva. HSV is relatively stable, especially in proteins (blood, sputum); it may survive for hours or even days at room temperature; it is heat and acid-sensitive. The clinician should use established infection control procedures and allow individuals with active lesions to postpone therapy when possible. Sterile gloves should be worn for intraoral contact.

Herpetic whitlow (herpetic lesions of the finger) are less common but significant. The CDC reports the case of an ungloved dental hygienist who transmitted 20 cases of herpes to patients from a herpetic whitlow lesion. The clinician with exudative lesions or weeping dermatitis should refrain from direct patient care and from handling myofunctional equipment.

Transmission of herpes may occur from spattering of saliva or blood droplets to the eye, although auto-inoculation of the eye from the oral cavity via the hand is believed to be more common. While infection of the eye is an infrequent occurrence, the risk of complications associated with ocular herpes, such as irritation to the eye and possible visual impairment can be reduced. Position the patient carefully to reduce direct transmission from spatter, wear eyeglasses and use established infection control procedures.

Most herpes simplex type 2 (HSV-2) infections involve the genital area. But approximately 10 percent of oral lesions are type 2. HSV-1 lesions are not clinically distinguishable from HSV-2 lesions. Tests can determine antibody to herpes, but are inadequate in determining whether herpes is type 1 or type 2, and typing is expensive and usually unnecessary.

TUBERCULOSIS: Primary infections with mycobacterium tuberculosis occur in the lungs. They can persist for years. Tuberculosis is disseminated extrapulmonary in 15 percent of cases. It involves the mouth in 3.5 percent of cases. All oral tissues except teeth may be infected with tuberculosis. The tubercle bacilli can survive for a long time outside the body. A clinician who treats a patient with open tuberculosis runs a risk of contamination via aerosol formation (coughing). Similarly, a tuberculosis-positive clinician can put a patient at risk.

GONORRHEA: Infections with *Neisseria gonorrhoeae* can occur in the mucous membranes of the oral cavity,

the tonsils and the pharynx. The bacterium, highly sensitive to hypothermia and dehydration, can nevertheless cause infections of the eyes, and nasal and oral mucosa via airborne transmission in exudate from patients with oral infections. Proper positioning of the patient can help here. Use established infection control procedures.

Syphilis: *This four-stage infectious disease is caused by Treponema pallidum. The hard chancre of primary syphilis and the multiform skin eruptions of secondary syphilis are the major sources of contamination. Contamination is also possible via infected blood. Contamination via objects is less likely to occur, because the bacteria are highly sensitive to cooling and oxygenation, and cannot survive long in the atmosphere. The disease is worldwide and the highest morbidity is found in the 15 to 30 age-group (sexually most active)....Dentists and oral hygienists run an increased risk of contamination through contact with skin lesions and mucosal lesions in and around the oral cavity....The formation of aerosol may lead to infection of the dentist's own mucous membranes and eyes, but transmission of Treponema pallidum may also occur via microlesions on the hands of dentists and oral hygienists (Van Amerongen, 1988). Clinicians should use established infection control procedures.*

LEGIONNAIRES' DISEASE: The water-loving bacterium, legionella pneumophila, was rediscovered and named after the epidemic of severe pneumonia which occurred during a reunion of Korea veterans in Philadelphia in 1976. It is often found in pipelines of heating systems and in humidifiers of air conditioning systems of hotels, hospitals, and apartment buildings. Transmission of legionella infections occurs via aerosols formed from contaminated water. Legionella have not yet been described in dental practices, but one should take into account the possibility of infection. Personnel of a certain dental department had significantly higher antibody titres than a matched control group; further, a larger percentage of persons had antibodies than the matched control group. Since these bacteria can multiply very quickly, water left stagnant at room temperature for a few hours may contain vast numbers of microorganisms. Pipelines should be regularly washed out and water in reservoirs replaced (Van Amerongen, 1988).

OTHER VIRAL INFECTIONS AND BACTERIAL DISEASES: *Preventive infection control strategies for hepatitis B, AIDS, and other infectious diseases caused by bloodborne viruses are similar. Additionally, risks for occupational transmission of any disease will be minimized by adhering to a standard set of protocols (CDC, 1986). Information and suggestions for such protocols are as follows.*

STERILIZATION VERSUS DISINFECTION: The clinician should be well aware that *Sterilization is the process by which all forms of microorganisms are destroyed, including viruses, bacteria, fungi, and spores. Methods of sterilization include the use of steam under pressure*

(autoclave), prolonged dry heat, chemical vapor, ethylene oxide gas, or immersion in chemical sterilants. Disinfection is generally a less lethal process than sterilization. It eliminates virtually all recognized pathogenic microorganisms, but not necessarily all microbial forms (bacterial endospores) on inanimate objects. A chemical agent for disinfection in dental settings must be registered by the Environmental Protection Agency (EPA) as a hospital disinfectant, and must be tuberculocidal. Virucidal efficacy must include, as a minimum, both lipophilic and hydrophilic viruses (Council on Dental Therapeutics, 1988). For a list of ADA Accepted Products, write to the Council on Dental Therapeutics, American Dental Association, 211 East Chicago Avenue, Chicago, Illinois 60611, or call 1-800-621-8099.

STERILIZATION: The clinician can use steam under pressure (autoclave), chemical vapor, or ethylene oxide gas if available. However, units for these types of sterilization can cost thousands of dollars and are prohibitively expensive to the solo practitioner. Chemical immersion using ADA accepted products requires full-strength, 10-hour immersion which eventually destroys instruments and container alike. The most practical technique is undoubtedly dry heat using an ordinary toaster oven reserved for the purpose. Metal instruments, foil-wrapped cotton rolls, Boley gauges, etc., must remain in the oven at 320 to 360 degrees fahrenheit for three hours or 160 to 180 degrees centigrade for three hours. Include a pair of tongs. Cooling time may take approximately an additional half hour. Simply remove the sterile items with the tongs and place in disinfectant solution. (When removed from the disinfectant solution with sterile gloves, items should be rinsed in sterile water). An accurate thermometer is necessary to assure the correct temperature of the oven.

HAND WASHING: Clean hands are critical to hygienic office procedures. Hands should be washed before and after seeing each patient and after leaving the therapy room. The Council on Dental Therapeutics can provide a list of accepted antimicrobial hand cleaners. Dry hands with new, disposable toweling. If no water source is available, the next best choice is a one to ten clorox solution applied with gauze.

TO GLOVE OR NOT TO GLOVE: We often wish to emphasize an educational rather than a medical model in the therapy setting to maintain motivation. Wearing gloves, masks, and caps during therapy is extreme. However, new sterile gloves for each patient should be used for any intraoral contact with the patient. The hands should be washed before the gloves are put on and after they are removed. Non sterile gloves should be used for clean-up when touching surfaces or materials contaminated with any body fluids or secretions. Use gloves when handling contaminated cheek retractors, for example, to prevent transmission to microlesions. Reusing gloves is not recommended, since defects in the used material may exist. If gloves break, remove immediately, wash hands, and reglove.

PROPER PATIENT POSITIONING: Minimize cross-infection by careful seating and positioning of patient and clinician.

PROTECTIVE ATTIRE: Eyeglasses are recommended to protect the eyes from saliva and saliva-borne blood and aerosol. Clean the glasses with water and soap after each patient. Clothing can further protect the clinician from spatter. Use humorous or attractive long aprons, cobbler aprons, laboratory coats, jackets, front buttoning blouses, or smocks if appropriate. Some aprons are particularly appealing to children. An impervious plastic apron which can be wiped at intervals with surface disinfectant is another option. If no aprons are worn, then your clean outer clothing changed daily can serve the function of a smock. Long sleeves and high collars give further protection. Some dental uniforms contain BIOGARD, an antimicrobial treatment claimed to disrupt growth of bacteria for the life of the garment and be safe for the wearer. *Laundering at 80 degrees centigrade for ten minutes as a rule suffices to kill most microorganisms. To make sure that even highly resistant microorganisms such as hepatitis B virus are killed, it is advisable to add an amount of chlorine (0.75 l per 100 kg) to the laundry.* (De Graaff, 1988).

STANDARDS FOR THERAPY EQUIPMENT:

Cheek retractors and other intraoral instruments: Mere disinfection of cheek retractors is unacceptable in our profession. This rules out chlorine bleach. This also makes impractical the use of plastic retractors, as their chemical immersion in full strength solution for 10 hours will soon destroy both the retractors and the sterilizing container. Metal retractors such as the Columbia, Shuman, Bishop, Black, or University of Minnesota retractors are available. (The Columbia has adult and child sizes on either end. The Shuman has separate sizes for adult and child.) The simplest and cheapest way to sterilize these is to expose them to dry heat. They must first be cleaned to remove debris. Clean by thoroughly scrubbing with soap and water or detergent, or by using a mechanical device such as an ultrasonic cleaner.

Squirt bottles: Each patient needs a squirt bottle to bring to each therapy session. The patient's first and last name can be printed on the bottom of the bottle with permanent black magic marker in case it is left at the office. The clinician should personally use a separate demonstration bottle. No one should interchange bottles. Should the patient forget a bottle, one newly disinfected in 10-hour solution, can be supplied. Bottles can be prepared ahead and stored in new sealed plastic bags. Protocol for an individual's use of the squirt bottle requires research by our profession to determine how often the bottle should be emptied and allowed to dry, how often it should be cleaned and how long refrigeration of a filled bottle would prolong time between emptying and washing. In the meantime, treating the bottle with the same standards as a drinking glass seems sensible.

Tongue depressors, straws, orthodontic rubber bands: These are disposable items which should be new for each patient. Wearing sterilized gloves, the clinician can prepare packets in baggies ahead of time which contain individual supplies. With hands washed with antimicrobial soap, touch depressors only in the middle and straws only on the end during therapy and only if necessary.

Mirrors: Avoid using touchables; a free standing mirror or wall mirror may work best. The patient can be provided with a hand mirror to bring to each session. If office-supplied hand mirrors are used, a clean baggie, new with each patient, can be taped to the mirror handle, or the handle can be covered with saran wrap or aluminum foil. The clinician should have a separate demonstration mirror. Do not interchange mirrors.

SURFACES: Surfaces which may become saliva or blood-contaminated may be covered with impervious-backed paper, aluminum foil or clear plastic wrap. The coverings should then be removed while wearing gloves which may be non sterile and discarded appropriately. The gloves should then be removed, the hands washed and clean materials prepared for the next patient.

Uncovered surfaces should be wiped with absorbent toweling to remove debris and the towel disposed of appropriately. The surface should then be disinfected with a suitable chemical disinfectant. *Overall, Lysol Spray Scent II [has] performed best across all 5 test organisms (TB organism, poliovirus I, P. seruginosa, S. choleraesuis, and S. aureus) using 3 EPA test methods and a wipe test developed by CRA in both absence and presence of whole human blood. The wipes tests forced disinfectants to perform in surface wipe mode with contact times that did not require re-wetting of surfaces (3 minutes versus 10 minutes) and demonstrated that antimicrobial action of 79% ethyl alcohol + 0.1% o-phenylphenol surpasses iodophors, chlorines, phenolics, glutaraldehydes, and quaternary ammonium compounds....Products recommended currently for medical environmental surfaces disinfection (iodophors and diluted household bleach) were unable to perform adequate disinfection in presence of blood when used as wipe on sterile plastic laminate surfaces. Wescodyne iodophor at 75 ppm also failed EPS's standard AOAC Use-Dilution Method for P. seruginosa, S. choleraesuis, and S. aureus (Clinical Research Associates, 1987).*

DISPOSAL OF WASTE MATERIAL: Disposal materials contaminated with body fluids should be *carefully handled and discarded in sturdy, impervious plastic bags to minimize human contact.* Liquid chemicals should be *carefully poured into a drain connected to a sewer while flushing with copious amounts of water unless labeling or local, state or federal regulations prohibit such a practice* (Council on Dental Therapeutics, 1988).

WORK WITH CARE: Work in an ordered fashion. Be careful not to puncture gloves. Use gloves with caution around heating devices.

OFFICE ENVIRONMENT: The office should be vacuumed and/or mopped and dusted regularly. Windows, walls, and carpeting should be kept clean. Chairs, the treatment chair headrest and arms, tables, counters, and units which are likely to become contaminated should be surface disinfected. Use protective disposable coverings when needed. The office should be well-ventilated. The germicidal Lysol II can eliminate many odors and germs in the air. Wastebaskets can be cleaned with Lysol II; they should not be overflowing; a step-on waste can with a lid can prevent garbage from being an eyesore and minimize contact with discarded items. Telephones and doorknobs need regular attention. Sinks and toilets should look and be meticulously clean. Liquid pump soap should be used and disposable toweling provided. Even office color and decor can reflect high standards of cleanliness. Consider the psychological effect of color: *Near-black (a rich black brown) and off-white have the quality of making all colors in a room look cleaner and livelier* (Allen, 1972).

THE CLINICIAN'S HYGIENE: It goes without saying that the clinician's hygiene reflects the degree of cleanliness in the office. The clinician's clothing, hair, and fingernails must be clean and neat. The nose must be clear of debris. To greet the patient with a healthy smile, the teeth must be kept clean, brushed gently, probably for a minimum of 3 minutes flossed and kept free of food particles. Clinicians should consult their dentists for specific recommendations. Tongue scraping or tongue brushing (done since antiquity) is suggested. This is because the papillary structure of the tongue dorsum affords a unique ecological site that provides an extremely large surface area favoring the accumulation of oral microorganisms and oral debris. Dry brushing can be worthwhile. Let toothbrushes dry out between brushings. Having two of different colors can be helpful. Replace the toothbrush when it becomes splayed, at least every 2-4 months. Have one at each work site. Control oral malodor. *Lung air may contribute to oral odor in smokers and in those who have ingested odoriferous foods (e.g., garlic), drugs, or have consumed alcoholic*

beverages. The oral malodor is generated by local oral conditions in all but about 10% of the cases, in which it may be caused by nonpathogenic extraoral causes. Of the latter cases, volatile aromatic compounds circulating in the blood can be excreted via the lungs (Harris, 1987).

WRITTEN PROTOCOLS: The author suggests that the clinician document the office infection control procedures and communicate them to those who share and clean the office. The author proposes, similar to the 1987 ADA Annual Session Executive Committee support of a statement on infection control in dental auxiliary education programs that the IAOM develop asepsis, infection and hazard control protocols, and establish mechanisms for monitoring compliance and mechanisms for periodic updating of the protocols.

CONCLUSIONS: In view of the information gathered here, the following guidelines seem necessary:

- Immunization against hepatitis B.
- Hand washing between each patient with antimicrobial cleanser and drying with clean, disposable toweling.
- Correct seating and positioning of patient and clinician.
- Use of eyeglasses by clinician.
- Use of protective clothing.
- Use of sterile gloves for intraoral examination. Use of non sterile gloves for clean-up of contaminated materials.
- Correct sterilization, not disinfection, of cheek retractors and other items used intraorally.
- Correct storage of sterilized items.
- Correct disinfection of surfaces.
- Correct handling of touchables such as squirt bottles, mirrors, tongue depressors and orthodontic rubber bands.
- Correct disposal of contaminated materials.
- Clean, well-ventilated, pleasant offices with clean heating and air conditioning systems.
- Meticulously clean sanitation facilities.
- High standards of personal hygiene.
- Communication of infection control procedures to all workers who share the therapy environment.
- Documentation of infection control procedures.

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