

INFECTION CONTROL INFORMATION

September–December 2003



DENTAL INFECTION CONTROL AND OCCUPATIONAL HEALTH/SAFETY COURSE

CO-SPONSORED BY: OSAP AND THE FEDERAL DENTAL SERVICES

DIS has received several questions about registration deadlines for the upcoming dental infection control/safety course being held Tuesday, 27 January–Friday, 30 January 2004 in Atlanta, Ga. All attendees (regardless of funding source—local, command, AFIT) must register for the course, and make their own travel and hotel reservations. The **course registration deadline is 19 January 2004**. Please visit www.osap.org for online registration information. Please call the Atlanta, Georgia Sheraton Colony Square Hotel directly at (404) 892-6000 to receive the government rate of \$112.00 **no later than 5 January 2004**.

Miscellaneous information:

- Course attendance is limited and reservations should be made as soon as possible.
- For questions about the course not addressed on the OSAP Web site, please contact Lt Col Jennifer Harte at DSN 792-7668, commercial at (847) 688-7668 or jennifer.harte@ndri.med.navy.mil.
- The course schedule is available (PDF format) by clicking [here](#).
- The course is not scheduled to end until 1615 on Friday, 30 January 2004; travel arrangements should be made accordingly.
- The uniform of the day is Class A service dress (service coat optional).

NEW INFECTION CONTROL PRODUCTS

New and innovative products are marketed each month and DIS is unable to evaluate all of them. Because DIS has not had the opportunity to evaluate these products, **we cannot confirm manufacturers' claims** about them. If you would like additional information about the products or are interested in evaluating them please visit <http://www.brooks.af.mil/dis/newproducts.htm> or the manufacturer's Web site for more information on the following products.

- PureLine50 (Sterisil: www.sterisil.com)
- Lisa tabletop pre-vacuum and post-vacuum sterilizer (A-dec/W&H: www.a-dec.com)
- UniKnit unit-dose retraction cord (DUX Dental/Van R: www.duxdental.com)
- Originate™ Disposable Impression Trays (AXIS Dental: www.axisdental.com)
- Isofluid® Plus Mask (Crosstex: www.crosstex.com)
- Opti-cide-3 Environmental Surface Disinfectant (Micro Scientific Industries: www.opticide.com)
- EcoTru® Professional Environmental Surface Disinfectant (EnviroSystems: www.envirosi.com)



FREQUENTLY ASKED QUESTIONS

JCAHO and Alcohol-Based Hand Rubs (11/03)

Question: Our medical group infection control officer wants the dental clinic to install alcohol-based hand rub dispensers in every dental treatment room. Is this necessary to be in compliance with the Joint Commission on Accreditation of Healthcare Organizations (JCAHO) infection control standards?

Answer: JCAHO recommends that health-care organizations comply with the 2002 Centers for Disease Control and Prevention (CDC) *Guideline for Hand Hygiene in Health-Care*. The 2002 CDC hand-hygiene guideline provides recommendations to promote improved hand-hygiene practices and reduce transmission of pathogenic microorganisms to patients and personnel in health-care settings. The guideline discusses many different hand-hygiene agents, alcohol-based hand rubs (i.e., preparations containing 60-95% alcohol) being one of them. Recent studies of the *in vivo* efficacy of alcohol-based hand rubs and the low incidence of dermatitis associated with their use are reviewed. The guideline also summarizes the value of multidisciplinary hand-hygiene promotion programs and the potential role of alcohol-based handrubs in improving hand-hygiene practices. The 2002 CDC *Guideline for Hand Hygiene in Health-Care Settings* recommends alcohol-based hand products as an option for routine use, primarily to increase compliance.



Dental clinics are designed differently from most hospital wards and medical clinics. Sinks and hand-hygiene supplies (e.g., soap, paper towels) are readily available in our dental treatment rooms unlike in many other health-care settings. Basically, alcohol-based hand rubs are just another hand hygiene option for dental health-care personnel. Alcohol-based hand rubs may be useful in exam rooms or radiology work areas where multiple patients are seen in a short period of time and frequent handwashing is indicated. Another indication may be in dental residencies where staff members are performing frequent patient checks. If you think the use of alcohol-based hand rubs will increase compliance with hand hygiene or might help decrease dermatitis symptoms, then the addition of these products to the dental clinic may be indicated. Careful evaluation is indicated before deciding to introduce alcohol-based hand rubs or any new hand-hygiene product into your practice. For items to consider when determining if alcohol-based hand rubs should be incorporated into your practice please visit the DIS Web site: www.brooks.af.mil/dis/HOT/alcoholhandwash.htm and www.brooks.af.mil/dis/INCON21/sec2.htm#ic05.

Regulated Waste (12/03)

Question: What is regulated waste? Are there special requirements for regulated waste containers?

Answer: According to OSHA, regulated waste is defined as “liquid or semi-liquid blood or other potentially infectious materials; contaminated items that would release blood or other potentially infectious materials in a liquid or semi-liquid state if compressed; items that are caked with dried blood or other potentially infectious materials and are capable of releasing these materials during handling; contaminated sharps; and pathological and microbiological wastes containing blood or other potentially infectious materials.”¹

Examples of regulated waste found in dental settings are solid waste that is soaked or saturated with blood or saliva (e.g., gauze saturated with blood following surgery), extracted teeth, surgically removed hard and soft tissues, and contaminated sharp items (e.g., needles, scalpel blades, wires). Most waste from dental offices falls into the category of general medical waste and thus can be disposed of in the regular trash. Some examples include used gloves, masks, gowns, lightly soiled gauze or cotton rolls, and disposable plastic barriers or wrapping used to cover equipment during treatment. Since definitions of regulated medical waste vary by location consult federal, state, and local regulations to determine if other waste items are considered regulated medical wastes

According to OSHA, regulated waste shall be placed in containers that are:



- closable;
- constructed to contain all contents and prevent leakage of fluids during handling, storage, transport or shipping;
- puncture resistant if discarding contaminated sharps;
- marked with fluorescent orange or orange-red labels with lettering and symbols in a contrasting color (red bags or red containers may be substituted for labels.); and
- closed prior to removal to prevent spillage or protrusion of contents during handling, storage, transport, or shipping.¹

Reference:

1. US Department of Labor Occupational Safety and Health Administration 29 CFR Part 1910.1030 Occupational Exposure to Bloodborne Pathogens; Needlestick and Other Sharps Injuries; Final Rule. Federal Register 2001; 66 (12); 5317-25. As amended from and includes Federal Register 1991 29 CFR Part 1910.1030 Occupational Exposure to Bloodborne Pathogens; Final Rule. 56(235);64174-82.

Alternative Water Sources (11/03)

Question: Are there any new alternatives to the use of a distiller as a source of water for use in dental unit separate water system bottles?

Answer: High quality dental treatment water is currently achieved by: 1) using high quality source water and 2) periodic or continuous cleaning of the dental unit water lines. Many clinics currently use distillers to obtain high quality source water. While this is an effective method, distillers must be properly maintained to prevent scale buildup and steps must be taken to prevent contamination/bacterial growth in the storage tank. When distilled water is used as source water, the dental unit waterlines must either be periodically cleaned or continuous cleaning can be achieved by using chemical products (placed in the separate water system bottle) that continually release a low level of germicidal agent (e.g., iodine, silver ion, chlorhexidine).



A centralized alternative to distillers is now available from Sterisil. Sterisil claims their PureLine50 water purification system uses a combination of reverse osmosis and other filtration, as well as ultraviolet light irradiation to cleanse incoming tap water and then adds a very low level of silver ions as an antimicrobial agent prior to storing the water in a bladder. This treated water has much lower bacteria and pyrogen levels compared to tap water, with the added antimicrobial benefit of the silver ions, eliminating the need for periodic

waterline treatment. An independent agency has verified that the silver ions do not affect enamel bond strengths. If facility plumbing permits, water from the system can be plumbed directly to the dental units, but a more likely scenario in USAF clinics is use of the PureLine50 to fill separate water system bottles from a central location. As with any waterline technique, periodic monitoring (culturing) of the dental unit treatment water is indicated to ensure that procedures are correctly performed and that devices are working in accordance with the manufacturer's previously validated protocol. Information on Sterisil's [PureLine50](#) can be found in the "New Products on the Market" area of the DIS Web site, as well as at Sterisil's Web site, www.sterisil.com.

FROM THE LITERATURE



Hepatitis B and C Transmission in Outpatient Settings

Transmission of hepatitis B and C viruses in outpatient settings—New York, Oklahoma, and Nebraska, 2000-2002. Centers for Disease Control and Prevention. *MMWR* 2003;52:901-906.

Transmission of hepatitis B virus (HBV) and hepatitis C virus (HCV) can occur in health-care settings from percutaneous or mucosal exposures to blood or other body fluids from an infected patient or health-care worker. This report summarizes the investigation of four outbreaks of HBV and HCV infections that occurred in outpatient health-care settings. The outbreaks were reported to public health authorities by clinicians who suspected these infections might have been health-care-related. The investigation of each outbreak suggested that unsafe injection practices, primarily reuse of syringes and needles or contamination of multiple-dose medication vials, led to patient-to-patient transmission. Because the majority of patients with acute HBV or HCV infection are asymptomatic, all health-care workers should adhere to recommended standard precautions and fundamental infection-control principles, including safe injection practices and appropriate aseptic techniques to prevent the transmission of bloodborne pathogens.

DIS Comment: Although these outbreaks occurred in outpatient medical clinic settings, it is possible for this to occur in a dental setting where multiple-dose medication vials are used for conscious sedation.



These outbreaks could have been prevented by adherence to basic principles of aseptic technique for the preparation and administration of parenteral medications. The authors of this report recommend frequent training programs to reinforce infection-control principles and practices, including aseptic techniques and safe injection practices (see below for recommendations). Furthermore, written policies and procedures to prevent patient-to-patient transmission of bloodborne pathogens should be established, and practices should be periodically evaluated and monitored.

Infection-control and safe injection practices to prevent patient-to-patient transmission of bloodborne pathogens:

- Use a sterile, single-use, disposable needle and syringe for each injection and discard intact in an appropriate sharps container after use.
- Use single-use medication vials, prefilled syringes, and ampules when possible. Do not administer medications from single-dose vials to multiple patients or combine leftover contents for later use.
- If multiple-dose vials are used, restrict them to a centralized medication area or for single patient use. Never re-enter a vial with a needle or syringe used on one patient if that vial will be used to withdraw medication for another patient. Discard if sterility is compromised.
- Do not use bags or bottles of intravenous solution as a common source or supply for multiple patients.
- Use aseptic technique to avoid contamination of sterile injection equipment and medications.

HIV

HIV disease. Patton, LL. *Dent Clin N Am* 2003;47:467–492.



HIV/AIDS is an evolving epidemic in developed countries, where prevention and early detection efforts continue to be important in control of the disease. Occupational transmission of HIV in the dental office has never been documented from patient to dentist and has been reported only once from dentist to patient. Use of potent combination antiretroviral therapies, available since the mid-1990s, has meant preservation or restoration of immune function for many adults. Oral diseases have become less prevalent. Dental treatment complications are unlikely and minor when they occur. In the era of highly active antiretroviral therapy, however, the dental provider must be increasingly cognizant of the potential for drug toxicities and interactions while providing care for HIV-infected patients.

DIS Comment: The author states much has been learned about HIV disease during its first 20 years of existence in North America, however the number of HIV-infected patients under dental care is expected to increase in the future. The article presents an overview of the epidemiology, transmission, pathogenesis, diagnosis, and medical management of HIV/AIDS patients. Also, discussed are HIV-associated oral mucosal lesions and periodontal disease including dental management of these conditions. Common or important potential drug interactions that will likely be encountered when providing dental care of HIV-infected patients are also presented.

Viral Hepatitis

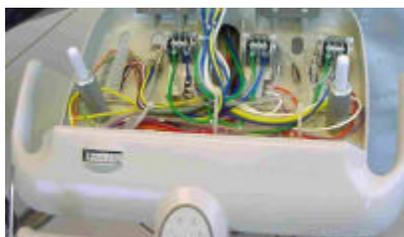
Advances in the diagnosis and management of human viral hepatitis. Winsom C, Siegel MA. Dent Clin N Am 2003;47:431–447.

Hepatitis is defined as an inflammation of the liver resulting in destruction of the organ's architecture. Many etiologic agents are responsible for hepatitis, however most hepatitis is of viral origin. The signs, symptoms, and stages of viral hepatitis vary greatly. Some patients may be asymptomatic. When symptoms are experienced, they are often described as flulike. Viral hepatitis occurs as either an acute or chronic infection. The article presents a comprehensive review of viral hepatitis types A through G. Definitions, causes, signs and symptoms, diagnosis, pathogenesis, and acute and chronic forms of hepatitis are included. Also discussed are modes of transmission, risk groups, morbidity and mortality, epidemiology, and treatment modalities.

DIS Comment: In dental settings, dental patients and dental health-care personnel (DHCP) may be exposed to a variety of pathogenic microorganisms, including bloodborne viruses (e.g., hepatitis B and C). Although transmission of bloodborne pathogens in dental health-care settings can have serious consequences, it is a rare event. Transmission can occur as a result of exposure to infected blood from patient-to-DHCP, from DHCP-to-patient, and from one patient to another. The opportunity for transmission is most likely from patient to DHCP, who frequently encounter patient blood and blood-contaminated saliva during dental procedures. There have been no reported cases of transmission of HBV since 1987 from DHCP-to-patients. There have been no reported cases of HCV transmission from DHCP to patients. Hepatitis B vaccination and infection control practices (e.g., standard precautions, engineering and work practice controls) have reduced infections in health-care personnel. This article provides an excellent overview of current information on hepatitis for DHCP and will help identify patients who will potentially have complications as the result of invasive dental treatment.

Dental Waterlines

Waterborne pathogens and dental waterlines. Mills, SE. Dent Clin N Am 2003;47:545–557.



Microbial biofilms colonize dental waterlines and contaminate water used in dental treatment. Biofilms are complex, resilient microscopic communities that are resistant to dislodgment or inactivation by antibiotics or germicides. Although organisms recovered from dental systems include potentially pathogenic bacteria, fungi, and protozoa, the risk of infection associated with exposure to contaminated dental water is unknown. High levels of endotoxin produced by gram-negative water bacteria have been reported in dental unit water. The impact of chronic exposure to endotoxin on patients and dental

workers suggests a topic for further investigation.

DIS Comment: Researchers have not demonstrated a measurable risk of adverse health effects among DHCP or patients from exposure to dental water, however a large body of scientific evidence verifies the potential for transmission of waterborne infections and disease in hospital settings. Disease outbreaks in the community have also been reported from diverse environmental aerosol-producing sources, including whirlpool spas, swimming pools, and a grocery store mist machine. This article reviews the nature of biofilms and dental equipment design features contributing to the contamination of dental unit water. An excellent review of the literature concerning dental waterlines and health issues is also presented. Although no epidemiological evidence suggests a current public health problem, the presence of large numbers of pathogens in dental unit waterlines generates concern. Exposing patients or DHCP to water of uncertain microbiological quality, despite the lack of documented adverse health effects, is inconsistent with generally accepted infection control principles.

Glutaraldehyde and Formaldehyde: Allergic Contact Dermatitis

Glutaraldehyde-induced and formaldehyde-induced allergic contact dermatitis among dental hygienists and assistants. Ravis SM, Shaffer MP, Shaffer CL, Dehkhaghani S, Belsito DV. *J Am Dent Assoc* 2003;134:1072–1078.

Research indicates that health-care personnel, particularly dental health-care personnel (DHCP), are likely to have reactions to glutaraldehyde and formaldehyde. The authors conducted patch test evaluations on 101 dental hygienists and dental assistants and 51 non-dental professionals to determine the incidence of glutaraldehyde-induced and formaldehyde-induced allergic contact dermatitis (ACD); the potential for coreactivity between glutaraldehyde and formaldehyde; and the correlation between training methods in safe handling of sterilizing solutions and the sensitivity to glutaraldehyde and formaldehyde among dental hygienists and dental assistants. Among the DHCP, 79.2% had a known exposure to cold sterilizing solutions, while the remainder were unable to provide a known history of exposure. 10.9% had clear reactions to glutaraldehyde, 4.0% were questionably allergic to glutaraldehyde, and 2.0% were definitely allergic to formaldehyde. One control subject had a reaction to glutaraldehyde, and one other had a reaction to formaldehyde. Wearing nitrile gloves, training in the safe handling of glutaraldehyde-containing solutions or both measures significantly reduced the risk of developing glutaraldehyde-induced ACD. Despite awareness of glutaraldehyde-induced ACD and published guidelines outlining methods for its safe use, the rate of ACD to glutaraldehyde remains unacceptably high, especially among dental hygienists and dental assistants and other health-care workers. In this study, DHCP were eight-fold more likely to be allergic to glutaraldehyde than were control subjects. The authors did not find any evidence of cross-reactivity between glutaraldehyde and formaldehyde in contrast to earlier studies. The preponderance of reactions among DHCP suggests that their present safety practices are largely ineffective in protecting against sensitization to glutaraldehyde in sterilizing solutions.

DIS Comment: Allergic contact dermatitis, also referred to as type IV or delayed hypersensitivity, may result from exposure to accelerators and other chemicals used in the manufacture of rubber gloves (e.g., natural rubber latex, nitrile, neoprene), as well as from other chemicals found in the dental practice setting (e.g., methacrylates, glutaraldehyde). Allergic contact dermatitis often manifests as a rash beginning several hours after contact and like irritant dermatitis, is usually confined to the area of contact. The condition can become chronic through repeated exposure.



As this article illustrates, high level disinfectants/chemical sterilants may present exposure risks to health-care personnel. These powerful, sporicidal chemicals (e.g., glutaraldehyde, peracetic acid, hydrogen peroxide) are highly toxic.^{1,2,3} Fortunately, the practice of using liquid chemical germicides for high-level disinfection or “cold” sterilization of dental instruments is not common in USAF dental facilities. Most reusable instruments and devices used in dentistry can withstand heat sterilization. If certain devices cannot be sterilized, heat tolerant or single-use disposable alternatives should be used. If no other alternative exists, precautions (e.g., closed containers to limit vapor release, wearing chemically-resistant gloves and other personal protective equipment) must be followed when using chemical sterilants to ensure the safety of DHCP. Other precautions may also apply (e.g., room exhaust ventilation, 10 air exchanges per hour).^{4,5} In addition to these precautions, manufacturer instructions for using chemical sterilants/high-level disinfectants must be followed precisely (e.g., dilution, immersion time, temperature).^{6,7} Sterilizing instruments using chemical sterilants may require up to 12 hours of complete immersion, whereas high-level disinfection for semicritical instruments requires shorter immersion times (12 to 90 minutes). Also, the sterilization process with liquid chemical sterilants cannot be verified with biologic indicators (i.e., spore tests).⁸ Special post-disinfection/sterilization instrument handling procedures are essential. Items need to be thoroughly rinsed to remove toxic or irritating residues, handled with gloves to prevent recontamination, delivered to the point of use in an aseptic manner, and if stored prior to use, the instrument should not be considered sterile. A common mistake is to use an intermediate level disinfectant for disinfection of heat-sensitive semicritical dental instruments (e.g., photographic retractors and mirrors) between patients because of the shorter contact time. Intermediate level disinfectants are intended for use on environmental surfaces (e.g., housekeeping surfaces, clinical contact surfaces) and are not to be used on any instruments or devices used intraorally; such use is counter to label instructions. Due to these limitations, use of heat-sensitive semicritical items

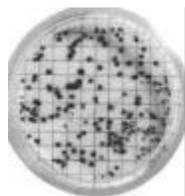
that must be processed with liquid chemical germicides is strongly discouraged; heat tolerant or disposable alternatives are available for almost all such items.

References:

1. CDC. Guidelines for Environmental Infection Control in Health-Care Facilities: Recommendations of CDC and the Healthcare Infection Control Practices Advisory Committee (HICPAC). 2003;52 / No. RR--10:1–42.
2. Stingeni L, Lapomarda V, Lisi P. Occupational hand dermatitis in hospital environments. *Contact Dermatitis* 1995;33:172–176.
3. Ashdown BC, Stricof DD, May ML, Sherman SJ, Carmody RF. Hydrogen peroxide poisoning causing brain infarction: Neuroimaging findings. *Am J Roentgenol* 1998;170:1653–1655.
4. Ballantyne B. Toxicology of glutaraldehyde: review of studies and human health effects. Danbury, CT: Union Carbide, 1995.
5. Favero MS. Current issues in hospital hygiene and sterilization technology. *J Infect Control (Asia Pacific Edition)* 1998;1:8–10.
6. US Department of Labor, Occupational Safety and Health Administration. Hazard \Communication 29 CFR 1910.1200. *Federal Register* 1994;59:17479.
7. US Environmental Protection Agency. Federal, Insecticide, Fungicide, and Rodenticide Act (FIFRA). Amended 1996. 40 CFR Part 152, 156, 158. *Federal Register* 1996.263.
8. Bond WW. Biological indicators for a liquid chemical sterilizer: a solution to the instrument reprocessing problem? *Infect Control Hosp Epidemiol* 1993;14:309–312.

Dental Unit Water and Sampling Methods

The efficacy of a continuous-use stabilized chlorine dioxide dental unit waterline cleaner and the evaluation of two water sampling methods. Porteous NB, Cooley RL, Lau CA. *General Dentistry* 2003;472–476.



Many commercial dental unit waterline (DUWL) cleaners are available. Results regarding the efficacy of these products vary and sampling methods and laboratory procedures can affect results. This study was conducted to test the efficacy of a continuous-use stabilized chlorine dioxide product and determine if two different sampling methods produced the same results. In sampling method one, reservoir bottles containing the continuous-use product were removed from the treated units and the liquid was discarded. The bottles were rinsed out with tap water, filled with tap water, and reattached to the unit for sampling. In sampling method two, the reservoir bottles were left attached to the unit and samples were collected. There was a statistically significant difference between the treated units and the control units but the two sampling methods revealed no statistically significant difference. Treated units showed a decline in the mean number of colony forming units per milliliter (CFU/ml) over the study period but the level was not consistently low enough to meet the ADA-recommended levels of 200 CFU/ml. **The findings of this study indicate that it is not necessary to replace a continuous use product with fresh, untreated water when testing water quality.**

DIS Comment: This study evaluated a continuous-use chlorine dioxide DUWL cleaner and suggested that weekly treatment protocols may not be sufficient to reduce microbial counts to levels that comply with acceptable standards of dental water quality. This reinforces the need for periodic water monitoring. Two options for monitoring dental unit water are currently available. Water can be submitted to the microbiology lab or the bioenvironmental engineers for culturing using method 9215 (heterotrophic plate count) as described in *Standard Methods for the Evaluation of Water and Wastewater*¹ or an in-office self-contained system that is equivalent to method 9215 can be used. When testing is performed on water undergoing continuous chemical treatment, the germicidal agent should be neutralized first to obtain accurate colony counts.² Sodium thiosulfate is the neutralizing agent of choice for chlorine; the amount currently used (1.0 mg/ml) to neutralize continuous-use chlorine-based products is the same amount used when neutralizing residual chlorine from the municipal water supply. As the authors of this study noted, as manufacturers continue to develop dental unit waterline cleaners, the standardization of sampling and laboratory handling methods is important.

References

1. American Public Health Association, American Water Works Association, Water Environment Foundation. In: Eaton RD, Clesceri LS, Greenberg AE, editors. *Standard methods for the examination of water and wastewater*. Washington DC: American Public Health Association, 1999:9-1–9-41.
2. ADA Council on Scientific Affairs. Dental unit waterlines: Approaching the year 2000. *J Am Dent Assoc* 1999;130:1653–1664.