Dental Unit Waterlines

Biofilm in dental waterlines continues to be a concern for the profession. As research reveals more about the nature of these complex microbial communities, investigators are also probing the links between chronic exposure to contaminated aerosols and respiratory health.

On the technological front, a wide range of new products are now available to help improve the quality of water produced by dental units and other dental devices. Virtually all new dental units come equipped with independent water reservoirs that allow the user to use various chemical treatments to control biofilm formation. The reservoir also allows the user to introduce water of known microbiological quality. Additionally, devices are available to treat incoming municipal water to remove bacteria and to treat water to prevent biofilm formation.

Compliance with treatment protocols has shown to be very important to the success of dental water treatment in clinical settings. In many cases, more complex and time consuming procedures result in greater likelihood of user error. Processes that are automated or passive can reduce compliance as a variable. As with all dental products, the best results will be attained by conscientiously following manufacturer recommendations for use.

Dentists need to become informed consumers when selecting dental equipment and products to treat dental water systems. When buying new dental units or devices that use water, ask the manufacturer to describe how to maintain good water quality. Include questions such as: How much time and effort does the process require? Have you tested any specific products for safety and effectiveness on your unit or device? Do any scientific studies support the approach that you have taken?

The same approach will be helpful when deciding on devices or chemical agents to remove or prevent biofilms. Find out how the product is to be used. How frequent and complex are the instructions for use? How much will it cost to use the product over a year? Ask the company to provide you with copies of studies and user evaluations that have been performed on its product.

Much is happening in 21st century dentistry. Dental technology continues to grow and expand, and with it the safety and infection control issues including waterlines, lasers, challenging new organisms such as prions, growing resistance to antibiotics, sharps safety and disinfectants and barriers.
Laser Dentistry

The field of laser dentistry continues to grow. As more dental practitioners use lasers in their offices, it is important to remember that there are related safety and infection control requirements. Let’s review some of these issues.

When lasers are used during surgical procedures, the thermal destruction of tissue produces what is termed “surgical smoke,” or a “laser plume.” Laser smoke can be composed of particles, gases, tissue debris, viruses and odor-causing substances. Employers should advise employees of the potential hazards of laser smoke. The latest CDC guidelines for infection control in dentistry recommend the use of:

1. Standard precautions (high filtration surgical mask and possibly full-face shield).
2. For minimal laser plumes, central room suction units with in-line filters.
3. For substantial laser plumes, dedicated smoke exhaust systems with high efficiency filters.

Always utilize laser safety eyewear appropriate for the wavelength in use. Failure to use such eyewear by those exposed to the laser (including patients) can result in serious eye injury. One should never look directly into the laser beam, even when wearing safety eyewear.

Class IV lasers can cause fires.

Appropriate procedures should be followed. For example, use only non-combustible anesthetic agents, and wet or fire retardant materials in the operative field. Staff should know the location of, and be trained in the use of, fire extinguishers.

Regarding sterilization, steam sterilization is appropriate. All the components used (optic fibers, handpieces, and tips) should be sterilized in separate sterilization pouches after each use, and according to the manufacturer’s instructions. It should also be noted that the port (connecting) end of the fiber must remain clean and oil free. The fiber should never be sterilized together with a lubricated high-speed turbine.

Certain types of lasers use water sprays for hard tissue procedures. As with all dental water delivery systems, measures should be taken to control biofilm formation in dental waterlines connected to the laser.

Each dental office should have a Laser Safety Officer (LSO) who is trained through an accredited safety program. The position of LSO is a good match for the job duties of the dental assistant. In assuming this role, the LSO directs laser safety practices, and ensures a safe environment while the laser is in use.

Prion Diseases

In recent years, there has been an increase in both the scientific and public awareness regarding prion diseases. Prion diseases, or transmissible spongiform encephalopathies (TSEs) are a family of diseases that affect both humans and animals. The causative agent is believed to be a prion. These diseases are rare, and characterized by long incubation periods, progressive neurodegeneration, and a failure to induce inflammatory response.

Human prion diseases include:
- Creutzfeldt-Jakob Disease (CJD)
- Variant Creutzfeldt-Jakob Disease (vCJD)
- Gerstmann-Straussler-Scheinker Syndrome
- Fatal Familial Insomnia
- Kuru

CJD and vCJD are fatal diseases. There is strong scientific evidence to link vCJD with bovine spongiform encephalopathy (BSE), also known as mad cow disease.

The prevalence of prion disease in North America is low. However, there is the possibility that CJD or vCJD cases from other nations may seek dental treatment, and pose a risk of iatrogenic transmission. Prions have been found to exhibit unusual resistance to conventional chemical and physical decontamination procedures. The risk of CJD transmission through dental procedures remains unclear, and an area of continued controversy and research. The current CDC guidelines for infection control in dentistry provide precautions for consideration without recommendation. When treating known CJD or vCJD patients, in addition to standard precautions other precautions include:

- Use of single-use disposable items and equipment whenever possible.
- Consider items difficult to clean (such as endodontic files, broaches and burs) as single-use disposables and discard after each use.
- Clean instruments thoroughly and steam-autoclave at 134 degrees Celsius for 18 minutes.
- Do not use flash sterilization methods.

Future research should shed more light upon the relationship between prions and dentistry.

Antibiotic Resistance

Antibiotics (or antimicrobial drugs) are drugs used to combat infections caused by bacteria. Due to widespread use over time, the bacteria that antibiotics control have developed resistance to these drugs. This is recognized as a worldwide public health threat, and the need to develop new classes of antibiotics has become a serious concern.

Many pathogenic bacteria are developing resistance. For exam-
ple, we have seen the media attention Methicillin Resistant \textit{Staphylococcus aureus} (MRSA) has gained as it has spread from hospital environments into the community. One recent study has found that the pathogens associated with bacterial endocarditis exhibited elevated resistance rates against the antibiotics used for prophylaxis in dentistry.

Antibiotic resistance is recognized as a concern for dentistry. It has been estimated that dentists prescribe between 7-11% of all common antibiotics. The ADA Council on Scientific Affairs has issued a report on antibiotic resistance and the overuse of antibiotics. The guidelines that the Council offers include:

- Make an accurate diagnosis
- Use appropriate antibiotics and dosing schedules
- Consider using narrow-spectrum antibiotics in simple infections to minimize the disturbance of the normal flora. And, use broad-spectrum antibiotics for more complex infections
- Avoid the unnecessary use of antibiotics in treating viral infections
- If treating empirically, revise the treatment regimen based on patient progress or test results
- Obtain thorough knowledge of the side effects of the antibiotic, and drug interactions before prescribing it
- Patient education—Educate the patient regarding the proper use of the antibiotic and the need to complete the full course of antibiotic as prescribed.

Antibiotic resistance is a problem that dentistry will continue to face, and the need for new classes of antibiotics is recognized.

**Sharps Safety**

Sharps safety is another important area that should not be overlooked. In general, needles, burs, syringes, laboratory knives, and other sharp instruments can cause percutaneous injuries. Additionally, needles have been recognized as a significant source of percutaneous injury in dental practice.

The revised OSHA Bloodborne Pathogens Standard requires employers to consider safer needles and other sharps devices when they conduct their annual review of the Exposure Control Plan. Employees who are directly responsible for patient care should always be involved in identifying and choosing these safer devices. Engineering controls remove or isolate a hazard in the workplace. Safety engineered sharps are considered to be appropriate engineering controls. Employers should on an ongoing basis stay informed of the latest developments in safety engineered sharps technology.

**Disinfectants and Barriers**

Equipment and environmental surfaces in the dental office become contaminated during patient procedures as a result of direct or indirect contact. The extent to which surfaces become contaminated and the relative risks of cross infection posed by this contamination is highly variable.

By discriminating between “touch” surfaces that require attention between patients and environmental surfaces that are part of daily housekeeping, the dental team can reduce unnecessary effort and expense. Equipment or environmental surfaces such as light handles, handpiece couplers and hoses, air water syringes and x-ray equipment that are touched with contaminated gloves during treatment pose the greatest risk of transmitting microorganisms from patient to patient. These surfaces must at a minimum either be barrier protected or cleaned with a hospital disinfectant between patients. Other surfaces such as countertops, floors and walls that are not contacted during treatment should be cleaned at least daily or whenever they are visibly soiled with blood or other patient material.

When choosing disinfectants, be sure that the product is a good cleaner as well as a disinfectant and will not harm the surfaces that will be disinfected. Some dental unit and equipment manufacturers can supply a list of products that they have evaluated and have been found to be safe. When making purchasing decisions, consider all of the costs of using a disinfectant. A low-cost product with a short shelf life (unopened product) or use life (opened or mixed product) may actually be more expensive to use than another product with longer use or shelf life.

Safety of staff and patients is paramount when using disinfectants or other chemicals. Always read the label instructions and be aware of the hazards listed. If disinfectants are mixed or stored in containers that are not supplied by the manufacturer, the user must affix a label that includes hazard warnings.

**Conclusion**

The topics discussed above are just a few of the many issues in dental safety and infection control that dental practitioners are faced with today. OSAP has been dentistry’s safety and infection control resource since 1984. To learn more about current issues regarding disinfectants, please refer to the May 2006 issue of \textit{Infection Control in Practice}, OSAP’s newsletter or to learn more about these and other safety and infection control topics, please visit the OSAP Web site at www.osap.org.
Infection Control

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Bios
Dr. Podolak, who is both a dentist and a safety engineer, is a 9-year member of OSAP. She possesses four degrees, and her training and background includes Public Health, Risk Management, and Occupational Safety and Health. She is President of Springhurst Associates, LLC, a safety consultancy. Additionally, Dr. Podolak is co-editor of OSAP’s monthly newsletter, The OSAP Report Online, the author of OSAP’s Executive News Summaries, and a regular contributor to the OSAP Web site. She can be reached at patricia.podolak@verizon.net.

Shannon E. Mills, DDS, FAGD, FICD is Associate Professor and Assistant Director of the Dental General Practice Residency Program, University of Nevada School of Medicine (UNSOM). In July of 2005, Dr. Mills retired from the U.S. Air Force in the rank of Colonel after 28 years of service. While on active duty, Dr. Mills served in military healthcare facilities in the US and overseas, gaining diverse experience in clinical general dentistry, education, research and healthcare policy. Dr. Mills has authored or co-authored numerous papers on dental infection control in peer-reviewed journals and was a member of the American Dental Association (ADA) panel that drafted the 1995 statement on dental unit water lines. He is a consultant to the ADA and the Centers for Disease Control and Prevention, Division of Oral Health as well as an active member of numerous professional organizations including OSAP, Dentistry’s Infection Control and Safety Resource.

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Antibiotic Resistance

Sharps Safety


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