any routine dental procedures include manipulation of soft tissues that may induce bleeding. For less invasive procedures such as restorative dentistry, crown and bridge preparation, endodontics, and periodontal scaling, standard precautions including the use of non-sterile examination gloves, routine handwashing procedures and irrigating solutions that meet drinking water standards provide acceptable levels of protection for the patient and the dental team. When the dentist cuts oral soft tissues to expose bone or other normally sterile tissues, there is a greater possibility of oral post-operative infection for the patient and blood exposure for the dental team.

The Centers for Disease Control and Prevention (CDC) Guidelines for Infection Control in Dental Health-Care Settings-2003 cite biopsy, periodontal surgery, apical surgery, implant surgery, and removal of teeth that require elevation of a tissue flap, removal of bone or sectioning as examples of oral surgical procedures.

During oral surgical procedures, standard (universal) precautions are necessary to ensure the safety of both dental healthcare personnel (DHCP) and patients. Standard precautions include handwashing, the use of gloves, protective eyewear, masks, protective clothing, controls to prevent injuries, and decontamination of instruments and environmental surfaces to help protect the patient from infection during all dental procedures.

Additionally, when performing oral surgical procedures the CDC recommends the use of sterile surgeon’s gloves, more thorough handwashing with long-acting antimicrobial products, the use of sterile irrigating solutions and disposable materials. These precautions address the increased chance for post-operative infections and decrease the risk of blood exposure for the dental team during more invasive oral procedures.

**Sterile Surgeon’s Gloves**

Sterile gloves minimize transmission of microorganisms from the hands of DHCP to patients. They also prevent contamination of the hands of DHCP with the patient’s blood and body fluids. Additionally, sterile surgeon’s gloves are more rigorously regulated by the Food and Drug Administration (FDA) and have an increased thickness over standard medical gloves; a characteristic that theoretically could provide an increased level of protection against exposure to blood for the provider. Patient/medical examination gloves are appropriate for oral exams, suture removal and other non-surgical procedures.
patient treatment.

**Surgical Hand Antisepsis**

The purpose of surgical hand antisepsis is to eliminate transient flora and reduce resident flora for the duration of a procedure to prevent contamination if gloves become punctured or torn. Skin bacteria can rapidly multiply under surgical gloves if hands are washed with soap that is not antimicrobial. Thus, an antimicrobial soap or alcohol hand rub with persistent activity should be used before putting on sterile surgeon’s gloves for surgical procedures.

Agents used for surgical hand antisepsis should substantially reduce microorganisms on intact skin, contain a nonirritating antimicrobial preparation, have a broad spectrum of activity, be fast-acting, and have a persistent effect. Persistence (i.e., extended antimicrobial activity that prevents or inhibits survival of microorganisms after the product is applied) is critical because microorganisms can colonize on hands in the moist environment underneath gloves.

The introduction of alcohol-based hand rubs in recent years has provided DHCP with an additional agent for surgical hand antisepsis. However, alcohols are not good cleaning agents and should not be used without first washing with soap and water if hands are visibly soiled. Alcohol alone in a hand rub preparation will be rapidly germicidal when applied to the skin but will not have the desired residual effect for persistent antimicrobial activity during the surgical procedure. Thus, alcohol products selected for surgical hand antisepsis also should include an antiseptic such as chlorhexidine, quaternary ammonium compounds, octenidine, or triclosan.

**Sterile Irrigating Solutions**

The small diameter tubing used in dental units encourages the development of biofilms that consist of high numbers of bacteria. Water passing through these contaminated lines may therefore contain large numbers of bacteria that can cause infection and bacterial by-products that may delay surgical healing or have other systemic effects.

The CDC infection control guidelines recommend that water used for non-surgical treatment meet U.S. standards for drinking water and contain no more than 500 colony forming units per milliliter of non-coliform bacteria. However, because the potential for post-operative infection or systemic exposure to bacteria and bacterial by-products is greater during surgical procedures, the CDC recommends using sterile saline or sterile water to irrigate surgical sites. Sterile water for cutting instruments or scalers requires a device that uses autoclavable or sterile disposable water containers and tubing. For all other surgical irrigation, use a reusable bulb syringe that is sterilized between patients, or a sterile, single-use plastic syringe.

**Engineering Controls**

Engineering controls prevent injuries by removing, eliminating, or isolating the hazard from dental workers and often incorporate safer designs of instruments and devices (e.g., self-sheathing anesthetic needles and intravenous safety catheters). A variety of devices with built-in sharps injury protection are available to the dental and medical market. The Occupational Safety and Health Administration (OSHA) requires the use of safety devices intended to prevent percutaneous injury that may result in exposure to blood during the delivery of healthcare. The CDC infection control guidelines also support the use of a combination of engineering and work practice controls to protect DHCP from body fluid exposure.

OSHA requires that employers stay current with the safety devices available on the market and implement their use, where appropriate. All affected employees should be included in the selection and evaluation of the engineered safety devices.
Infection Control In Practice is a resource prepared for clinicians by the Organization for Safety & Asepsis Procedures with the assistance and expertise of its member-contributors. OSAP is a nonprofit, independent organization providing information and education on infection control and occupational health and safety to dental care settings worldwide.

Information in this issue has been brought to you with the help of the following individuals:

Jennifer L. Cleveland, DDS, MPH is an epidemiologist with the Centers for Disease Control and Prevention in Atlanta.

Infection Control

Compliance Corner

**FDA** The Food and Drug Administration (FDA) regulates medical examination gloves and sterile surgical gloves. Physical property testing and performance requirements stipulate the appropriate Acceptable Quality Levels (AQLs) for pinholes, dimensions, and physical properties.

**Examination Gloves**
- Freedom from Holes 2.5 AQL
- Dimensions 4.0 AQL
- Physicals 4.0 AQL

**Sterile Surgical Gloves**
- Freedom from Holes 1.5 AQL
- Dimensions 4.0 AQL
- Physicals 4.0 AQL

FDA also regulates the gloves for claims. For example, glove manufacturers previously used the word "hypoallergenic" pertaining to the gloves' residual chemical content. Because the term was often misinterpreted as referring to the gloves' protein allergen content, FDA issued a regulation to prevent the use of this term in conjunction with medical gloves.


**CDC** The Centers for Disease Control and Prevention (CDC) has issued an update on alcohol-based hand rubs and fire safety. These hand rubs are an important tool in improving hand hygiene practices and reducing healthcare-associated infections, and they are becoming more widely used in hospitals.

Alcohol is flammable, and there is some concern that if stored or used improperly, these hand rubs could ignite. To keep that from happening, CDC recommends three things:
- First, when using these products, be sure to rub your hands until the alcohol has evaporated and your hands are dry;
- second, keep your dispenser of alcohol-based hand rub away from high temperatures or flames;
- and third, store your excess supplies of this product in cabinets or areas approved for flammable materials.

http://www.cdc.gov/handhygiene/firesafety/default.htm

Glossary

**Biofilm** A complex colony of microorganisms, most notably bacteria, that forms on surfaces that are bathed in water

**Dental treatment water** Nonsterile water used during dental treatment, such as for irrigating nonsurgical operative sites and cooling highspeed rotary and ultrasonic instruments

**Health care associated (nosocomial) infection** An infection occurring in a patient in a healthcare facility in whom it was not present or incubating at the time of admission; or the residual of an infection acquired during a previous admission

**Resident flora** Organisms that are attached to deeper layers of skin and are more resistant to removal

**Standard precautions** A standard of care designed to protect clinicians and patients from pathogens that can be spread by blood or any other body fluid, excretions, secretions (except sweat). These precautions apply to nonintact skin and mucous membranes

**Sterile water delivery system** A device or system that uses a reservoir and single-use disposable or sterilizable tubing to bypass the dental unit and deliver to the patient water or other solutions that are completely free of microorganisms

**Transient flora** Organisms found on the superficial skin layers that are readily removed by handwashing. In healthcare settings, this flora results from direct contact with patients or contaminated surfaces
Always keep in mind the definition of surgical procedures found in the CDC Guidelines for Infection Control in Dental Health-Care Settings - 2003. “Oral surgical procedures involve the incision, excision, or reflection of tissue that exposes the normally sterile areas of the oral cavity.”

**Hand Hygiene**

For routine, nonsurgical dental procedures:

- Visibly soiled hands
  - Soap and water, or
  - Antimicrobial soap and water

- Hands not visibly soiled
  - Soap and water, or
  - Antimicrobial soap and water, or
  - Alcohol-based hand rub

For surgical procedures:

- Visibly soiled hands
  - Antimicrobial soap* and water

- Hands not visibly soiled
  - Soap and water followed by alcohol-based hand rub*

*These products should be FDA-cleared, broad-spectrum, fast-acting and have a persistent effect.

**Gloves**

Medical exam gloves may be used for nonsurgical, routine dental procedures such as:

- Consult and examination
- Post operative check
- Suture removal
- Extraction of teeth that does not require removal of bone, sectioning of tooth or periosteal flap

Sterile surgical gloves should be used for oral surgical procedures such as:

- Biopsy
- Periodontal surgery
- Apical surgery
- Implant surgery
- Surgical extractions of teeth

**Safety Devices**

A number of safety devices are available for routine dental and oral surgical procedures. Safety devices should be evaluated by all end users and implemented if found to be acceptable. Examples of available devices with safety mechanisms include:

- Anesthetic syringes
- Needleless IV systems
- Syringes for IM or IV administration
- IV catheters
- Surgical scalpels
- Blunt suture needles

CDC has developed sample forms for screening and evaluating safer dental devices. These forms and instruction can be found at: [http://www.cdc.gov/oralhealth/infectioncontrol/forms.htm](http://www.cdc.gov/oralhealth/infectioncontrol/forms.htm)

**Irrigating Solutions**

Routine dental procedures:

Commercial devices and procedures designed to improve the quality of water used in dental treatment have become widely available. Methods shown to be effective include:

- Independent reservoirs
- Chemical treatment
  - Continuous
  - Intermittent
- Filtration
- Combined approaches

Follow manufacturer’s instructions for maintenance of the dental unit or waterline treatment product and for monitoring water quality.

**Oral surgical procedures:**

Sterile solutions for surgical procedures may be delivered via:

- Sterile water delivery systems (disposable or sterilizable) that bypass the dental unit (e.g., surgical handpieces)
- Sterile bulb syringe
- Single use sterile syringe

**Ask OSAP**

Q: Will a filter system on dental waterline tubing create sterile water for surgical irrigation?

A: Although technically capable of producing sterile water, microfiltration systems will not deliver sterile solutions to the operative site. Therefore, only systems that bypass the dental unit and make the claim of delivering sterile water to the patient should be used for irrigation during surgical procedures.

— OSAP

Q: Are we required to wear head coverings as part of the personal protective attire for performing oral surgery procedures?

A: There is no specific requirement for head coverings for many oral surgery procedures. However, head coverings may be indicated when doing dental implants, surgery in the operating room setting, or any other time that you are using a sterile surgical technique. Head coverings will prevent the accidental contamination of the surgical site with hair or other debris that may be released from the hair or scalp and will also help prevent blood or body fluid contamination of the healthcare worker’s hair.

— OSAP

Do you have an inquiry about infection control, occupational health, or practice safety? Ask OSAP. Send your questions to office@osap.org
There are several classifications of devices or materials associated with infection control in oral surgery. Selection of the right one for each individual practice should be based on the needs and desires of the dental team in ensuring that the delivery of patient care is safe and appropriate.

<table>
<thead>
<tr>
<th>Item</th>
<th>Clinical Application</th>
<th>Examples</th>
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</thead>
<tbody>
<tr>
<td>Medical Exam Gloves</td>
<td>Oral exams, suture removal, nonsurgical extractions, x-rays, impressions, etc.</td>
<td>Natural rubber latex, coated latex, vinyl, nitrile, synthetic polyisoprene, polyurethane</td>
</tr>
<tr>
<td>Sterile Surgical Gloves</td>
<td>Surgical extractions, biopsies, periodontal and apical surgeries, implants, etc.</td>
<td>Natural rubber latex, coated latex, synthetic polyisoprene, nitrile, neoprene, polyurethane, thermoplastic rubber</td>
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<tr>
<td>Sterile Water Systems</td>
<td>Delivery of sterile coolant/irrigants for oral surgical procedures</td>
<td>Sterile bulb syringe or disposable sterile syringe with sterile water or saline, sterile reservoir and tubing connected to surgical handpieces, peristaltic pump with sterile tubing and reservoir attached to air driven handpiece, sterile saline or water bag with sterile tubing</td>
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<tr>
<td>Engineered Safety Devices</td>
<td>Protect workers from contact with sharp contaminated items through encapsulation, shielding, destruction, blunting or other mechanical means. Required by the Occupational Safety and Health Administration.</td>
<td>IV catheters, syringes for IM and anesthetic injections, needless IV systems, plastic handle disposable surgical scalpels, retractable blades on surgical scalpels, blunt suture needles</td>
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To help practices stay on track, OSAP provides this calendar listing typical schedules for periodic maintenance, record-keeping, and infection control activities. This schedule is intended only to serve as a guide. Proper practices, procedures, and maintenance schedules can vary according to the kinds of products used, the practice type, and patient volume. Always follow the device or equipment manufacturer’s instructions for maintenance and infection control.

For a monthly dental office calendar you can customize to best meet the needs and schedules in your practice, visit osap.org/calendars/index.htm. (Adobe Acrobat Reader required.)

### OCTOBER 2004

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<th>SUNDAY</th>
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Greater New York Dental Meeting Nov. 26 - Dec. 1, NYC
If you wish to obtain one (1) hour of continuing education (CE) credit, complete the following test and fax or mail it to the OSAP Central Office for grading. Please include a check or credit card to cover handling charges. Pending satisfactory results (at least seven out of ten), you will be issued a letter for one (1) CE credit hour through the Academy of General Dentistry and the Dental Assisting National Board. AGD Approved National Sponsor, FAGD/MAGD credit, 10/23/93 to 12/31/05. OSAP also is an ADA CERP Recognized Provider. For more information, call OSAP at 800-298-6727 (410-571-0003).

1. Gloves are medical devices regulated by:
   a. CDC  
   b. FDA  
   c. OSHA  
   d. EPA

2. Skin bacteria may rapidly multiply under surgical gloves if the dental worker uses:
   a. alcohol hand rubs alone  
   b. antimicrobial soap and water  
   c. soap followed by alcohol hand rubs  
   d. soap that is not antimicrobial

3. Water passing through untreated dental water lines may be:
   a. capable of delaying surgical healing only  
   b. capable of causing surgical site infections only  
   c. capable of causing infection, delaying surgical healing or having systemic effects on patients  
   d. capable of causing systemic infection only

4. The CDC recommends that dental offices maintain units in a manner that will reliably deliver treatment water that does not exceed \( \text{_____ cfu}/\text{mL} \) for routine dental procedures.
   a. 200  
   b. 300  
   c. 400  
   d. 500

5. Engineered devices intended to prevent exposures to blood through injury are:
   a. required for routine, but not surgical dental procedures  
   b. required for surgical, but not routine dental procedures  
   c. required for all procedures where a device is available  
   d. required only in a hospital setting

6. Transient flora on the hands of healthcare workers:
   a. are attached to deeper levels of the skin  
   b. are not the most likely hand organisms to be associated with healthcare-associated transmission  
   c. are more difficult to remove by handwashing than resident flora  
   d. result from direct contact with patients or contaminated surfaces

7. Antimicrobial hand agents for surgical procedures do not need to:
   a. substantially reduce microorganisms on intact skin  
   b. have broad-spectrum activity  
   c. be kept in a sterile container  
   d. have a persistent antimicrobial activity

8. Sterile surgical gloves are not needed for:
   a. suture removal  
   b. apical surgery  
   c. surgical extraction  
   d. biopsy

9. Which of the following methods is not appropriate for the delivery of sterile irrigant during surgical procedures?
   a. peristaltic pump with sterile tubing and reservoir  
   b. sterile bulb syringe  
   c. single use sterile syringe  
   d. inline filter on standard dental unit

10. A device that would not be considered an engineered sharps injury prevention device is a:
    a. needle cap holder  
    b. safety anesthetic syringe  
    c. retractable scalpel  
    d. retractable IV needle

Mail or Fax completed test to receive (1) hour of continuing education credit, or visit www.osap.org/training/online/ to test online.

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MAIL TO: OSAP CE • P.O. Box 6297 • Annapolis, MD 21401 • USA  FAX TO: 410.571.0028
If you use nitrous oxide or sedation in your dental office and haven’t checked the exposure levels to the workers in the dental operatory, now is a good time to check for high levels of nitrous oxide says Long Island, New York dentist and infection control consultant, Dr. Harold Edelman. In testing 100 dental practices in the community he found that 6% to 8% of the practices had higher than acceptable limits of nitrous oxide circulating in the dental office air.

The National Institutes of Occupational Safety and Health (NIOSH) establish guidelines for safe exposure to numerous gases and vapors, including nitrous oxide. The current NIOSH recommended exposure limit (REL) for nitrous oxide is 25 ppm over an 8-hour time weighted average. This means that although short term exposure levels may be higher, the average exposure for an average workday (8 hours) should not exceed 25ppm. However, in some of the offices, tested levels as high as 800 ppm to 900 ppm were found. This level raises concerns for people in their childbearing years since some studies have indicated that nitrous oxide may be linked to infertility.

Dr. Edelman suggests testing initially to establish a baseline (be sure to use the monitors on a day where there is nitrous oxide in use), and repeating whenever processes or equipment change, since those changes may result in changes in exposure levels. Wear the monitoring badge as close as possible to your breathing zone and be sure to follow manufacturer’s specific instructions. Some states have regulations regarding permissible exposure levels (PEL) to nitrous oxide in the workplace. Consult your state OSHA office to determine if there are regulations in your location.

Equipment damage and failure also may result in excess exposure to nitrous oxide. Routinely check hoses and masks for leaks (delivering oxygen through the hose while washing the outside with soapy water is one way to detect leaks) and calibrate scavenging systems to provide at least 20 psi of pressure to evacuate waste gases from the mask.

An OSAP member since 1997, Harold Edelman, DDS, is a New York University Dental School graduate and principle of Professional Compliance Group. He is a certified OSHA trainer in voluntary compliance and biohazards and a New York State Education Provider. He can be reached at 631-928-6468.

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Do you have a practice tip you’d like to share with other OSAP members and subscribers? Send your suggestions for enhancing dental infection control and safety in practice to editor@osap.org. Be sure to include contact information, a photo, and a brief bio. Thanks!