After reading this article, the reader should be able to:
► list some ways patients may become involved in cross-contamination.
► describe the importance of patient eye protection during treatment.
► describe how sterilized instruments may become re-contaminated before being used on the patient.
► describe potential infection control problems associated with using chairside supply carts and instrument drawers during patient treatment.
► describe the role of dental unit waterlines in contaminating patients with environmental microbes.

Are You Keeping Your Patients Safe?

Scenario 1

The incident:
Herman was the first patient of the day in Dr. Zaradka’s office. Herman was to receive a crown on tooth #17. The chairside assistant (Viola) set up the operatory. She washed her hands, unwrapped the sterilized instruments and laid them out on the disposable tray on the bracket table. She checked the drawer in the cabinet next to the dental chair to make sure all the slots in the white glass divider were full of extra, appropriate, sterilized instruments. The sliding top on the portable cart located next to the dental chair was opened to provide access to all of the supply type items needed for that day. She placed protective barriers on the light handles and switch, headrest, headpiece hoses and control unit, and the operator chair backs. She connected the heat-sterilized handpieces to the hoses, inserted a fresh, disposable air/water syringe tip, and flushed the handpiece waterlines with the incoming community water for about 10 seconds. She then put on her exam gloves, got Herman from the waiting room and seated him. She had him remove his partial and prescription glasses and she set them aside. She placed his patient napkin and called in Dr. Zaradka. Herman’s restoration went smoothly except that Dr. Zaradka did drop a spoon excavator, but he quickly retrieved one from the convenient chairside instrument drawer. After dismissing Herman, Viola removed her exam gloves and donned utility gloves (after washing her hands), gathered up the instruments and took them to the sterilizing room, returned to the operatory, removed and discarded the plastic barriers and syringe tip, then closed the chairside instrument drawer and the cart top. She cleaned and disinfected the bracket table, cart top and instrument drawer handle before removing her gloves and washing her hands. She added a previously sterilized and unwrapped spoon excavator to the open slot in the instrument drawer and repeated the operatory set-up for the next patient.

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Potential consequences:
Viola opened sterilized instrument packages with washed but bare hands. Hopefully she did not touch the instruments themselves. Even washed hands can contain some microbes that could be transferred to the patient through instruments serving as fomites. Also, Viola opened the instruments too early in the set-up regime. This leaves them susceptible to unnecessary contamination with microbes long before they are used. In addition, having the instruments in plain view on the bracket table when the patient is being seated can be upsetting to some patients. Since the top of the supply cart was open before and during patient treatment, contamination of the items inside from patient and staff spatter and airborne microbes will occur. Since the cart contents are used with multiple patients, this can easily lead to cross-contamination. Also, reaching into the supply cart during treatment enhances the risk of the supply items being exposed to patient materials from contaminated fingers. The same is true for drawers at chairside containing supplies or unwrapped instruments. Retrieval from the drawer with contaminated fingers risks contamination of multiple items.

When Viola asked for Herman’s eyeglasses and did not offer protective eyewear during treatment, she put Herman at some degree of risk for eye injuries. There are opportunities for foreign objects to enter patients’ eyes including tooth particles or filling materials generated during restoration procedures. This also includes chemical splashes and dropped instruments that may be erroneously passed over the patient’s face. Reports of patient eye injuries include impalement of a patient’s eye by an excavator; corneal abrasion from an exploding anesthetic carpule, eye infection from dental unit water and subconjunctival hemorrhage after a dentist hit a patient’s eye with his thumb.1, 2 Viola also did not provide a preprocedural rinse.

Prevention:
The concept of instrument processing does not only involve sterilization but also includes cleaning, prepackaging and sterility maintenance (keeping those instruments in a sterile environment until used at chairside). Instruments are wrapped or packaged before sterilization to protect them from recontamination before use. Yes, the sterilized instruments have to be “exposed” at some time, but the time between opening the sterilized packages/cassettes and use on the patient should be minimal. So, open sterilized instrument packaging after the patient is seated. If sterile instruments have to be touched before treatment,
Dr. Z said, “It’s good water straight from the tap, and we went to had really bad tasting water.

The second patient of the day for Dr. Zaradka was Clark who had a crown re-cemented that had come off the night before. Viola set up the operatory as described earlier and called in Dr. Z. The doctor greeted Clark, and the first thing Clark said was “Hi doc – you know the last dentist I went to had really bad tasting water. How’s your water?” Dr. Z said, “It’s good water straight from the tap, and we flush out the lines after each patient”. Clark said “Great – and another thing - you and your helper don’t have to wear gloves, I don’t have any diseases and besides they taste awful”. Dr. Z said “well we’ll wash them really good with soap and water and that will help the bad taste”. So Dr. Z put on his exam gloves and washed them. He then put on his eyeglasses and pulled his mask up from below his chin and proceeded with cementing the crown. After Dr. Z finished, Clark said he really did have a bad taste in his mouth, so Viola used the water syringe to rinse out Clark’s mouth. She inserted the saliva ejector and told Clark to “close and spit” to evacuate his mouth. She wiped off his mouth, removed his bib and sent him to the front desk.

Potential consequences:
When Dr. Z entered the operatory his mask was below his chin. He was going to reuse the mask he used with his previous patient, Herman. Remember Herman had a crown prep, so consider- able aerosol and spatter was created which contaminated the outside of the mask. When Dr. Z greeted Clark, donned and washed his gloves and then adjusted the used mask, his “clean” gloves became contaminated with Herman’s oral microbes on the outside of the mask. These were then transferred by the gloves to Clark’s mouth resulting in cross-contamination. Washing gloves with a detergent enhances the entrance of contami- nated fluids through inherent pinholes (wicking).

The physical nature of dental unit waterlines promotes both bacterial growth and development of biofilm in the lines. High concentrations of microbes (maybe as high as a million CFU per mL) in the handpiece and air/water syringe water can be flushed into a patient’s mouth unless the dental unit waterlines are treated to control the development of the biofilm. Even good quality tap water that enters the dental unit will become highly contaminated as it passes through untreated waterlines that are lined with biofilm. The biofilm sheds bacteria into the flowing water. Although no epidemiological evidence indicates a public health problem, the presence of high numbers of mi- crobes in dental unit water used for patient care is not consist- ent with good quality infection control. The water that enters patients’ mouths should at least be of drinking water quality, and this is not likely with dental unit water systems that have not been appropriately treated and monitored.

When Viola asked Clark to “close and spit” through the saliva ejector, she put Clark at small risk of being contaminated with fluids from the saliva ejector vacuum line. Studies have

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shown that there is a chance of back-flow towards the patient’s mouth when the negative vacuum is created by closing the lips around the saliva ejector. 4, 5

Prevention:
Dr. Z should have taken the opportunity to explain to Clark that the patient treatment gloves also protect the patients from microbes that might be on the hands of dental team members. Hand washing usually removes the transient microbes (those most important in disease spread) that are picked up by touching contaminated surfaces. However, some transient microbes may remain on the hands if the handwashing procedures are inadequate or there is dermatitis, which may interfere with microbiome removal. Thus, gloves can protect both the dental staff and the patients.

Dr. Z unnecessarily contaminated his treatment gloves before entering the patient’s mouth. Operators should place their masks and their protective eyewear, wash their hands and finally, place gloves just before beginning treatment.

Several types of commercial devices and procedures designed to improve the quality of dental unit water are available. Many of these are offered by a variety of corporate members of OSAP, some of which are listed on page 5. Flushing the waterlines between patients may reduce contaminants retracted back into the lines as well as adding some fresh chlorine from the community water supply, but this will not remove the accumulated biofilm.

Did You Know?

Did you know that OSAP has designed a new strategic direction for 2010 to 2013?

VISION:  Safe dental care for people everywhere

MISSION:  To be the world’s leading advocate for the safe and infection-free delivery of oral care

Check out further details at http://www.osap.org.

What’s Wrong With This Picture?
Can you identify any breach in infection control and safety procedures in this photo? Check your answers below.

1. The dental assistant and the clinician are not wearing long sleeves to protect their forearms from microbial splatter.
2. The dental assistant’s open neckline creates exposure of skin to microbial splatter.
3. The patient is not wearing protective eyewear.
4. The dentist’s mask is improperly worn and does not cover the nose.

Do not tell patients to close their lips around the saliva ejector and spit into the tip. Alternatively, some disposable saliva ejector tips now have a small hole in the side that relieves the pressure when the tip is closed off preventing potential suck back.

Some related recommendations from the CDC 3

•  “Change masks between patients, or during patient treatment if the mask becomes wet.”
•  “Do not wash surgeons’ or patient examination gloves before use or wash, disinfect, or sterilize gloves for reuse.”
•  “Do not advise patients to close their lips around the tip of the saliva ejector to evacuate oral fluids.”
•  “Use water that meets regulatory standards set by the Environmental Protection Agency (EPA) for drinking water (<500 CFU/mL of heterotrophic water bacteria) for routine dental treatment output water.”
•  “Consult with the dental unit manufacturer for appropriate methods and equipment to maintain the recommended quality of dental water.”
•  “Follow recommendations for monitoring water quality provided by the manufacturer of the unit or waterline treatment product.”
•  “Discharge water and air for a minimum of 20-30 seconds, after each patient, from any dental device connected to the dental water system that enters the patient’s mouth (e.g., handpieces, ultrasonic scalers, air/water syringe).”
AUSTRALIAN NEWS

Beginning July 1, 2010, a National Registration and Accreditation Strategy commenced in Australia for all 10 Health Professions, replacing 85 State Health Boards with 10 National Boards. The Australian Federal Government set up this strategy to allow portability of registration across State boundaries, rigorous accreditation processes for individuals and courses, and uniformity of standards across Australia.

The Dental Board of Australia adopted a Code of Practice (legally able to be used as a benchmark for practice standards) on Infection Control. This is available at www.dentalboard.gov.au and in summary states:

1. Every practice has to have a written manual which includes:
   - The current Australia Standards document on sterilization protocols (similar to an ISO document);
   - Generic government guidelines on infection control for all health practitioners and facilities http://www.health.gov.au;

2. Every practitioner must take steps to ensure the practice is as clean as practicable, and he or she follows steps to reduce the risk of the transmission of infectious disease.

3. Each practitioner must know his or her bloodborne virus status and attest that he or she will comply with the Code of Practice.

Of note, the Australian Dental Association Guidelines are, wherever possible, evidence-based and are similar to the CDC Guidelines in the USA. Having the same enforceable standards across the country for the first time is a great quality assurance advancement and has been welcomed.

Gerard Condon, BDSc, MDSc
Member, Dental Board of Australia
Member, Infection Control Committee, Australian Dental Association

“Thanks” to our SPONSORS

OSAP thanks the following companies that help to underwrite each issue of this special series of Infection Control In Practice in 2010.

- A-dec ➤ a-dec.com
  Enriching the lives of dental professionals by providing simple and creative solutions.

- Biotrol ➤ biotrol.com
  E-mail sciencegeeks@biotrol.com for infection control answers. Infection control down to a science.

- Certol International ➤ www.certol.com
  Focused on cleaning technology and products to support your infection prevention program.

- Coltene/Whaledent ➤ coltene.com
  A worldwide and highly innovative developer, manufacturer and provider of dental consumables.

- Crosstex ➤ crosstex.com
  A leading global manufacturer of infection control and single-use disposable products for the healthcare industry.

- DentalEZ Group ➤ dentalez.com
  DentalEZ’s six brands provide a full line of products for the operatory.

- Dentsply ➤ dentsply.com
  Delivering solutions ‘For Better Dentistry’ which benefit practitioners and patients globally.

- DUX ➤ duxdental.com
  Trustworthy innovation for superior infection control products, staff safety and patient comfort.

- Henry Schein ➤ henryscheindental.com
  We’re here for you! Supplies, equipment, services and technology for dental practices.

- Hu-Friedy ➤ hu-friedy.com
  Hu-Friedy helps dental professionals perform at their best by providing superior products, knowledge and support.

- Medicom ➤ medicom.com
  Medicom, proud leaders in disposable infection control products since 1988.

- Midmark ➤ midmark.com
  Midmark Corporation, A provider of innovative solutions that work for you.

- Miele ➤ miele.com
  Developed specifically to clean dental instruments and accessories and to reduce the risk of infection by providing high-level disinfection.

- North Bay/Bioscience ➤ nbbs.com

- Palmero Health Care ➤ palmerohub.com
  DisCide Ultra Spray & Wipes • DisCideXRA Hand Wipes • TelAseptic Wipes • Barriers • Safety & Disposable Eyewear.

- Patterson Dental ➤ pattersondental.com
  Dental’s most trusted partner for service, supplies, equipment and technology.

- PDI, The healthcare division of Nice-Pak ➤ pdipdi.com
  Live a healthier life with clinically proven products that safely clean, disinfect and control disease infection.

- SciCan ➤ scican.com
  SciCan Inc., the final word in all dental instrument reprocessing.

- Septodont ➤ septodontusa.com
  Septodont, providing better dentistry through pain control, restoratives and infection control products.

- SmartPractice ➤ smartpractice.com

- Sultan Healthcare ➤ sultanhealthcare.com
  Products to complete the cycle of infection control.

- TotalCare ➤ kentotalcare.com
  Offering high-quality infection prevention products to protect staff and patients in the dental operatory.
If you have received this newsletter from a friend or associate, you can access other helpful resources and timely information on infection control and safety by becoming a member of the OSAP community.

**Member resources include:**

- OSAP discount on all CE at [www.ineedce.com](http://www.ineedce.com) -NEW (see Member Orientation at OSAP website for details)
- Growing list of dental issues' Toolkits addressing challenging IP/Safety Issues on website for easy download
- Written referenced responses to your IC questions (“Ask OSAP”)
- Helpful time and $$-saving “Practice Tips”
- Surface disinfectants chart
- Free online OSAP Guide to CDC Guidelines course
- Daily and monthly online IC news round-ups
- PowerPoint presentations and other resources from the 2010 Infection Prevention Symposium
- Discounted registration for 2011 programs (January 10-13 in Atlanta and June 9-12 in Dallas)
- Infection Control Educator’s Toolkit
- Free downloads of mission trip IC guide, traveler’s guide and much more!

**Member registration is easy.**

Online at [www.osap.org](http://www.osap.org) or by phone: 1-800-298-OSAP (6727) within the U.S. or 1-410-571-0003 outside the U.S.

**Current membership levels:**

- Individual member (within the U.S.) $110
- Individual member (outside the U.S.) $160
- Web-only member (anywhere) $100
- Student member $25
- Corporate memberships are welcome; please contact OSAP for more information.

*(Note: The OSAP Board voted to maintain these rates through June 30, 2011.)*

**Biofilm:** A mass or layer of microbes attached to a surface.

**Cross-contamination:** The spread of microbes from one person to another.

**CFU/mL:** Colony-forming units per milliliter -- an expression of the concentration of microbes in a fluid environment. One CFU is equivalent to one or a very few bacteria. A milliliter is 1/1000th of a liter.

**Fomite:** An inanimate object that becomes contaminated and involved in the spread of microorganisms.

**Unit Dosing:** Distribution of supplies in packages each containing items needed for the treatment of just one patient. They are made up ahead of time and contain general supplies such as an anesthetic carpule, four cotton rolls, three cotton balls, two gauze pads, articulating paper, etc.

**Links to Resources**

If you wish to obtain one (1) hour of continuing education (CE) credit, complete the following test by selecting the best answer and fax or mail it to the OSAP Central Office for grading. Please include a check or credit card to cover the handling charges. Pending satisfactory results (at least seven out of ten), you will be issued a letter for one (1) CE credit hour. OSAP is recognized by the American Dental Association as a CERP Provider.*

For each item, pick the best answer.

1. When should the chairside assistant don the gloves to be used for patient treatment?
   a. Before disinfecting the operatory surfaces  
   b. Before placing operatory surface barriers  
   c. Just before seating the patient  
   d. Just before starting the treatment

2. When should the face mask be changed?
   a. After each 20 minutes of use  
   b. After the morning patients have been seen  
   c. After every patient  
   d. After every other patient

3. The infection prevention aspect of gloving during patient care is best described as protecting:
   a. the patient.  
   b. the dental staff.  
   c. the patient and the dental staff.  
   d. neither the patient nor the dental staff.

4. Which of the following would be considered as fomites?
   a. Contaminated dental instruments  
   b. Contaminated hands  
   c. Contaminated fingers  
   d. The patients’ mouths

5. CDC recommends that the microbial concentration of dental unit water should be less than or equal to __________ CFU/mL.
   a. 5,000  
   b. 500  
   c. 50  
   d. 5

6. According to the CDC when is it OK to wash patient examination gloves before use?
   a. Only at the beginning of the day  
   b. Before every patient  
   c. Before surgery patients  
   d. Never

7. Asking patients to evacuate their mouths by forming a seal around the saliva ejector and spitting into the saliva ejector:
   a. may cause back flow of material in the vacuum line towards the patients’ mouths.  
   b. is safe because it is the best method to remove oral secretions.  
   c. will make the patients cough almost every time.  
   d. will generate dental aerosols.

8. The level of microbes in the water coming out of an untreated dental unit is almost always:
   a. the same as in drinking water.  
   b. higher than in drinking water.  
   c. lower than in drinking water.  
   d. zero.

9. Why should instruments be packaged before they are placed in a sterilizer?
   a. To prevent the dirt from the steam sterilizer water, from the chemical vapor, or from the hot air from depositing on the instruments  
   b. To prevent rusting of the instruments  
   c. To keep the killed microbes inside the packages so they won’t contaminate the sterilizer chamber  
   d. To protect the instrument from recontamination after sterilization

10. How many milliliters in a liter?
    a. 10  
    b. 100  
    c. 1,000  
    d. 10,000

*ADA CERP is a service of the American Dental Association to assist dental professionals in identifying quality providers of continuing dental education. ADA CERP does not approve or endorse individual courses or instructors, nor does it imply acceptance of credit hours by boards of dentistry. Concerns or complaints about a CE provider may be directed to the CE provider or to ADA CERP at ADA.org/goto/cerp. Please email the OSAP central office at office@osap.org or call 410-571-0003 if you wish to be in contact with the course author/creator(s) with any questions or for clarification of course concepts. All participants assume individual responsibility for providing evidence of contact hours of continuing education to the appropriate authorities and for the maintenance of their individual records.

Please mail or fax completed test with the appropriate payment to receive one (1) hour of continuing education credit.

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After completing the information above:
mail to: OSAP CE, P.O. Box 6297, Annapolis, MD 21401, USA  or fax to: 1-410-571-0028

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There are many ways a patient can become contaminated with microbes from other patients and from the environment. Fortunately, our body defenses are usually up for these types of microbial challenges. Nevertheless, you should continue to ask yourself “Are you keeping your patients safe?”

► How will you maintain the sterility of sterilized instruments until just before their use?
► How will you protect your patients’ eyes during treatment?
► How will you ensure that your dental treatment water is of good microbial quality?
► How will you use the saliva ejector without the risk of back flow into the patient’s mouth?
► How will you retrieve common supplies without promoting cross-contamination during patient treatment?

Read On!