just be working on her son, she decided not to wear any gloves or surgical face mask but still wore her scrubs and protective eyeglasses. She gave Sam protective eye-glasses to wear during the procedure. The instruments and handpiece she used were pre-packaged and sterilized. A disposable prophy angle, air-water syringe tip, and high-volume evacuator tip were used and the operatory touch surfaces were covered with plastic barriers. The dental unit water was chemically treated to achieve good mi-crobial quality. She washed her hands with antibacterial soap before and after treating Sam. A few days later Zena developed a suppurating infection on her right thumb next to the nail.

Potential Consequences
The infection prevention procedures Zena used were fine except she was not wear-

Learning Objectives
After reading this publication, the reader should be able to:

► differentiate between hospital-associated and community-associated infections.

► give examples of the "super bugs" that are resistant to commonly used antibiotics.

► describe how norovirus and MRSA might cause problems in a dental office.

Microbes That Challenge the Journey to Safe Dental Care

Although prevention of diseases caused by all microbes is important, there is a group of microbes that present particular problems because of their antibiotic resistance and/or enhanced transmission in healthcare facilities or public places. The bacteria involved are often resistant to more than one important antibiotic (referred to as “super bugs”), and the viruses are not affected by the common antibiotics. These microbes cause healthcare-associated infections (HAI) and sometimes community-associated infections and include:

• methicillin-resistant Staphylococcus aureus (MRSA);

• vancomycin-resistant Staphylococcus aureus (VRSA);

• vancomycin-intermediate resistant Staphylococcus aureus (VISA);

• multidrug-resistant Mycobacterium tuberculosis;

• carbapenem-resistant Enterobacteria-ceae (CRE).

Others are:

• vancomycin-resistant enterococci;

• Clostridium difficile;

• gram-negative bacteria such as Burkholderia cepacia; Klebsiella spp; Acinetobacter spp; and Escherichia coli;

• influenza virus and noroviruses.

Fortunately these microbes have not yet caused major problems in dentistry as they have in other healthcare disciplines. Nevertheless we must not let our infection prevention guard down in dentistry, for such microbes can be brought into dental facilities by patients or staff.

Scenario 1
The Incident
Zena has been a hygienist for 18 years. She is a single mother with three teen-age children, one of whom (Sam) is an accomplished high school wrestler. Sam was selected to participate in a 3-month, summer, European wrestling tour paid for by the International Wrestling Union. Zena was concerned about Sam’s oral hygiene while away, so she took him to her office after working hours to give him a dental prophylaxis before his trip. Since she would just be working on her son, she decided not to wear any gloves or surgical face mask but still wore her scrubs and protective eyeglasses. She gave Sam protective eye-glasses to wear during the procedure. The instruments and handpiece she used were pre-packaged and sterilized. A disposable prophy angle, air-water syringe tip, and high-volume evacuator tip were used and the operatory touch surfaces were covered with plastic barriers. The dental unit water was chemically treated to achieve good mi-crobial quality. She washed her hands with antibacterial soap before and after treating Sam. A few days later Zena developed a suppurating infection on her right thumb next to the nail.

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Microbes That Challenge the Journey to Safe Dental Care
Navigating Your Course to Infection Prevention & Safety

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cleaning and disinfection of potentially contaminated operatory surfaces, and instrument sterilization. Normally, hand hygiene eliminates transient bacteria picked up by touching contaminated sites. However, Zena’s chapped hands may have been too painful to allow for thorough handwashing. Had Zena been wearing gloves she likely would not have become infected.

PS: Zena’s MRSA infection subsided after two weeks of vancomycin therapy.

Related Regulations and Recommendations

- Perform hand hygiene with either a non-antimicrobial or an antimicrobial soap and water when hands are visibly dirty or contaminated with blood or other potentially infectious material. If hands are not visibly soiled, an alcohol-based hand rub may also be used. Follow the manufacturer’s instructions (CDC).6,7

- Wear medical gloves when a potential exists for contacting blood, saliva, other potentially infectious materials or mucous membranes (CDC, OSHA).6,7

- Wear a surgical mask and eye protection with solid side shields or a face shield to protect mucous membranes of the eyes, nose, and mouth during procedures likely to generate splashing or spattering of blood or other body fluids (CDC, OSHA).6,7

- Wear protective clothing (e.g., reusable or disposable gown, laboratory coat, or uniform) that covers skin and personal clothing (e.g., forearms) likely to be soiled with blood or saliva (CDC, OSHA).6,7

Scenario 2

The Incident

It was Tuesday and since Dr. Romley’s 35th birthday was just two days away, the dental office staff decided to celebrate with a pitch-in just after work on Thursday. The following food assignments were made: Mally brought strawberry tossed salad and corn casserole, Faith made the baked beans, Sorley prepared the chicken salad, and Davis brought the croissants, birthday cake, plasticware, plates and drinks.

On Thursday morning the chicken salad, corn casserole and tossed salad were placed in the office refrigerator, and everything else was carefully covered with aluminum foil. The office had a microwave to warm up the casserole and beans. Everyone sampled all the food except Sorley. She was allergic to strawberries and did not eat any tossed salad. The party was a success and all had plenty to eat.

Two days later Mally, Faith, Davis and Dr. Romley came down with intestinal cramping, nausea, vomiting and diarrhea. Mally and Faith also had fever and body aches. Fortunately, everyone but Davis recovered in 3 days. Davis became severely dehydrated from the excessive vomiting and diarrhea and experienced lightheadedness, dry mouth, and decreased urination; however, he completely recovered two days later after drinking lots of fluids.

Potential Consequences

This scenario is common to many foodborne illnesses. Possible infectious agents involved include norovirus, *Campylobacter*, *Salmonella*, *Shigella*, *E. coli*, *S. aureus* to mention a few. The fact that norovirus is the leading cause of gastroenteritis in the U.S. makes it a likely candidate in this instance. According to the Centers for Disease Control and Prevention (CDC) noroviruses cause about 21 million cases of gastroenteritis a year with 70,000 hospitalizations and 800 deaths.8 It is spread through contaminated food or by contact with contaminated surfaces or infected people.

Foods more commonly involved in outbreaks include fresh fruits, leafy greens such as lettuce, and shellfish; however, any food served raw or handled after being cooked can be contaminated. There are several types of noroviruses, so one can get norovirus illness several times. The virus is present in the stools of an infected person, and can be shed for several days after the symptoms subside.

If symptomatic staff return to work, gastroenteric viruses could be spread to frequently touched environmental surfaces (e.g., telephone, microwave surface, computer keyboard). Attention to proper hand hygiene and disinfecting environmental surfaces is key to prevention of re-infection or transmission to others.

The tossed salad was likely the culprit, since Sorley was the only one who did not become sick and the only one who did not eat any salad. It was later discovered that Mally’s younger sister just recovered from intestinal upset two days before she helped Mally prepare the tossed salad and the corn casserole. The leaf lettuce used was torn into smaller pieces by hand, and the fresh strawberries were topped and cut by hand. Of course salad is never cut by hand. Of course salad is never

continued on page 4
Acinetobacter: This gram-negative bacterium is an opportunistic pathogen found in soil and water and is often resistant to common antibiotics. It can cause a variety of diseases including pneumonia, wound and urinary tract infections, and sepsis, mainly in hospital patients, with open wounds, those contacting contaminated invasive devices or under long-term care. It’s spread by person-to-person contact and via contaminated surfaces.11

Burkholderia cepacia: Formerly known as *Pseudomonas cepacia*, this opportunistic pathogen is found in soil and water and is often resistant to common antibiotics. It poses little risk to healthy persons but those with underlying medical problems, such as the hospitalized, are more susceptible. It has caused serious respiratory infections in those with cystic fibrosis, and those treated with certain contaminated medicines and medical equipment. There have been outbreaks of respiratory infections involving contaminated mouthwash, nasal spray and sublingual probes used to measure tissue CO2.11

Carbapenems: Carbapenems are a class of antibiotics with a broad spectrum of anti-bacterial activity. These antibiotics are resistant to beta-lactamases, the enzymes that make bacteria resistant to penicillin. Carbapenems are antibiotics of last resort for many bacterial infections including penicillin-resistant *Klebsiella* and *E. coli* pneumonias.11

Carbapenem-resistant *Enterobacteriaceae* (CRE): CRE are enteric bacteria (e.g., certain strains of *Klebsiella* and *E. coli* that are resistant to carbapenems and most other antibiotics. They cause infections in hospital patients especially after contact with contaminated breathing machines and urinary and intravenous catheters.11

*Clostridium difficile*: This bacterium can cause a serious inflammation of the colon, and is linked to about 14,000 deaths a year in the U.S. Those at the highest risk are older persons taking antibiotics and receiving medical care. This spore-forming bacterium is spread by the fecal-oral route, and in healthcare facilities it is transferred from patient-to-patient via contaminated surfaces and the hands of healthcare providers. These infections are usually treated with metronidazole or vancomycin.11

Community-associated MRSA infections: Infections with MRSA that originate outside of a healthcare facility in the community. These are usually skin infections.

Healthcare-associated infections (HAI): Infections that originate in healthcare facilities. The CDC estimates that 1 in 20 patients contract an HAI.7

Healthcare-associated MRSA infections: Infections with MRSA that originate inside of a healthcare facility and are usually internal infections causing sepsis, pneumonia, wound infections, or urinary track infections.

Norovirus: Noroviruses cause gastroenteritis. People may suddenly feel very sick and vomit frequently or have several episodes of diarrhea; but, most people get better within 1 or 2 days and have no long-term health effects from this illness.11

Touch surfaces: Environmental surfaces contaminated by touching with hands/gloves and involved in patient care.

Transient microbes: These are microbes present on the outer surface of the skin, such as the hands, for short periods of time. They are acquired by contact with patients or contaminated surfaces but are usually removed or killed by proper hand hygiene.

Vancomycin-resistant enterococci (VRE): These bacteria are resistant to vancomycin, the drug often used to treat infections caused by enterococci. Enterococci are bacteria that are normally present in the human intestines and in the female genital tract and are often found in the environment. These bacteria can sometimes cause infections (mainly in hospitalized patients) of the urinary tract, the bloodstream, or of wounds associated with catheters or surgical procedures.

VISA/VRSA: Vancomycin-intermediate resistant *S. aureus* (VISA) has a lower (“intermediate”) resistance to vancomycin than vancomycin-resistant *S. aureus* (VRSA) as determined by laboratory tests.
In October 2010, the World Health Organization (WHO) convened a multi-professional group to draft a curricular guide on Patient Safety for faculty and students in all health care disciplines, including dentistry. The International Dental Federation and OSAP contributed critical content.

On April 25-26, 2013 the WHO’s Patient Safety Program celebrated a Regional (South America) Launch of WHO’s Patient Safety Curriculum Guide – Multi (Professional Edition) in Buenos Aires. The Launch was hosted by Dean Dr. Jorge César Martínez and the School of Medicine at Universidad del Salvador. Sir Liam Donaldson (WHO’s Special Envoy for Patient Safety) and Agnés Leotsakos (WHO’s Patient Safety Program manager) participated in this ceremony. The educational part of the program included a lecture on “Successes and Challenges Teaching Patient Safety in Dental Schools”. Integration of patient safety into dentistry provides a sound platform for OSAP to continue education and research collaboration with WHO’s Patient Safety Program.

Enrique Acosta-Gio, DDS, PhD
National University of Mexico

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

- Disregard for the uncovered hoses and connectors.
- The operator and patient are not wearing protective eyewear.
- The operator’s face mask is not covering her nose.
- The operator is not wearing long sleeve protective clothing when there is a chance for body fluid contamination of the forearms.
- The dental operatory.

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What Can OSAP Do for You?

I entered dental hygiene education after 29 years in private practice. I was fortunate to work in an office that practiced exemplary infection control. As a full time educator I was assigned to teach pre-clinic theory, which included everything associated with infection control. I was surprised by some of the practices I encountered in the infection control arena and when I questioned the reasoning I heard the all too familiar “We have always done it that way”. Being a newcomer I was not sure of the best way to handle the situation. My request that our institution join OSAP was approved. I now had OSAP to back me up on correct infection control protocol. Not only that, I now had information at my fingertips. I utilized OSAP’s Infection Control In Practice newsletter in the classroom and in the Infection Control CE courses I offered.

I love the support OSAP provides with current up-to-date information. I know if there are changes recommended by the CDC, OSAP will send updates immediately. This not only is a time saver, it is comforting to know I am up-to-date, thanks to OSAP. I feel confident in the material that I deliver in the classroom and the community.

After attending the OSAP annual symposium in Atlanta, Georgia last year I had additional reasons to love OSAP. Everyone associated with OSAP cares about the individual. The meeting was loaded with valuable, useful information in an extremely friendly environment. I felt like one of the family.

When I conduct an Infection Control seminar for the dental community in my state I inform those attending about OSAP and the benefits of membership. Dentistry is fortunate to have the OSAP team providing on-going support for proper infection control. I believe the level of infection control utilized in private practice is indicative of the level of care provided for patients.

Mitzi Efurd, MSDH, Ed.D.
Dental Hygiene Program Director, University of Arkansas, Fort Smith, Dental Hygiene Program

Explore and Learn at OSAP.org

Need some help in continuing your journey for safe dental care?
Visit www.osap.org and simply select your job role category at the top of the OSAP home page. You will land on a page customized with resources specifically designed to meet your needs. It’s your online tool to resources that help the dental team practice infection prevention and deliver safe dental care.

Links to Resources

Continuing Education

CE Unit 3/13

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. Educational Method: Self-Instruction. OSAP is recognized by the American Dental Association as a CERP Provider.*

For each item, select the best answer.

1. Where is the natural environment for Acinetobacter?
   a. Hospitals  b. Dental patients’ mouths  c. Soil and water  d. Rodents

2. Where is the natural environment for Burkholderia cepacia?
   a. Hospitals  b. Dental patient’s mouths  c. Soil and water  d. Rodents

3. What type of harmful infection is normally caused by Clostridium difficile?
   a. Oral  b. Respiratory  c. Skin  d. Intestinal

4. What type of harmful infection is normally caused by noroviruses?
   a. Oral  b. Intestinal  c. Skin  d. Respiratory

5. What temperature should food be re-heated to before serving?
   a. 165°F  b. 100°F  c. 85°F  d. 40°F

6. What is the leading cause of gastroenteritis in the U.S.?

7. Community-associated MRSA infections are usually of what type?
   a. Pneumonia  b. Skin  c. Urinary tract  d. Sepsis

8. Where are enterococci normally found in healthy people?
   a. Respiratory secretions  b. Intestine and vaginal tracts  c. Skin  d. Nostrils and eyes

9. What is the main characteristic of “super bugs”?
   a. Larger than normal bacteria  b. Are only found in the human mouth  c. Can cause death in 3 days  d. Have resistance to more than one commonly used antibiotic

10. What antibiotic is used as a last resort to treat pneumonias caused by bacteria such as Klebsiella and E. coli that are resistant to penicillin?

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mail to: OSAP CE, P.O. Box 6297, Annapolis, MD 21401, USA  or fax to: 1-410-571-0028
What’s It All About?

This issue describes some microbes that are resistant to multiple antibiotics and/or cause serious infections in healthcare facilities or public places.

Do you know how an intestinal pathogen can cause a problem in a dental office?

Are you aware of “super bugs” that may contaminate dental operatory surfaces?

Are you faithfully performing infection prevention procedures?

Read On!