Learning Objectives

After reading this article, the reader should be able to:

► state the current federal recommendations for instrument processing;
► state the importance of packaging instruments prior to sterilization;
► state the importance of properly monitoring the sterilization process;
► describe correct monitoring of the sterilization process;
► describe how to investigate sterilization failures.

Scenario 1
The incident:
Dr. Luke Dovid’s nephew (Dr. Jake Dovid) just graduated with a MSD degree in periodontics and was in the process of opening up his practice in the same office as his uncle. Dr. Luke’s long-time dental assistant rather suddenly decided to retire and move to North Dakota. So he quickly hired Mavis, a recent graduate from a nearby dental assisting school. He told Mavis that he follows the bloodborne pathogens standard from the Occupational Safety and Health Administration (OSHA). But since it said little about instrument processing, he just designed his own instrument recirculation procedures. So he showed Mavis how she should ultrasonically clean a batch of about 20-30 instruments at a time, place them in a large sterilizing pan, run them through the autoclave, dry and cool them under a fan and take the pan to the operatory. He then showed her how to grasp each instrument with tongs and place it back into an empty slot next to an identical unused instrument in the glass dividers in the chairside cabinet drawers. This instrument processing procedure was not what Mavis learned, but she was reluctant to say anything for fear of losing her job. Dr. Jake stopped by his uncle’s office and asked Mavis how things were going. She told him about the old fashioned instrument processing procedures being used.

Potential consequences:
Contaminated instruments that are not properly processed before being reused could serve as fomites in cross contamination from patient to patient. This may result from inadequate cleaning, packaging, sterilization or storage of instruments. Inadequate cleaning leaves organic and inorganic debris on instruments that may insulate underlying microbes resulting in insufficient contact with sterilizing agents such as steam or dry heat. Over-packaging and improper loading of the sterilizer can also prevent the sterilizing agent from adequately contacting every surface of the instrument being processed. An inadequate seal in packages due to holes from reused packaging, holes from stapling, removal of wet packaging from sterilizers, or failure to use packaging can all result in recontamination following removal from the sterilizer.

Make and Keep Objects Safe for Use

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Make and Keep Objects Safe for Use

Improper use or functioning of a sterilizer can allow microbe survival, and improper handling or storage of processed instruments (e.g., allowing exposure of unprotected instruments prior to reuse) are further ways that can lead to their unwanted contamination prior to patient care.

Prevention and Empowerment:

The goal of instrument processing is to provide sterile instruments at chairside for use on a subsequent patient. Mavis and Dr. Jake need to empower themselves with confidence to communicate with Dr. Luke and motivate him to modernize his instrument processing procedures. They should show him the infection control guidelines from the Centers for Disease Control and Prevention (CDC) and remind him that the OSHA standard relates to employee protection and therefore says little about patient protection procedures such as instrument processing. They need to tell him that ultrasonically cleaning too many instruments at one time can interfere with the cleaning process. He should consider using one or, at the most, two layers of instruments in the cleaning basket or switch to an instrument cassette system. They also need to say to him: “If instruments are not packaged prior to placing in the sterilizer, they can become recontaminated post-sterilization with microbes from airborne contaminants, hands, salivary spatter, and from contact with non-sterile environmental surfaces.” He also should know that cooling sterilized instruments under a fan is problematic, for fans in the sterilizing room draw in the contaminated air and blow it over the exposed instruments. Dr. Luke needs to be convinced that chairside instrument or supply drawers that are opened during patient treatment are fraught with many cross contamination problems. Give the example that uncovered instruments in these drawers easily become contaminated from airborne microbes and from being touched with contaminated gloves during retrieval of adjacent instruments.

Some related recommendations from the CDC:

- “Designate a central processing area. Divide the instrument processing area, physically or, at a minimum, spatially, into distinct areas for 1) receiving, cleaning, and decontamination; 2) preparation and packaging; 3) sterilization; and 4) storage. Do not store instruments in an area where contaminated instruments are held or cleaned.”
- “Clean all visible blood and organic contamination from dental instruments and devices before sterilization or disinfection procedures.”
- “Before sterilization of critical and semicritical instruments, inspect instruments for cleanliness, then wrap or place them in containers designed to maintain sterility during storage (e.g., cassettes, organizing trays).”
- “Allow packages to dry in the sterilizer before they are handled to avoid contamination.”

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Scenario 2

Incident:
Dr. Lime was a real stickler about infection prevention in his office. He and his infection prevention coordinator (Flossie) worked hard to make sure the patients and staff were safe from unnecessary contamination. When any breach in infection prevention procedures occurred Dr. Lime blew his stack. So Komo (his new sterilizing room assistant) made every effort to follow procedures as she knew them. When Komo ran her very first weekly spore test in the steam sterilizer, it turned out positive (sterilization failure). She informed Flossie who told Dr. Lime. He accused Komo of messing up and told Flossie to solve the problem immediately. After discussing the packaging and sterilizing procedures with Komo, Flossie did not discover any procedural errors, so she told Komo to run two more spore tests. Komo was pretty upset with all of this and didn’t like to be yelled at, so she doubled the sterilizer exposure time during the spore testing, and the tests came out negative. So from then on whenever Komo had to run a spore test she doubled the exposure time and everyone was “happy”.

Potential Consequences:

As discussed in Scenario 1, inadequate sterilization may lead to cross-contamination which puts patient safety in jeopardy. Sterilization monitoring is one of the very few things we can do to monitor infection prevention and patient safety. Use of chemical indicators and mechanical monitoring are designed to determine if the processed instruments are safe to use. Mechanical and chemical parameters evaluate the sterilizing conditions and spore testing evaluates the procedure’s effectiveness. Analyzing the performance of these procedures is high on the list of investigators pursuing possible disease transmission situations. Knowingly faking these quality assurance procedures can have serious outcomes. Besides risking patient safety, if the cover-up is discovered, Dr. Lime could lose public/patient trust and have regulatory or liability problems that could close his practice.

Prevention and Empowerment:
Spore testing needs to be performed during the same procedures and under the same sterilizer conditions as are used to process patient care instruments. After all, using biological indicators is an accepted method for validating the sterilization process (sterility assurance) because this directly assesses the killing of known highly resistant microorganisms rather than merely testing the physical and chemical conditions necessary for sterilization. The goal is not to make sure one always achieves negative spore tests results. As the infection prevention coordinator, Flossie needed to take more initiative in investigating the situation rather than place this burden on Komo. She should have followed up with scheduled assessments of Komo’s implementation. She also should have empowered Komo with information about the significance of failures, the proper procedures for investigating failures and all the possible causes of sterilization failure such as improper:

- cleaning of the instruments;
- packaging;
- loading of the sterilizer;
- sterilizer cycle timing;
- sterilizer temperature; and
- method of sterilization.²

Although such failures are more commonly related to inappropriate packaging, overloading or use of the sterilizer, sterilizer malfunction can occur. The repeat spore testing also should have included the use of chemical indicators and mechanical monitoring. Also, if chemical indicators had been used routinely in every load/package, the sterilization problem may have been detected sooner.

By the way, Dr. Lime’s sterilizer was malfunctioning so Komo’s actions did not cause the failure.

Some related recommendations from the CDC:²
- “Use mechanical, chemical, and biological monitors according to the manufacturer’s instructions to ensure the effectiveness of the sterilization process.”
- “Monitor each load with mechanical (e.g., time, temperature, pressure) and chemical indicators.”
- “Place a chemical indicator on the inside of each package. If it is not visible from the outside, also place an exterior chemical indicator on the package.”
- “Place items/packages correctly and loosely into the sterilizer so as not to impede penetration of the sterilant.”
- “Do not use instrument packs if mechanical or chemical indicators suggest inadequate processing.”
- “Monitor sterilizers at least weekly using a biological indicator with a matching control (i.e., biologic indicator and control from same lot number).”³
- “Use a biologic indicator for every sterilizer load that contains an implantable device. Verify results before using the implantable device, whenever possible.”

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- “The following are recommended in case of a positive spore test (biological indicator):
  a. Remove the sterilizer from service and review sterilization procedures (e.g., work practices and use of mechanical and chemical indicators) to determine whether operator error could be responsible.
  b. Retest the sterilizer by using biological, mechanical, and chemical indicators after correcting any identified procedural problems.
  c. If the repeat spore test is negative, and mechanical and chemical indicators are within normal limits, put the sterilizer back in service.”

- “The following are recommended if the repeat spore test is positive:
  a. Do not use the sterilizer until it has been inspected or repaired or the exact reason for the positive test has been determined.
  b. Recall (to the extent possible) and reprocess all items processed since the last negative spore test.
  c. Before placing the sterilizer back into service, rechallenge the sterilizer with biological indicator tests in three consecutive empty chamber sterilization cycles after the cause of the sterilizer failure has been determined and corrected.”

- “Maintain sterilization records (i.e., mechanical, chemical, biological) in compliance with state and local regulations.”

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**Did You Know?**

Tips from Jackie Dorst (SafePract@aol.com) on how to visualize three aspects of infection prevention.

1) Demonstrate airborne contamination of touch and splash surfaces by using diluted disclosing solution in a spray bottle. Choose a spray bottle with a “fine mist spray” and a spray distance of about 36 inches. Hold the spray bottle in the position of the patient’s head on the dental chair and spray in a circumference. Visualize the “contamination”. Immediately clean and wipe down all sprayed surfaces after demonstration to prevent staining of surfaces.

2) Secretly “contaminate” operatory touch & splash surfaces with *Glo-Germ™* lotion. Ask a clinician to clean and prepare the room for the next patient. Then “reveal” with the Glo-Germ black light on hard to clean surfaces and easily overlooked contamination. Demonstrate with a positive, helpful attitude – not finger pointing blame!

3) In the sterilizing room use red tape on cabinet edges in “contaminated zone” and blue tape on cabinet edges in “sterile zone”. This gives a visual reminder to help prevent cross contamination in the instrument reprocessing area.

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**Meeting Attendees Take the “What’s Wrong?” Challenge**

*Chicago, IL –* Meeting attendees who were visiting the exhibit hall during the RDH Under One Roof meeting (July 28-30, 2011) were greeted by OSAP staff and invited to take the ‘What’s Wrong with this Picture?’ Challenge. Oversized posters of two different ‘What’s Wrong?’ images were displayed. Attendees were asked to identify errors in infection prevention or safety depicted in the images. The challenge was well received and initiated conversations and ‘stories’ of infection prevention and safety challenges encountered in clinical settings. Thanks to all who took the ‘Challenge!’
What’s Wrong With This Picture?

Can you identify any breach in infection control and safety procedures in this photo? Check your answers below.

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SmartPractice  ► smartpractice.com

Drilling Down With OSAP  CONNECT

OSAP provides a wealth of infection prevention and safety information on its web site http://www.osap.org.

For example, on the home page highlight the “Guidelines/Standards” on the left-hand menu; click on “Guidelines by Topic Areas”; and you’ll see the “Toolkit Index” which is an alphabetical search engine to link you to multiple sites on a variety of topics. Try it!

If you’re a blogger or tweeter check out the bottom left-hand menu on OSAP’s home page http://www.osap.org.
Join OSAP

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 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.) $115
- Individual member (outside the U.S.) $165
- Web-only member (anywhere) $100
- Student member $25
- Corporate memberships are welcome; please contact OSAP for more information.

*Watch for new membership categories!*

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**Glossary**

**Biological indicators:** material containing bacterial spores used to monitor the use and functioning of sterilizers – also referred to as spore tests

**Chemical indicators:** material that changes color or form when exposed to heat, steam, or ethylene gas used to monitor the use and functioning of sterilizers

**Chemical monitors:** the process of using external and internal chemical indicators in each package or cassette to demonstrate whether proper sterilization conditions were achieved

**Fomite:** an inanimate object involved in the spread of microbes

**Mechanical monitoring:** documenting the temperature and pressure readings from the sterilizer gauges and readouts along with the process time to determine the use and functioning of the sterilizer

**Negative spore test:** spores do not grow, indicating that they have been killed during the sterilization process – sterilization success

**Positive spore test:** spores grow indicating that they have not been killed during the sterilization process – sterilization failure

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**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. Biological indicators are best described as material:
   a. that changes color or form when exposed to heat, steam, or ethylene gas and used to monitor the use and functioning of sterilizers.
   b. containing bacterial spores used to monitor the use and functioning of sterilizers.
   c. implanted in tissue to monitor oxygen concentrations.
   d. used to coat dental instruments to monitor sharpness.

2. Chemical indicators are best described as material:
   a. that changes color or form when exposed to heat, steam, or ethylene gas and used to monitor the use and functioning of sterilizers.
   b. containing bacterial spores used to monitor the use and functioning of sterilizers.
   c. implanted in tissue to monitor oxygen concentrations.
   d. used to coat dental instruments to monitor sharpness.

3. What is the first step to be taken after a sterilization failure is detected through spore testing?
   a. Review procedure to identify problems
   b. Repeat the cycle and observe
   c. Determine the fate of the sterilizer
   d. Take the sterilizer out of service

4. A positive spore test (biological indicator) with the proper control indicates:
   a. sterilization success.
   b. a false negative.
   c. sterilization failure.
   d. a testing error.

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

6. Why are fans a problem if used in the sterilizing room?
   a. They cool the hot sterilized instruments too quickly
   b. They draw too much electricity away from the heat sterilizers
   c. They are usually too noisy disturbing the patients
   d. They draw in the contaminated air and blow it over the instruments

7. The goal of instrument processing is to:
   a. sterilize contaminated instruments.
   b. provide sterile instruments at chairside for use on a subsequent patient.
   c. clean instruments free of visible debris.
   d. eliminate water spots.

8. According to CDC how often is one to perform mechanical monitoring of a sterilizer?
   a. Once a day
   b. Once a week
   c. Once a month
   d. Every load

9. The CDC recommends that a chemical indicator is to be placed:
   a. on top of each sterilizer load once a day.
   b. on top of each sterilizer load once a week.
   c. inside every package.
   d. inside one package in each load.

10. The CDC recommends biological testing of routine sterilizer loads:
    a. once a day.
    b. once a week.
    c. once a month.
    d. once a year.

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What’s It All About?

This issue presents scenarios describing various breaches of infection prevention and safety protocol in the dental setting that may lead to the spread of infectious agents to patients. Always remember to make and keep objects safe for use and empower yourself and others with confidence on how to perform infection prevention.

• Do you know CDC’s recommendations for dental instrument processing?
• Do you know how to properly monitor the sterilization process?
• Do you know the difference between positive and negative spore tests?
• Do you know how to investigate sterilization failures?

Read On!

In the next issue.....Emerging Issues