Infection Control In Practice

Dentistry’s Newsletter for Infection Control and Safety

SPECIAL SERIES

This is the fourth part in our series to help you with infection control by compartmentalizing the issues and procedures. We began with “Before You Walk in the Door”, then proceeded to “The Reception Area”, and “The Operatory”, and we’ll follow the current issue with “Support Equipment” and “Ending the Day”.

Instrument Processing Room

Instrument processing is one of the most important patient safety aspects of the office infection control program. In order to maintain a high level of safety, it’s important to:

- decide upon the specific instrument processing procedures to use;
- standardize them and document in written form as Standard Operating Procedures (SOPs) [office SOPs are great for training new employees and temps, and evaluating procedures];
- perform them the same way every time;
- periodically evaluate the process;
- update the system if changes occur in products, equipment, or regulations/recommendations.

The ultimate goal of instrument processing is to provide sterile instruments for treatment of the next patient. It’s not enough just to clean and sterilize the instruments. Sterility (see Glossary) needs to be maintained until the instruments are placed at chairside for the next patient. Accomplishing this goal involves six major steps: transport and pre-soaking, cleaning, corrosion control and packaging, sterilizing, monitoring, and storage and transport. The details of instrument processing have been described in several publications. Instrument processing steps are summarized here, and a listing of some pitfalls in the process are provided under Putting It All Together on pages 4-5.

Transport and presoaking

The goal here is to safely gather and transport the contaminated instruments to the processing room and prepare them for cleaning. The transport needs to occur fairly quickly so the operatory can be readied for the next patient. If thorough cleaning of the contaminated instruments will be delayed, place them in the cleaning detergent so they won’t dry and be more difficult to clean.

Cleaning

Removing as much bioburden (see Glossary) as possible from the instruments will facilitate the subsequent sterilization process. Allowing some bioburden to remain will challenge the sterilization process. The Centers for Disease Control and Prevention (CDC) recommends to clean all items before sterilization preferably using automated cleaning equipment (e.g., ultrasonic cleaner, instrument washer, thermal disinfector). In everyday life in the office, an item is considered to be clean if it looks clean.

Learning Objectives

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

- locate detailed information on instrument processing and related CDC recommendations and OSHA rules.
- list and understand the steps for instrument processing.
- describe the rationale for each instrument processing step.
- identify and correct pitfalls in instrument processing.
Infection Control

Corrosion control and packaging
Carbon steel items processed in a steam sterilizer will rust. This can be retarded by using rust-inhibitors, using stainless steel instruments or using a dry heat or unsaturated chemical vapor sterilizer for these items. Packaging the instruments before placing them in a sterilizer will maintain the sterility of the instruments after removal from the sterilizers and during storage and transport to chairside for the next patient.

Sterilization
While proper cleaning will kill and remove most microbes from the instruments, they cannot be considered sterile. To achieve this they must be exposed to extreme physical conditions that have been shown to kill the most resistant microbes. In the dental office such conditions are achieved in gravity steam sterilizers, positive steam flush/pressure pulse sterilizers, vacuum steam sterilizers, dry heat sterilizers, or unsaturated chemical vapor sterilizers. Key points to help assure success are proper loading, operation and maintenance of the sterilizer. Heat-sensitive reusable items can be cleaned and processed through a liquid sterilant at an exposure time that will achieve sterilization.

Monitoring
Sterilization monitoring determines if instruments have been exposed to physical conditions known to achieve the death of all microbes. The CDC recommends mechanical, chemical and biological monitoring (see Glossary). Mechanical and chemical monitoring yield immediate results used to determine if the instruments appear to be safe to use. Biological monitoring (spore-testing) provides the main guarantee of sterilization.

Storage and transport
Use event-related storage (see Glossary) for sterilized instruments. Store sterilized instrument cassettes and packages in a low dust area and in a manner that will not tear the packaging or allow them to become wet causing wicking (see Glossary). Check each package or cassette before transporting to chairside. If packaging is torn, don’t use those instruments. Re-clean, re-package and re-sterilize them.

— OSAP
Some patients will be curious about what’s been done to the instruments that will be used on them. So here are some examples of what can be said about the instruments. “We take your safety very seriously in this office. We:
• carefully clean the instruments.
• package them to protect them.
• run them through a sterilizer at high temperatures.
• test the sterilizers.
• check the packages to make sure the instruments stay sterile until we unwrap them.”
Putting It All Together

Avoiding the pitfalls of instrument processing will help ensure the desired end result of always having safe instruments for all patients. Consider the following pitfalls in instrument processing.

**PITFALL: Intermingling of contaminated and sterile items**

*Results in using non-sterile instruments on patient*
- Separate the instrument processing room from the treatment rooms to keep chances of cross-contamination low.
- Place several signs marked “CONTAMINATED” in the instrument processing room at sites where uncleaned, cleaned, and cleaned and packaged instruments are located. Remember, nothing is considered sterile unless it has been properly cleaned, packaged AND processed through a sterilizer. Use of signs may seem simplistic, but they can really help on busy days; when temps, the doctor or sales reps may enter the processing room; and to alert housekeeping staff during their nightly cleaning.
- Place signs marked “STERILE” at sites used for packages after they have been removed from the sterilizer.
- Use chemical indicators (that are visible from the outside) on all packages. These will change color after processing through a properly functioning sterilizer differentiating them from packages that have not been processed through a sterilizer.

**PITFALL: Dangerous handling of chemical solutions and sharp contaminated instruments**

*Results in injuries and potential exposure to pathogens or irritating chemicals*
- Dispose of used needles and scalpels in sharps containers at chairside to avoid a second handling in the instrument processing room.
- Use instrument cassettes to reduce the direct handling of contaminated sharp instruments.
- Wear heavy duty gloves if gathering up loose contaminated sharp instruments at chairside.
- Transport contaminated instruments to the instrument processing room in containers that allow visibility of their contents. This prevents the dangerous act of reaching blindly into a container of sharp instruments.
- Besides the heavy duty gloves, wear masks and protective eyeglasses and clothing to prevent direct contact with contaminated items and cleaning chemicals.
- Always use a basket or cassette rack in ultrasonic cleaners to avoid contact with the contaminated used solution when removing the processed instruments from the chamber.
- Avoid routinely hand-scrubbing instruments. It’s too dangerous.
- Avoid splashing when handling liquid detergents, rinsing instruments and when emptying used cleaning solution into the sink.
- Handle instrument packages carefully and as few times as possible to avoid puncturing your hands or tearing the packaging.

**PITFALL: Inadequate cleaning**

*Results in bioburden remaining on the instruments which can interfere with sterilization*
- Avoid over-loading any cleaning device. Use only one or two layers of loose instruments in the ultrasonic cleaning basket. Follow the manufacturer’s directions for loading instrument washers.
- Use a cleaning solution designed for use with dental/medical instruments. Other types of detergents may damage the instruments.
- Fill the ultrasonic cleaner tank to about an inch from the top to assure proper cleaning throughout the chamber.
- Make sure all instruments are submerged in the ultrasonic cleaning solution.
- If uneven cleaning is suspected in a part of the ultrasonic tank, dip a wide piece of aluminum foil to the bottom of the tank, “zap” it for 30-60 seconds and check to see if the dents are evenly distributed over the entire submerged part. If not, a transducer may be faulty.

**PITFALL: Improper packaging**

*Results in interference with the sterilization process or allows re-contamination of the instruments after sterilization*
- Check instruments after the cleaning process. If they are visibly clean, proceed (and consider reducing the cleaning time to be as efficient as possible). If not, check the cleaning equipment and the procedures used.
- Rinse ultrasonically cleaned instruments/cassettes well to remove the residual cleaning solution that does contain microbes.

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sterilization wrap, paper/plastic peel pouches, nylon plastic tubing, and certain paper bags).

- Avoid using paper bags for heavy or sharp instruments for they may protrude through the bag.
- Avoid using closed containers in steam or unsaturated chemical vapor sterilizers; a closed container will keep the sterilizing agent from directly contacting the surface of the items to be sterilized.
- Avoid using paper/plastic peel pouches in a dry heat sterilizer for the plastic may separate from the paper.

Some blue or green sterilization wrap contains plastic material that may melt in a dry heat sterilizer.
- Avoid using staples to seal packages. Use “autoclave” tape or heat-seal nylon plastic tubing.
- Instrument cassettes do need to be wrapped or placed in large paper/plastic pouches.

**PITFALL: Improper sterilization**

Prevents the instruments from becoming sterile
- Use deionized or distilled water rather than tap water in steam sterilizers to avoid “water spotting” on the instruments.
- Use FDA-cleared sterilizers and follow the manufacturer’s directions for operation and maintenance. Boiling water, bead “sterilizers”, hot oil baths, cooking ovens and toaster ovens are not considered as sterilizing systems.
- Load the sterilizer chamber with a single layer of packages or cassettes or place them on their edges to assure adequate exposure to the sterilizing agent. Most sterilizers have racks that properly position packages.

**Avoid handling wet packages. Dry them inside the sterilizer chamber or sterilizer cassette before removing them. This prevents wicking and reduces the chance of tearing the packaging materials upon handling.**
- Plan for obtaining a back-up sterilizer when the primary sterilizer fails.

**PITFALL: Improper storage**

Results in re-contamination of the previously sterilized instruments
- Avoid the following “events” for they may damage the packaging material.
  - excessive handling
  - handling wet packages
  - sliding wrapped cassettes onto shelves
  - getting the packages wet which causes wicking
  - stacking them so those on and near the bottom become compressed
- Check the integrity of packages before they are distributed to chairside.

**PITFALL: Improper or infrequent sterilization monitoring**

Results in erroneous reading of the sterilization indicators, prolongs identification of sterilization failures and may allow non-sterile instruments to be used on patients
- Use sterilization indicators as instructed by their manufacturers or by the sterilization monitoring service being used.
- Use spore-test indicators before their expiration dates.
- Place spore-tests inside of packages that are in the center of the load or wherever the sterilizer manufacturer indicates.
- If mechanical, chemical or biological monitoring indicates a failure, stop using that sterilizer until the problem is identified and corrected.
- Perform extra spore-testing when there are changes in sterilization equipment, personnel, supplies, and procedures or if there is a question about the sterility of a certain package or container.
Infectious diseases declining worldwide

The World Health Statistics 2008 report is now available at [http://www.who.int/whosis/whostat/2008/en/index.html](http://www.who.int/whosis/whostat/2008/en/index.html). A key conclusion in the report is that the global burden of disease is shifting from infectious diseases to noncommunicable diseases, with chronic conditions such as heart disease and stroke now being the chief causes of death globally. WHO states that “the shifting health trends indicate that leading infectious diseases - diarrhea, HIV, tuberculosis, neonatal infections and malaria - will become less important causes of death globally over the next 20 years”. It’s not clear at this time if this change is due to fewer infectious disease deaths or more noncommunicable disease deaths.

Traveler’s guides

The World Health Organization (WHO) indicates that more than 800 million international journeys were made in 2007. Global travel exposes many people to changes in altitude, humidity, disease agents and temperature - all of which can lead to ill-health. Many health risks can be minimized by precautions taken before, during and after travel. WHO’s 2008 edition of *International Travel and Health* is now available. Chapters can be downloaded at: [http://www.who.int/ith/chapters/en/index.html](http://www.who.int/ith/chapters/en/index.html).

The CDC has a very interesting website that provides travelers with health information about numerous worldwide destinations. Check it out at [http://www.cdc.gov/travel/destinationList.aspx](http://www.cdc.gov/travel/destinationList.aspx).

OSAP offers the *Traveler’s Guide to Safe Dental Care* which is available in English, Spanish and Portuguese at [http://www.osap.org/displaycommon.cfm?a=n1&subarticlenbr=55](http://www.osap.org/displaycommon.cfm?a=n1&subarticlenbr=55).

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**Glossary**

**Blobburden:** The mixture of microbes, body fluids and dental materials on instruments used in patient’s mouths.

**Biological monitoring:** The use of biological indicators (i.e., spore strips or spore vials containing live bacterial spores) to test the use and functioning of sterilizers - also known as spore testing. CDC recommends routine biological monitoring weekly. It should also be performed at other times when procedures, personnel, supplies or equipment changes.

**Chemical monitoring:** The use of chemical indicators (i.e., inks or other chemicals that change color or form when exposed to certain levels of heat or other physical conditions) to test the use and functioning of sterilizers. CDC recommends placing a chemical indicator inside of every package, and if it can’t be seen from the outside, another one is to be placed on the outside of every package.

**Event-related storage:** This means that the sterilized instrument cassettes or packages can be used if no event has occurred during storage and transport that has compromised the packaging material.

**Mechanical monitoring:** The documentation of readings (e.g., time, temperature, and pressure) from sterilizer gauges and readouts to determine the use and functioning of sterilizers. CDC recommends mechanical monitoring of every load.

**Spore testing:** The use of highly resistant bacterial spores (biological indicators) to test the use and functioning of sterilizers.

**Sterility:** The absence of live microbes.

**Wicking:** The drawing through of microbes from the surface to the inside of wet paper.

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**Ask OSAP**

*Q:* Why package instruments before sterilization? Won’t the packaging material just interfere with the sterilizing process?

*A:* If instruments are not packaged before sterilization they will become recontaminated (through contact with dust, spatter, aerosols, contaminated surfaces, hands, and moisture) when they are removed from the sterilizer and before they are delivered to the next patient. In addition, the bacterial spores used in spore testing of sterilizers are killed when they are placed inside wrapped cassettes or instrument pouches. The sterilizer cycles used for packaged instruments do operate for longer times than those for unwrapped items to ensure proper sterilization.

Do you have a question or challenge about infection control support equipment and ending the day? Send your questions to editor@OSAP.org. Dr. Miller can ensure we incorporate the answer into the upcoming issues of this Special Series.

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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 appropriate fee as indicated below. 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 more information, call OSAP at 800-298-6727 (410-571-0003).

For each question, pick the best answer.

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

2. What type of sterilization causes carbon steel instruments to rust?
   a. Dry heat
   b. Unsaturated chemical vapor
   c. Steam
   d. Ethylene oxide

3. Which form of sterilization monitoring provides the main guarantee of sterilization?
   a. Recording of the exposure time
   b. Biological
   c. Chemical
   d. Recording of the maximum temperature reached

4. The main reason for cleaning instruments before sterilization is to:
   a. prevent the formation of water spots.
   b. reduce the rusting of instruments.
   c. eliminate the need for packaging the instruments.
   d. give the sterilization procedures the best chance to work.

5. Why is it important to let packaged instruments dry inside the steam sterilizer?
   a. To complete the killing of microbes
   b. To prevent water spots from appearing on the instruments
   c. To minimize tearing of packaging materials when handling the sterilized items and to avoid wicking
   d. To let the chemical indicators fully turn the appropriate color

6. How should you load a sterilizer?
   a. Place packages in a single layer or on their edges
   b. Pack the packages tight to eliminate as much air as possible
   c. Stack the packages one on top the other
   d. Put only one package at a time in the sterilizer

7. Paper-plastic peel pouches cannot be used in a ______________ sterilizer because the plastic will separate from the paper at the high temperatures used in this sterilizer.
   a. dry heat
   b. steam
   c. unsaturated chemical vapor
   d. dry heat sterilizer and steam

8. Disposable sharps used at chairside should be discarded in:
   a. any trash can with a double plastic liner.
   b. a sharps container at chairside.
   c. a glass jar in the instrument processing room.
   d. scrap amalgam containers.

9. Which of the following best describes event-related storage?
   a. Sterilized instruments are re-sterilized if not used within a designated period of time.
   b. Sterilized instruments must be used on the same day they are sterilized.
   c. Sterilized instruments are used only if the packaging material has not been torn or exposed to moisture.
   d. Sterilized instruments in packages can be used anytime as long as the internal indicator has changed to the proper color.

10. What is used for biological monitoring?
    a. Certain bacterial spores
    b. Special chemicals that change color when exposed to high temperatures
    c. Highly resistant viruses
    d. Specific disease-producing fungi

Mail or Fax completed test with the appropriate payment to receive one (1) hour of continuing education credit.

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MAIL TO: OSAP CE • P.O. Box 6297 • Annapolis, MD 21401 • USA • FAX TO: 410.571.0028
There are several things that can be done to help ensure success and enhance safety when handling or processing contaminated instruments.

Avoid two-handed sharpening of contaminated scalers at chairside by supplying multiple scalers with each patient set-up. Clean, sterilize and then sharpen instruments using a sterilized stone. Sterilizing sharp instruments in a dry heat sterilizer may help reduce dulling.

A sterilized sharpening stone also can be taped to a countertop so that one-handed sharpening could be performed when necessary. Use instrument sharpening plastic test sticks to assess instrument sharpness as needed. If using a mechanical instrument sharpening device, follow the manufacturer’s directions for sterilization.

Handpieces need to be cleaned before being sterilized. The outside can be wiped or brushed with alcohol or water depending upon the manufacturer’s directions. Handpieces that need to be lubricated before sterilization also need to be purged after lubrication (“blown out” with compressed air) to remove the excess lubricant. This purging can cause the airborne spread of contaminants from inside the handpiece. Lubricate and purge the handpiece into a vacuum line or into a device capable of containing the contaminated spray.

Avoid using cloth as the outer sterilization wrap for it is not a good barrier to microbes and it can absorb too much steam or chemicals inside the sterilizers.

If it is absolutely necessary to hand-scrub the instruments, use a long-handled brush, heavy duty gloves, mask, protective eyewear and protective clothing. To avoid contaminated splatter, hand-brush the instruments while they are submerged. For safety, clean just one instrument at a time.