LEARNING OBJECTIVES
After reading this publication, the reader should be able to:

• describe the consequences of not properly cleaning instruments before sterilization.
• describe the importance of packaging cleaned and dry instruments prior to sterilization.
• describe how to properly use instrument cleaning equipment.
SCENARIO: The Incident

Dr. Presser’s office was so swamped on Monday with several dental emergencies that there was no time to immediately process the contaminated instrument cassettes. So they were taken to the “Contaminated” area in the processing room and either placed in the ultrasonic cleaner filled with cleaning solution or left on the countertop.

Two back-to-back cancellations at the end of the day allowed Maddy (responsible for instrument processing) to catch up. She processed the cassettes in the ultrasonic cleaner through a regular cycle. After consulting with his staff, Dr. Presser had recently purchased a new ultrasonic unit that was able to accommodate several cassettes at one time. After cleaning the rest of the cassettes Maddy rinsed them all under running water; excess fluid was shaken off over the sink; internal chemical indicators were added; they were wrapped with blue denim cloth, sealed with autoclave tape, and processed through the autoclave. When Dr. P began patient treatment the next day he noticed that some of the instruments looked “dirty”.

Potential Consequences

Cleaning blood and saliva from instruments will be more difficult if these biological materials (as well as dental materials) are allowed to dry on the instrument before processing. These materials on some of Dr. P’s instruments were dry after sitting out on the countertop for a few hours. If instruments are not thoroughly cleaned, the debris will prevent the sterilizing agent (e.g., steam) from directly contacting the microbes on the surface of the instrument and within the debris. This insulation could result in sterilization failure that cannot be detected through sterilization monitoring.

Placing the instrument cassettes (or loose instruments) directly into the fluid in an ultrasonic cleaner chamber increases the risk of exposure. When this happens the hands must be submerged in the contaminated fluid at the end of the cycle to retrieve the items. If the gloves worn during instrument processing have been breached (which is often difficult to determine), exposure occurs. When instruments or cassettes are removed from an ultrasonic cleaner they should be carefully rinsed (avoiding splashing), for the residual solution on the items contains microbes. If removing any rust inhibitor that may be present in the cleaning solution is a concern, an inhibitor can be added back later, if needed. Maddy should have dried the cassettes and carefully inspected the processed instruments for cleanliness before packaging.

Blue denim cloth is not a Food & Drug Ad-
cannot be thoroughly cleaned within an hour or so. This facilitates subsequent cleaning. Follow the manufacturer instructions for use (IFU) for the pre-soak solution that is chosen.

Since sterilization monitoring cannot detect the cleanliness of the instruments, and since unclean instruments may not be able to be sterilized, special care must be taken to ensure proper instrument cleaning. This may take a few practice runs using different cleaning times followed by careful visual inspections to select a procedure that helps ensure instrument cleanliness. Even so, instruments need to be visually inspected routinely after each cleaning. If a dirty instrument does become sterile (which can’t be determined), its appearance would be very unsettling to a patient if noticed. Thus, processed instruments need to be clean and sterile not just sterile.

Instruments or cassettes to be ultrasonically cleaned should be placed in a basket or cassette rack to avoid having to submerge the hands in contaminated solution to retrieve the items at the end of the cycle. Using a basket or rack may also reduce the chances of splashing the cleaning fluids.

Some Related Centers for Disease Control and Prevention (CDC) Recommendations and Occupational Safety and Health Administration (OSHA) Regulations:\textsuperscript{2-4}

- Assign responsibilities for reprocessing of dental equipment to dental healthcare personnel with appropriate training.
- Wear puncture- and chemical-resistant/heavy-duty utility gloves for instrument cleaning and decontamination procedures.
- Wear additional appropriate personal protective equipment (PPE - e.g., mask, protective eyewear and gown) when splashing or spraying is anticipated during cleaning.
- Clean all visible blood and other contamination from dental instruments and devices before sterilization.
- Use FDA-cleared automated cleaning equipment (e.g., ultrasonic cleaner, washer, washer-disinfector) to remove debris to improve cleaning effectiveness and decrease worker exposure to blood.
- Use work-practice controls that minimize contact with sharp instruments if manual cleaning is necessary (e.g., long-handled brush).
- Thoroughly clean instruments according to manufacturer instructions, and visually inspect them for residual contamination before sterilization.
- Have manufacturer instructions for reprocessing reusable dental instruments/equipment readily available, ideally in or near the reprocessing area.
- Do not use liquid chemical sterilants/high-level disinfectants as a holding solution.
- After cleaning and drying instruments, package them by using a container system or a wrapping that is compatible with the type of sterilization process used and that has been cleared by the FDA.
- Label each package to be sterilized with the sterilizer used, the cycle or load number, and the date of sterilization.

General:
- Check for the availability of pre-soaking, cleaning, and sterilization instructions prior to purchasing instruments and devices that will require sterilization.
- Consider the quality of instruments and their resistance to corrosion prior to purchase.

Holding:
- If used, the holding solution can be the same solution used to thoroughly clean the instruments (e.g., ultrasonic cleaning solution) that normally contains a rust inhibitor.
- Follow manufacturer IFU for all holding solutions. Try not to soak the instruments any longer than necessary to keep the chances for corrosion at a minimum.
- Some holding solutions contain enzymes to help loosen biological debris on the instruments.

Cleaning:
- Preliminary cleaning of some reusable hand instruments can occur at chairside during an appointment by CAREFULLY wiping on a 4X4 taped to the instrument tray.
- Hand-scrubbing contaminated instruments is too risky for routine cleaning. Use FDA-cleared automated equipment (e.g., ultrasonic cleaner, instrument washer, washer/disinfector).
- Follow the manufacturer instructions for use (IFU) when using automated cleaning equipment.
- Be sure to use a detergent designed for use on dental/medical instruments, and recommended by the manufacturer of the cleaning equipment used.
- Always use a basket or rack with the ultrasonic cleaner.
- Follow the instrument and handpiece manufacturer IFU.

(Continued on page 4)
STRATEGIES FOR INSTRUMENT PROCESSING
(Continued from page 3)

Cleaning: (Continued from page 3)

- Visually inspect items after cleaning, rinsing and drying.
- Consider test runs on typical batches of contaminated instruments, and if not visually clean increase the cleaning time. If clean, carefully consider decreasing the cleaning time to be as efficient as possible.
- Consider using a commercially available test to verify cleaning efficiency.
- Used ultrasonic cleaning solution is highly contaminated with microbes. So processed instruments need to be rinsed to remove those residual microbes, and the used cleaning solution needs to be discarded carefully (at least once a day) while wearing PPE.
- The aluminum foil test can estimate the uniformity of the cleaning action of an ultrasonic cleaner.
- Ultrasonic cleaners without built-in rinse cycles should be located next to a sink to avoid dripping of contaminated fluid during the transfer of items. Instrument washers and washer/disinfectors have automatic rinsing cycles.

Packaging:

- Proper packaging of cleaned instruments and other devices before sterilization serves to maintain sterility after sterilization and during storage.
- Use only FDA-cleared sterilization wrap, pouches and bags. These items have been shown to allow the penetration of the sterilization agent (i.e., steam, dry heat, unsaturated chemical vapor) but prevent the passage of microbes and maintain sterility for a significant period of time (indefinitely unless the packaging is compromised).
- Follow the manufacturer IFU for the sterilization packaging material, and use the proper packaging material for the method of sterilization to be used. For example:
  - For steam sterilization: Paper wraps and bags, nylon plastic tubing, paper/plastic peel pouches.
  - For dry heat sterilization: Closed containers, paper wraps and bags, special nylon plastic tubing.
  - For unsaturated chemical vapor sterilization: Paper wraps or bags, paper/plastic pouches.
- Packaging material needs to be sealed with sterilization tape or the built-in adhesive on peel pouches. Sealing with staples will penetrate the material causing a sterility breach in post-sterilization storage.
- Paper sterilization bags should not be used with heavy instruments or sharp items that can easily penetrate the bag.
- Instrument cassettes need to be packaged in FDA-cleared wrap or paper/plastic peel pouches.
- Insert a chemical indicator inside each package to be sterilized or use packaging material already inscribed with an internal chemical indicator.
- If the internal chemical indicator cannot be seen from the outside, place another chemical indicator on the outside of the package or use packaging material already inscribed with an external chemical indicator.
- Label each package to be sterilized with the sterilizer used, the cycle or load number, and the date of sterilization. Do not use marking that will run or fade (e.g., some inks) during sterilization. Do not penetrate the packaging material with the writing device. Some permanent markers (e.g., some types of Sharpie®) can be used on the plastic of paper/plastic peel pouches. The autoclave tape on wrapped packages can be labeled.
- When using a biological indicator, place the indicator inside of a package.
- If there is concern about packaging or wrapping technique, test for the penetration of the sterilizing agent by placing a biological indicator inside the package.
- Paper wraps, bags and paper/plastic peel pouches are not reusable. Reusable sterilization wrap is available, but only use FDA-cleared wrap that is validated for this purpose.

Corrosion Control, Lubrication, Drying, Inspection:

- Instruments or parts of instruments made of carbon steel (e.g., some burs and other cutting items) are subject to rusting. While some of these are considered as single use (disposable) items, non-corrosive forms of sterilization are offered by the dry heat sterilizer and unsaturated chemical vapor sterilizer.
- Cleaned and rinsed instruments and cassettes should be carefully dried (remember cleaned instruments are still not sterile) and inspected before being packaged in paper wraps or paper/plastic peel pouches. Moisture can cause the paper to tear when handled, and instruments need to be dry to thoroughly inspect for cleanliness. Also, residual moisture on instruments/cassettes can interfere with the rust prevention properties of dry heat and unsaturated chemical vapor sterilization.
- Follow the manufacturer IFU for cleaning and lubricating devices such as specific handpieces. Automatic devices are available for cleaning and lubricating the inside of some handpieces. If the outsides are not cleaned by these devices, this can be accomplished by manual scrubbing with a soft long-handled brush. When not using an automatic device to clean and/or lubricate handpieces, consider spraying/flushing the handpiece into a vacuum line or container to reduce spread of internal contaminants.
- Hinged instruments may need to be lubricated according to the manufacturer IFU, and should be left open before packaging to facilitate sterilization.

# Closed solid containers (e.g., capped glass vials, metal trays or boxes with lids) are not to be used as packaging for steam or unsaturated chemical vapor sterilization. These prevent the entrance of the sterilizing agent.

§ Closed containers are appropriate for dry heat sterilization as long as biological indicators show the penetration of heat into the container. The plastic in paper/plastic peel pouches not validated for this use will be damaged in a dry heat sterilizer.

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What’s Wrong With This Picture?

Can you identify the breach(es) in infection prevention and safety procedures in this photo taken of instruments about to be sterilized? Check your answer below.

Educational Spotlight

NEW! Interactive Online Article:
Understanding the CDC’s Summary of Infection Prevention Practices in Dental Settings

This new CE opportunity is the result of collaboration between OSAP, the Dental Assisting National Board (DANB), and the Dental Auxiliary Learning and Education (DALE) Foundation.

The article reviews the “Summary of Infection Prevention Practices in Dental Settings: Basic Expectations for Safe Care” introduced in 2016 by the Centers for Disease Control and Prevention (CDC).

The interactive format of the online article allows you to review at your own pace. Take notes, access a glossary with links to related resources, and understand the topic before completing the online post-article assessment to earn two CE credits.

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TEAM HUDDLE DISCUSSION GUIDE

1. Are you sure your instruments are getting clean?
2. Are you using FDA-cleared sterilization packaging material?
3. Are you adding appropriate sterilization indicators to your instrument packages?

Glossary

**Aluminum foil test:** Estimates the uniformity of the cleaning action of ultrasonic units. Involves inserting a piece of light-weight aluminum foil into the cleaning solution and operating the unit for 20 seconds. The resulting pebbling should be evenly distributed on the submerged portion of the foil. Follow manufacturer IFU. See page 117 of reference #3 for details.

**FDA-cleared:** Indication that the FDA had reviewed manufacturer information and any testing data showing an item is safe and effective as defined on its labeling.

**Wicking:** The drawing of microbes through material that is wet.

Links to Resources


INFECTION CONTROL IN PRACTICE Team Huddle™

KEY TAKEAWAYS

1. Proper instrument processing plays a key role in providing the Safest Dental Visit™.
2. Using FDA-cleared materials and equipment for instrument sterilization and following manufacturer IFU are key to successful patient protection.
3. Proper instrument cleaning and packaging prior to sterilization is necessary to help ensure patient safety.
4. Short-cuts in instrument processing may put patients at risk of acquiring infectious diseases.

QUESTIONS FOR ONLINE QUIZ

1. What is the rationale for using a holding solution in dental instrument processing?
   a. To thoroughly clean the instruments before sterilization
   b. To apply rust inhibitors after processing through the sterilizer
   c. To keep debris from drying on the instruments before cleaning
   d. To keep the instruments moist during the steam sterilization process

2. What should be used to routinely clean contaminated dental instruments?
   a. Automated equipment
   b. Dishwasher
   c. Scouring sponge
   d. Long-handled brush

3. What does FDA-clearance mean?
   a. That a product is about to be discontinued
   b. That a product is safe and effective as defined on its labeling
   c. That a product is the least expensive of its type on the market
   d. That a product has been recalled (removed) from the marketplace

4. What should be done immediately after cleaning and drying contaminated instruments?
   a. Package them
   b. Place them in a sterilizer
   c. Submerge them in a holding solution
   d. Visually inspect them for cleanliness

5. What is the rationale for packaging clean and dry instruments prior to sterilization?
   a. To eliminate water spots
   b. To maintain sterility after sterilization
   c. To prevent rusting of carbon steel items
   d. To reduce by half the subsequent sterilization time

6. What does an aluminum foil test measure?
   a. The dryness of cleaned instruments
   b. The sterility of processed and stored instruments
   c. The uniformity of the cleaning action of an ultrasonic cleaner
   d. The ability of the sterilizing agent to penetrate the packaging material

7. What should not be used as packaging for steam sterilization?
   a. Solid metal boxes with lids
   b. Paper/plastic peel pouches
   c. Paper wraps
   d. Paper bags

8. What is the rationale for cleaning instruments prior to sterilization?
   a. To prevent rusting of the instruments
   b. To prevent water-spotting during steam sterilization
   c. To eliminate the need for packaging before sterilization
   d. To prevent the insulation of microbes in the debris from the sterilizing agent

9. What is a rationale for drying instruments/cassettes after cleaning and rinsing?
   a. To kill remaining microbes by desiccation
   b. To prevent water-spotting during steam sterilization
   c. To keep from getting packaging material wet and tearing before sterilization
   d. To prevent residual water keeping sterilizing agents from directly contacting the surface of the instruments/cassettes

10. The CDC recommends labeling instrument packages for sterilization at a minimum with:
    a. the sterilizer used, the cycle or load number, the date of sterilization.
    b. the sterilizer used, the contents of the package, the date of sterilization.
    c. the sterilizer used, the cycle or load number, the contents of the package.
    d. the cycle or load number, the contents of the package, the date of sterilization.

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TEAM HUDDLE HIGHLIGHTS

1. When did you last evaluate your instrument processing procedures?

2. Are you using FDA-cleared instrument packaging materials prior to sterilization?

3. Do you know why it’s important to dry cleaned instruments prior to packaging?

4. Are your sterile instrument packages properly labeled?

Read on!