TEAM HUDDLE: Understanding the Responsibility of Infection Prevention and Control

Dental infection prevention and control is a system of policies and procedures designed to ensure the use of best practices to reduce the risk of transmitting potentially dangerous microbes from the treatment environment and support areas. An effective infection control program hinges on the understanding of the WHAT, the WHY, and the HOW of the preventive policies and procedures as well as techniques that enhance compliance.

LEARNING OBJECTIVES

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

- describe general aspects of dental instrument processing.
- describe the problems associated with improper loading of an autoclave.
- describe the written instrument processing documents that should be maintained.
- describe what the three types of sterilization monitoring indicate.
SCENARIO: The Incident

Dr. Sertis and his dental assistant wife (Irene) are about ready to retire and have their grandson (Dr. Kard), who just finished his General Practice Residency program, and his wife Jolene (a CDA) take over the practice. When Dr. K joined the practice he appointed Jolene as the Infection Control Coordinator. She met with Irene, along with the other dental assistant (April) and the hygienist (Mindy), to discuss the office safety procedures. Jolene found that environmental, laboratory, waterline, waste, and radiographic asepsis were fine as well as the hazard communication program.

When Jolene asked April for a copy of their instrument processing procedures, April said: “We don’t have a written copy, but I’ll be glad to explain the procedures we use.” April said that “loose instruments are placed in the ultrasonic tank and the tank filled with water and a couple of drops of an inexpensive dishwashing detergent. After about 10 minutes the instruments are gathered up using heavy utility gloves, placed in a pan with holes in it and rinsed under tap water. Then they are dumped out on a terry cloth towel, arranged in functional sets, and placed in paper/plastic peel pouches. Some non-sharp items like anesthetic syringes, spatulas, and 3-way and evacuator tips are placed in the less expensive paper bags and stapled shut. Everything is sterilized in our autoclave.”

When Jolene watched April use the autoclave she noticed that instrument packages were stacked one upon the other (layered) in the steam sterilizer, but the packages were allowed to dry before removing from the sterilizer. The packages were then stored in a closed cabinet.

When asked about sterilization monitoring April said that the instrument pouches and bags they use have a mark on the outside that changes color in the autoclave. For weekly spore testing she said she places the spore strip envelope on top of the load of instrument packages and mails the envelope to their monitoring service. She said that they have never had any failures. When asked about how often she checks the temperature reached in the sterilizer, April said she periodically checks the “mid-cycle” temperature and it’s always at 250 degrees Fahrenheit.

Potential Consequences, and Prevention: (Further details on page 4)

1. Loose instruments were placed directly into the ultrasonic tank.

This breach violates two infection control principles: 1 Avoid contacting blood/body fluids. Limit the spread of contamination.

WHAT: Avoid contact with used ultrasonic cleaning solutions.

WHY: Manufacturers’ instructions for use (IFU) must be followed when using any piece of equipment. In the case of an ultrasonic cleaner which cleans via cavitation of the high frequency sound waves in the liquid, instruments must sit in a basket that prevents them from being on the bottom so that the cavitation can clean from all directions. An ultrasonic cleaner does not sterilize. Used solutions contain live microorganisms originally present on the contaminated instruments. 2 Reaching into the solution to retrieve (“scoop up”) instruments from the bottom of the tank increases the risk of sharps injury and of direct contact with the contaminated solution (e.g., through undetected leaks.
in gloves). Splashing also may occur when adding items to the cleaning solution.

**HOW:** To avoid contact with cleaning solutions and contaminated instruments wear heavy utility gloves, mask, and protective clothing and eyewear when processing instruments."\(^3\) A helpful tip is to use an ultrasonic cleaner basket with a larger transport container to safely transport instruments from the operatory to a holding solution or ultrasonic cleaner."\(^4\) The instrument transport container needs to be puncture resistant, leakproof on the sides and bottom, covered, and color-coded or labelled with a biohazard symbol."\(^3, 5\) Use the basket to hold the instruments in the ultrasonic cleaner. This facilitates removal from the cleaner and makes rinsing easier. If instrument cassettes are used to contain the instruments through use, cleaning, and sterilization, a rack or basket also should be used to hold the cassettes during ultrasonic cleaning.

2. **Dishwashing detergent was used in the ultrasonic cleaner.**

This breach violates the infection control principle to: **Make objects safe for use.**

**WHAT:** Use a cleaning solution designed for use with medical/dental instruments and recommended for use in the ultrasonic cleaner.

**WHY:** Dishwashing detergents work great in removing grease/fat but are too alkaline to use on instruments. Also cleaning agents/solutions designed for use on instruments usually contain rinsing and anti-corrosion agents.

**HOW:** Manufacturers of ultrasonic cleaners usually recommend the proper cleaning agent for their units. Use of disinfectants in the ultrasonic cleaner is not recommended (unless designed for that use), for they may not facilitate the cleaning process and could generate vapors that should not be inhaled.

3. **Staples were used to close paper sterilization bags.**

This breach violates the infection control principle to: **Make objects safe for use.**

**WHAT:** Do not compromise the integrity of sterilization packaging materials.

**WHY:** Staples make holes in the sterilization bags that allow microorganisms to enter and contaminate the instruments after the sterilization process.

**HOW:** Seal paper bags and sterilization wraps with sterilization tape and use self-sealing paper/plastic peel pouches.

4. **Instrument packages were stacked one upon the other (layered) in the steam sterilizer.**

This breach violates the infection control principle to: **Make objects safe for use.**

**WHAT:** Sterilizers need to be loaded in a way that allows sufficient access to the sterilizing agent.

**WHY:** If the sterilizing agent (e.g., steam, chemical vapor, dry heat) is prevented from entering the packages, sterilization of the items inside will not occur. Stacking (layering) packages and overloading a sterilizer chamber inhibits good access to the sterilizing agent through compacting and impedes air removal. Also it enhances breaching the integrity of the packaging material by compression, and this allows for contamination of the package content post-sterilization.

**HOW:** When loading a sterilizer, place packages on their edges or place them in a single layer. Follow the manufacturers’ IFU when loading the sterilizer.

5. **Chemical indicators were used only on the outside of instrument packages. Spore test envelopes were placed on top of sterilization loads. Only the temperature reached in the sterilizer was checked, and this was not routine.**

These breaches violate the infection control principle to: **Make objects safe for use.**

**WHAT:** Perform biological, chemical, and mechanical sterilization monitoring according to the recommendations from the Centers for Disease Control and Prevention (CDC)."\(^3, 6\)

**WHY:** Biological, chemical, and mechanical monitoring of sterilization procedures determine the effectiveness of the procedures and help ensure the safety of items used for patient treatment. Maintaining records of this monitoring documents the correct performance of sterilization procedures and provides information for any third-party inquiries.

While mechanical indicators cannot ensure sterilization, readings of time, temperature, and/or pressure that are clearly incorrect can be the first indication of a problem with the sterilization cycle.

Chemical indicators also can provide an early indication of a sterilization problem. Indicators on the outside of packages can show that the item has been exposed to the sterilization process. This allows for a quick visual identification of processed packages. Chemical indicators on the inside of packages show if the sterilizing agent has actually reached the instruments inside the package. While chemical indicators do not prove sterilization, they can identify certain equipment malfunctions and some procedural errors.

Biological indicators (BI - spore tests) can provide the main guarantee of sterilization by verifying the correct functioning of sterilization cycles.

**HOW:** Place a chemical indicator inside of each package, and if not visible place another chemical indicator on the outside of the package. Monitor each load with mechanical indicators (e.g., temperature, pressure, time). Monitor sterilizers at least weekly using a biological indicator (spore test) and a control from the same lot number. Maintain sterilization monitoring records according to state or local requirements."\(^3\)

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**In Case You Missed It:**

Have you let your patients know you care about their safety? OSAP members: You can still login here to get your Dental Infection Control Awareness Month (DICAM) patient poster, social media toolkits and additional resources!
Instrument Processing Recordkeeping:
The CDC recommendations are as follows:6
- “Written policies and procedures are available to ensure reusable patient care instruments and devices are cleaned and reprocessed appropriately before use on another patient.”
- “Policies, procedures, and manufacturer reprocessing instructions for reusable instruments and dental devices are available, ideally in or near the reprocessing area.”
- “Routine maintenance for sterilization equipment is:
  - performed according to manufacturer instructions;
  - documented by written maintenance records.”

Ultrasonic Cleaning:
Follow the manufacturers’ IFU for the ultrasonic cleaner and cleaning solution. Fill the ultrasonic cleaner tank to about one inch from the top with appropriate cleaning solution. Use a basket or cassette rack. Rinse loose debris from the instruments prior to placing into the ultrasonic cleaner. Clean until there is no visible soil on the instruments - usually 4-16 minutes. Cleaned instruments should be rinsed to remove residual microorganisms present in the cleaning solution. Units with a drain make tank clean-up safer, for this avoids having to dump the used solution into the sink risking splashing. The used solution becomes contaminated and should be changed at least daily and more often, if it becomes cloudy or visibly soiled. Rinse, disinfect (following the manufacturer IFU), rinse and dry the ultrasonic tank at the end of the day.

Instrument Washers/Disinfectors:
These units automatically clean and rinse instruments in baskets and cassettes. Some use extremely hot water for an appropriate time to achieve disinfection. Use the cleaning solution recommended by the manufacturer and follow their IFU. Household dishwashers are not recommended for cleaning medical/dental instruments, for they have not received assurances from the US Food and Drug Administration (FDA) for safety and effectiveness. Remember the bioburden (microorganisms, blood, saliva, dental materials) on improperly cleaned instruments can interfere with the sterilization process by insulting microorganisms in the debris. Always dry and then inspect instruments to ensure that all visible soil has been removed prior to packaging. Since the cleanliness of instruments cannot be detected by biological, chemical, or mechanical monitoring as can some other problems, it’s very important to perform instrument cleaning correctly.

Packaging:
Sterilization packaging materials are medical devices that need to be cleared by the FDA. Use of other non-FDA-cleared materials (e.g., plastic food bags, aluminum foil, closed metal containers) risk safety and effectiveness because they can prevent penetration of the sterilizing agent. Do not reuse sterilization packaging materials unless the manufacturer of an FDA-cleared product indicates this can be done. Instrument cassettes house instruments at chairside, and during the cleaning, packaging, sterilization, and storage steps of instrument processing. Cassettes keep the instruments in their functional sets, and contribute to a culture of safety by decreasing the direct handling of contaminated and sharp items.

Loading a Sterilizer:
Besides allowing for good contact with the sterilizing agent, proper loading of a steam sterilizer is important to remove air from the sterilizer chamber before the sterilization cycle begins. It’s more difficult to create a vacuum (remove the air) from within a tightly packed load. Sterilizing temperatures (e.g., 121°C and 134°C; or 250°F and 273°F) are reached in an autoclave when there is saturated steam (no air) in the chamber. The temperature of air pockets in the chamber may not reach sterilizing levels. Air is removed in autoclaves when:
- the entering steam forces air out through a drain (gravity displacement sterilizer).
- the air in the chamber is removed by a vacuum pump (vacuum sterilizer).
- the air is removed by repeated sequences of steam flushes and pressure pulses (positive steam flush/pressure pulse sterilizer).

A Bowie-Dick test available for tabletop sterilizers can determine proper air removal in vacuum type steam sterilizers.

If there is concern about a loading procedure used, place spore strips inside a few packages throughout the load to determine spore death during the cycle.

Biological Monitoring:
This procedure assesses the sterilization process directly by showing if highly resistant bacterial spores are killed. Spores on biological indicators are more resistant and are present in higher numbers (about one million per test) than the common microbial contaminants that may be present on equipment used for patient treatment. Thus, killing of these spores during the sterilization process indicates that potential pathogens on the items being processed have been killed.3 The best information from biological monitoring is achieved when BIs are placed in challenging positions in the sterilizer loads.

Follow sterilizer manufacturers’ IFU for this monitoring. If not available, BIs should be placed inside of a package and the package placed in a challenging position in the load (e.g., in the center of the load or wherever indicated by the sterilizer manufacturer). Besides the routine use of BIs (e.g., weekly) they also should be used:
- whenever a new type of packaging material, tray or cassette is used;
- after training new sterilization personnel;
- during initial uses of a new sterilizer;
- first run after repair of a sterilizer;
- after changes in instrument processing procedures.8

Further details on instrument processing in dentistry are available elsewhere.5,9
What’s Wrong With This Picture?
Can you identify the breach(es) in infection prevention and safety in this photo of instrument sterilization?

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Can you identify the actions in this short video that breach infection control or safety? Access the link below and challenge your knowledge.

https://youtu.be/fayCBwj9uiA

The Scenario:
Dental handpiece cleaning/sterilization

TEAM HUDDLE DISCUSSION GUIDE

1. Are your spore tests placed in appropriate positions inside your sterilizer?

2. Are you following the equipment manufacturers’ instructions for use when you clean and sterilize your contaminated instruments?

3. Do you have a written copy of the policies, procedures, and manufacturers’ reprocessing instructions for reusable instruments and dental devices?

4. Do you have written policies and procedures to ensure your contaminated instruments are cleaned, reprocessed, and monitored for sterilization properly?

Links to Resources


INFECTION CONTROL IN PRACTICE

**KEY TAKEAWAYS**

1. Instrument processing must be performed properly to help ensure patient safety.

2. Following manufacturers’ IFU for cleaning and sterilization equipment is key to successful instrument processing.

3. All three methods of sterilization monitoring must be used to help ensure the Safest Dental Visit™.

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**QUESTIONS FOR ONLINE QUIZ**

1. According to the CDC, what personal protective equipment (besides heavy utility gloves) should be used when processing contaminated instruments?
   a. Mask and protective clothing
   b. Mask and protective eyewear
   c. Protective eyewear and protective clothing
   d. Mask, protective eyewear, and protective clothing

2. What is the most important problem caused by overloading an autoclave?
   a. Dulling of sharps
   b. Excessive water spotting
   c. Low temperature air pockets
   d. Corrosion of stainless steel instruments

3. What does chemical monitoring indicate?
   a. The main guarantee of sterilization
   b. The earliest indication of a possible sterilizer problem
   c. The level of corrosive chemicals in the sterilizer chamber
   d. An early indication that a package has been processed through a sterilizer

4. What should be done to the tank of an ultrasonic cleaner at the end of the day?
   a. Rinse, disinfect, rinse, and dry
   b. Rinse and dry
   c. Disinfect and dry
   d. Dry

5. Where should spore tests be placed for routine sterilization monitoring?
   a. At the side of the load
   b. At the bottom of the load
   c. Taped to the outside of every package
   d. Where the sterilizer manufacturer indicates

6. According to the CDC what written instrument processing information should be maintained?
   a. Sterilizer maintenance records
   b. Brand, age, and original cost of all sterilizers used
   c. Daily list of patients on which sterilized instruments were used
   d. Name and address of the company that can supply a back-up sterilizer if needed

7. What type of sterilization monitoring provides the earliest indication of a possible problem with the sterilizer?
   a. Chemical
   b. Biological
   c. Ultrasonic
   d. Mechanical

8. How does bioburden remaining on improperly cleaned instruments interfere with steam sterilization?
   a. It causes the instruments to over heat
   b. Packaging material is compromised by sticking to the bioburden
   c. It insulates microorganisms in the bioburden from the steam
   d. It “soaks up” the steam which lowers the overall chamber temperature

9. What should be done if a previously sterilized instrument package is discovered to be torn or punctured before opening at chairside?
   a. Repackage and resterilize
   b. Reclean, repackage, and resterilize
   c. Disinfect the instruments and repackage
   d. Apply autoclave tape over the defect and resterilize

10. What does the Bowie-Dick test measure?
    a. Instrument corrosion
    b. Death of bacterial spores
    c. Air removal from the autoclave chamber
    d. Instrument cleaning efficiency of washers

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**Step 2:** OSAP will send you a purchase confirmation email and a separate email with the link to the online CE exam. Click on that link to access the exam.

**Step 3:** Complete the online exam. You have 2 attempts to pass with 7 out of 10 correct answers. When finished, you can print out or download your CE record of completion for your records. Your record of completion will also be emailed to you.

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TEAM HUDDLE HIGHLIGHTS

1. Can you identify two problems caused by improper loading of the autoclave?

2. Do you have written documents that describe your instrument processing procedures and sterilization equipment maintenance?

3. Do you know what each of the three methods of sterilization monitoring indicate?

Read on!