General Aspects of Instrument Processing

One of the most important duties of the Infection Control Coordinator (ICC) is to maintain procedures that ensure the instruments used to provide patient treatment have been properly prepared. The main goal of these procedures is to prevent the spread of potentially pathogenic microbes from contaminated instruments to patients. These procedures are sometimes just referred to as “instrument sterilization”, but sterilization is only one step in the collection of procedures needed to prepare contaminated instruments for safe reuse. The “Chain of Instrument Processing” (Figure 1) is similar to the “Chain of Infection”. When one link is broken the overall desired result is challenged.

LEARNING OBJECTIVES

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

• describe the general steps for instrument processing.
• describe the modes of disease transmission involving contaminated dental instruments.
• list resources for training on instrument processing procedures.
• describe the importance of having standard operating procedures and manufacturer instructions for instrument/equipment processing available to reprocessing personnel.
The Incident

One of Dr. Ember’s dental assistants came down with the flu (this was the real influenza – she had not yet received her annual flu shot). Dr. E called a temp agency and hired a dental assistant (Vernal). Vernal had been a part-time chairside assistant for about 12 years filling in at various offices. Her main duty in Dr. E’s office would be instrument processing, and she told Dr. E that she did have a general knowledge of the sterilizing procedures but would like to review the related standard operating procedures (SOPs) for the office.

Dr. E gave her a copy of their exposure control plan and said he would walk her through the sterilizing procedures. On her first day Dr. E showed her how they process instruments (e.g., how to operate the ultrasonic cleaner and steam sterilizer; where all the supplies are kept; how to lubricate the handpieces; how to package the instruments and use the chemical indicator strips; and where the sterile instruments are to be stored until needed).

The next day, after helping out at chairside for the first two patients, Vernal started processing instruments. She immediately had questions (e.g., How long should the ultrasonic cleaner run? How will I know when to change the cleaning solution? What solution should be used to wipe off the outside of the handpieces? Should the handpieces be lubricated before or after processing? Which instruments need to be soaked in the anti-corrosion solution? What’s the best way to load the sterilizer? Will the same sterilizer cycle be used for all the instruments and handpieces? Which of those wrapped instrument packages on the counter have been sterilized?). Vernal knew that Dr. E was very busy with patients, and she didn’t want to ask those questions in front of the patient. So she did what she thought was best and proceeded to process the instruments.

Potential Consequences

The exposure control plan for Dr. Ember’s office, which is required by the Occupational Safety and Health Administration (OSHA) as part of the Bloodborne Pathogens Standard, was little help to Vernal since instrument processing procedures are not a part of that standard. Instrument processing is a critical part of an infection control program, and it is key to providing safe visits for each patient. However, OSHA’s charge is to protect the workers of America rather than patients. Vernal’s situation is a prime example of the value of SOPs.

Instrument processing involves several steps, and the performance of each step determines the success of subsequent steps. For example if instruments are not properly cleaned, then the sterilizing agent (e.g., steam) may not penetrate through the debris to reach the surface of the instruments, which is needed to achieve sterilization. If packaging is not performed correctly, then the sterility of the instruments can easily be breached.
and instruments become recontaminated before being presented for treatment of a subsequent patient.

If the sterilization step is not performed correctly, or instructions for sterilizing specific devices are not followed, then the instruments may not be safe to use on patients. If sterilization monitoring is not performed correctly or not at all, how does one know if the instruments are safe to use or even if they have been processed through a sterilizer? If sterilized instrument packages are not handled and stored correctly, then the instruments can become recontaminated before being presented for use on a subsequent patient.

Instrument processing involves considerable details. For example it’s not enough to just know how to operate an ultrasonic cleaner. What type of cleaning solution will provide good cleaning without damaging the instruments? How full should the chamber be filled with the cleaning solution? What does degassing the cleaning solution mean and how do you do it? Why is it not good to place instruments on the bottom of the cleaning chamber? How many instruments can be cleaned at one time? Can handpieces be cleaned in an ultrasonic cleaner? Should the instruments be rinsed after ultrasonic cleaning? Why is it important to dry and inspect instruments prior to packaging? What does “correct packaging” mean?

Sterilizers are relatively easy to operate, but which cycle should be used for which instruments? What’s the best way to load a sterilizer to ensure the sterilizing agent has ready access to all items in the chamber? Why is it important that instruments are dry before removing from a steam sterilizer? What items should be processed through a dry heat sterilizer rather than a steam sterilizer? Can all handpieces be sterilized?

Thus, understanding the details of instrument processing is an important key to sterilization success.

Note: Answers to the questions posed above will be presented in later issues of Infection Control In Practice this year.

Since the components of the OSHA-required written exposure control plan do not include specific information on instrument processing, SOPs in this area are needed. Manufacturer’s Instructions for Use (IFUs) on how to operate and maintain handpieces, the ultrasonic cleaner, and the sterilizer would have helped Vernal better understand her tasks.

Some Related Recommendations:¹

- Reusable critical and semi-critical dental items and devices are cleaned and heat-sterilized according to manufacturer instructions between patient use. If the manufacturer does not provide such instructions, the device may not be suitable for multi-patient use.
- Have manufacturer instructions for reprocessing reusable dental instruments/equipment readily available, ideally in or near the reprocessing area.
- Assign responsibility for reprocessing of dental equipment to dental health care personnel (DHCP) with appropriate training.

Prevention

In addition to receiving the bloodborne pathogens training required by OSHA¹ and recommended by the Centers for Disease Control and Prevention (CDC),² dental health care personnel responsible for instrument processing need training on the reprocessing steps involved.

This information is provided by coursework in accredited dental, dental assisting, and dental hygiene educational institutions. It can also be obtained in some continuing education courses and from several opportunities offered by OSAP.³⁴ For example:

- the annual Dental Infection Control Boot Camp™;
- the annual Dental Infection Control Conference;
- special webinars;
- Written training – OSHA and CDC Guidelines Interact Training System (2017), From Policy to Practice: OSAP’s Guide to the CDC Guidelines (2016);
- on-line training - From Policy to Practice: OSAP’s Interactive Guide to the CDC Guidelines;
- charts and checklists;

Equipment manufacturers have training protocol on how to use and maintain their products. The manufacturers provide instructions for decontamination (Instructions for Use). The CDC has information on instrument processing including a checklist for related procedures.¹²⁷⁸ There are also textbooks on infection control that describe dental instrument processing in detail.⁹¹⁰

Regular update training is very important for it ensures knowledge of any changes in equipment, supplies, or regulations. This training also serves to “reboot” infection prevention, to help fight complacency, and to reassure that what is being done is still correct.
The overall goal of instrument processing is to ensure that contaminated instruments will be made safe to use on a subsequent patient. Each step in the process (Figure 1, Page 1) must be performed precisely or the desired end result will not be achieved.

**Three basic modes of disease transmission involving contaminated instruments.**[^9] ^[10]

1. **Patient-to-patient (Primary mode)**
   Microbes from a patient’s mouth that contaminate instruments are not removed or killed before the instruments are used on another patient.

2. **Dental personnel-to-patient (Secondary mode)**
   Microbes from the hands or respiratory droplets of dental personnel contaminate unpackaged instruments after the sterilization step but before presenting at point of use – e.g., chairside.

3. **Environment-to-patient (Secondary mode)**
   Microbes from the environment contaminate the instruments after the sterilization step but before presenting or unpackaging at point of use – e.g., chairside.

**Two other considerations when processing instruments.**

1. **Preventing occupational exposure of personnel processing instruments:**
   - from sharps injuries.  
     *Handle sharps carefully.*
   - from direct contact of the broken skin with contaminated instruments.  
     *Wear heavy utility gloves.*
   - from splashing of contaminated fluids or cleaning chemicals in the eyes or onto mucous membranes or skin.  
     *Wear protective eyewear, protective clothing, and a mask during instrument processing.*
   - from burns.  
     *Wear heat resistant gloves when loading/unloading sterilizers.*

   The CDC recommends that training and equipment be available to ensure that DHCP wear appropriate personal protective equipment (e.g., heavy duty utility gloves, protective clothing, masks, eye protection) to prevent exposure to infectious agents or chemicals.

2. **Keep instrument damage to a minimum:**
   - use corrosion-reducing chemicals when appropriate,  
     *(e.g., when carbon steel items are processed through steam sterilizers).*
   - consider non-corrosive forms of heat sterilization when appropriate,  
     *(e.g., dry heat or unsaturated chemical vapor sterilizers).*
   - lubricate items following manufacturer instructions,  
     *(e.g., certain handpieces).*
What’s Wrong With This Picture?

Can you identify the breach(s) in infection prevention and safety procedures in this photo taken just before a treatment procedure is about to begin? Check your answer below.

Answer: The operator’s facemask and protective eyewear should be put on properly before donning gloves. The operator’s exam gloves have become contaminated by grasping the radiograph to show the patient. The operator’s exposed forearms prior to performing a clinical procedure that could potentially cause spatter.

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If you need support in building the case for your attendance you can access OSAP’s justification toolkit at: http://www.osap.org/?page=AnnConfValue2017

For registration details visit:
http://www.osap.org/?page=2017AnnualConfMain
TEAM HUDDLE DISCUSSION GUIDE

1. Do you have SOPs for your instrument/equipment processing procedures, and are they updated when changes in equipment or procedures occur?

2. Are the current SOPs for instrument processing being followed?

3. Are manufacturer reprocessing instructions posted in the reprocessing area or otherwise readily available?

4. Are your instrument processing personnel appropriately trained?

Links to Resources


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QUESTIONS FOR ONLINE QUIZ

1. What is the primary mode of disease transmission from contaminated dental instruments?
   a. Patient-to-patient
   b. Environment-to-patient
   c. Patient-to-dental personnel
   d. Dental personnel-to-patient

2. What part of dental infection control is not covered by OSHA standards?
   a. Hand hygiene
   b. Instrument processing
   c. Use of personal protective equipment
   d. Hepatitis B immunization of dental personnel

3. What step in the “chain of instrument processing” follows holding, cleaning, corrosion control and lubrication?
   a. Sterilization monitoring
   b. Sterilization
   c. Packaging
   d. Storage

4. What is the main goal of instrument processing?
   a. To sterilize instruments
   b. To clean instruments for reuse
   c. To prevent heat damage of the instruments
   d. To provide instruments that are safe to use on a subsequent patient

5. What sterilizer types provide a non-corrosive environment?
   a. Steam and dry heat
   b. Dry heat and unsaturated chemical vapor
   c. Steam and unsaturated chemical vapor
   d. Steam and ethylene oxide gas

6. Why must instruments be packaged prior to sterilization?
   a. To prevent rusting of the instruments
   b. To prevent recontamination after sterilization
   c. To reduce the normal sterilization time in half
   d. To keep the instruments from directly contacting the sterilizer chamber

7. What training would be least helpful in learning about dental instrument processing?
   a. Attending OSAP’s Boot Camp
   b. Attending OSAP’s Annual Conference
   c. Studying OSHA’s Bloodborne Pathogens Standard
   d. Reading infection control textbooks

8. What items are recommended by the CDC to be readily available to personnel performing instrument processing?
   a. Appropriate patient treatment records
   b. Safety data sheets for the clinical surface disinfectants
   c. Related hepatitis B vaccination declination statements
   d. Written policies and procedures for instrument processing

9. What items are recommended by the CDC to be readily available to personnel performing instrument processing?
   a. Emergency exit routes from the reprocessing work area
   b. Reprocessing instructions from manufacturers of the instruments/equipment
   c. Medical records of patients on which the instruments being reprocessed were used
   d. Written opinions from health care professionals confirming hepatitis B vaccination of all office personnel

10. Who does the CDC recommend should be reprocessing dental instruments?
    a. Dental hygienists
    b. The infection control coordinator
    c. Dental personnel with appropriate training
    d. Dental assistants with at least one year of related experience

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KEY TAKEAWAYS

1. Proper instrument processing plays a key role in providing the Safest Dental Visit™.
2. Each step in the “chain of instrument processing” must be completed correctly or the desired end result (patient protection) may not be achieved.
3. Written standard operating procedures and manufacturer instructions for instrument/equipment reprocessing must be followed to ensure the desired result of providing patient safety.
4. Instrument processing personnel need to ensure their training is current.
TEAMS HUDDLE HIGHLIGHTS

1. When did you last evaluate your instrument processing procedures?
2. Is your training on instrument processing current?
3. Are you aware of the importance of each step in the “chain of instrument processing”?
4. Do you have written standard operating procedures and manufacturer instructions for instrument processing and are they followed?

Read on!